VIT | Vidyalankar Institute of Technology
Accredited A+ by NAAC

ISSN : 2278 - 1722

Applied Engineering and Technologies

VOLUME - 10, ISSUE 1

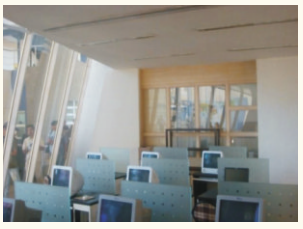
June - 2023

CONTENTS

Paper Id	Title	Page No.
AET 001	Automated reconciliation System of GSTR-2A & GSTR-2B	1
AET 002	Online Voting System using Blockchain	4
AET 003	Knockout: A Competitive Programming environment using Socket.io	11
AET 004	Flight Fare Prediction using Machine Learning	19
AET 005	Apparel Ecommerce App with Recommendations of products having similar image using deep learning	23
AET 006	Web 3.0 Game Using Blockchain	33
AET 007	Disease Prediction and Doctor Appointment System, 2023	38
AET 008	Analyzing Twitter Feeds: Real-time Sentiment Analysis	44
AET 009	Face Mask Detection Using CNN, 2023	50
AET 010	Movie Recommendation System Using Feature Engineering Through NLP	56
AET 011	Workify – Remote Work Tracker	61
AET 012	AttendEase – A GPS Based Attendance System For Teachers	64
AET 013	Vikalp app – An Android Application For Student Career Choices	70
AET 014	Real-Time Sign Language Detection	75
AET 015	Empowering Global E-Learning with EduChain: A Blockchain-based Marketplace for Education and Social Impact	79

Continue on back cover page...











Published by

Vidyalankar Institute of Technoogy

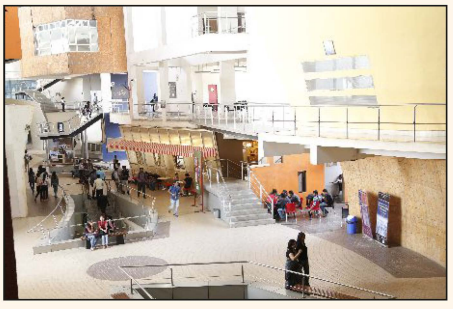
Wadala, Mumbai, Maharashtra

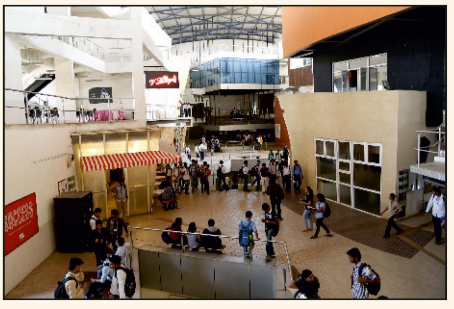
www.vit.edu.in

VIT

Vidyalankar Institute of Technology







About VIT

Vidyalankar - A Sanskrit word which reveres 'Vidya' (Knowledge) as a precious 'Alankar' (Ornament), the essence being that knowledge is the true ornament of a progressive mind. A trusted and prestigious education specialist, the Vidyalankar Group of Educational Institutes continues to spread the radiance and the bright sparkle of knowledge and education far and wide.

Vidyalankar Institute of Technology (VIT) is an Engineering Degree and Management College, approved by AICTE and affiliated to the University of Mumbai. Incepted in 1999, awarded an 'A' Grade by the Govt. of Maharashtra. Institute has also been accredited with A+ grade by NAAC and our programs are accredited by National Board of Accreditation.Recently UGC had granted an "Autonomous" status to the institute. The Institute constantly strive for generating quality technocrats.

Inspired by the philosophy of “Student Delight”, every year VIT welcomes and nurtures around 660 engineering talents at the undergraduate level in Electronics, Electronics and Telecommunication, Information Technology, Computer and Biomedical domains, around 120 Management students and makes them industry ready. Around 18 graduate engineers hone their skills, expand their knowledge base and orient themselves to R&D while achieving post-graduate qualifications. The institute also has a Ph.D. centre in Computer Engineering

EDITORIAL BOARD

Editor in Chief
Principal VIT

Editorial Team

- Dr. Vidya Chitre
- Dr. Akshatha Bhat
- Dr. Sanjeev Dwivedi
- Prof. Akhil Masurkar
- Prof. Manoj Suryavanshi
- Prof. Rajashree Soman
- Prof. Satendra Mane
- Prof. Ameya Revandkar
- Prof. Kanchan Dhuri
- Prof. Amit Nerurkar
- Prof. Amit Aylani
- Prof. Bhavika Khatri
- Prof. Geetha Narayanan

Foreword

Dear Readers,

The goal of the technical journal "Applied Engineering and Technologies" published by Vidyalankar Institute of Technology is to provide a platform for participants with academic, industrial, and research backgrounds to exchange ideas and to effectively present and share their research projects. We are pleased to release the technical journal's tenth edition. VIT has always encouraged its faculty and students to not just excel in the dissemination of current knowledge, but to also reach out to newer horizons and explore technology in a broader context

The journal's theme centres on applications in the fields of Bio-Medical engineering, Information Technology, Computers, Electronics, and Electronics and Communication. This year's issue includes 46 articles prepared by student groups which have been reviewed by editorial team comprising highly experienced faculty. This issue is published to motivate students towards research and encourage them to present their findings through papers

The target readers are undergraduate and postgraduate students and practicing upcoming professionals from industry and academia. This will further serve to facilitate their interaction and intellectual exchange of ideas with academia, industry and research personnel and help them to chisel and hone their talents to become better professionals.

Technology standards within the industry are evolving rapidly as new innovations continue to emerge over the years. At the Institute, formal research is highly encouraged among faculty as well as students, as it empowers them to enrich their corpus of knowledge and enables them to become better informed professionals. This initiative takes the Institute one more step forward in realizing the dream of being an innovative research-based educational center, in alignment with the Vision and Mission of the institute. The success of this initiative depends on your response. We would appreciate your feedback.

Editorial Team

AET 001

Automated Reconciliation System of GSTR-2A and GSTR-2B

Aniket Matondkar
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
Aniket.matondkar@vit.edu.in

Shravan Chenna
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
shravan.chenna@vit.edu.in

Rutvik Sarkate
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
Ruvik.sarkate@vit.edu.in

Dr. Sachin Bojewar
Head of Department
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
sachin.bojewar@vit.edu.in

Mansi Jaiswal
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
Mansi.jaiswal@vit.edu.in

***Abstract*— The introduction of the Goods and Services Tax (GST) in India has had a huge impact on how businesses conduct themselves and adhere to tax laws. Reconciling Input Tax Credit (ITC) claims with the data present in the GSTR-2A and GSTR-2B forms is one of the crucial elements of GST compliance. For small and medium-sized businesses (SMEs), the existing manual reconciliation procedure is time-consuming, prone to mistakes, and frequently difficult. The GSTR-2A and 2B reconciler is an automated system that this research report suggests be used to speed up reconciliation and lower mistake rates. The suggested remedy pulls information from GSTR-2A and GSTR-2B, compares it, verifies the information, and produces a reconciliation report. The proposed approach may make it easier for enterprises to comply with GST requirements, increase accuracy, save time and effort, and let them concentrate on their main business functions. A potential method for businesses, particularly SMEs, to easily and successfully comply with GST laws is the GSTR-2A and 2B reconciler.**

Keywords— GST, Reconciliation.

I. INTRODUCTION

The Goods and Services Tax (GST) was implemented in India in 2017 with the goal of unifying the market and streamlining the tax system. Even though the introduction of GST has simplified the tax system, businesses, particularly small and medium-sized enterprises (SMEs), still have trouble adhering to its regulations.

Complying with GST regulations involves filing several returns, one of which is the reconciliation of GSTR-2A and GSTR-2B. GSTR-2A is an auto-generated return that contains the details of all the inward supplies of goods and services that are received by the taxpayer from suppliers. On the other hand, GSTR-2B is generated using data from GSTR-1 and GSTR-5 filed by the suppliers. Reconciling GSTR-2A and GSTR-2B is crucial to ensure that the Input Tax Credit (ITC) claimed by the taxpayer matches the details provided by the suppliers.

The current reconciliation process is manual, time-consuming, and prone to errors. The manual process involves comparing data from GSTR-2A and GSTR-2B line by line, identifying mismatches, and resolving them. This process is often a challenge for businesses, especially SMEs, which may not have the resources or expertise to handle the complexity of GST compliance.

Therefore, there is a need for an automated solution that streamlines the reconciliation process, reduces errors, and saves time for businesses. In this research paper, we propose a web-based application called GSTR-2A and 2B reconciler, which aims to automate the reconciliation process and provide an efficient and effective solution for businesses.

The proposed solution extracts data from GSTR-2A and GSTR-2B, matches it, validates the data, and generates a reconciliation report. The solution's user-friendly interface is designed to reduce the learning curve for users and simplify the reconciliation process for businesses. The proposed solution has the potential to help businesses comply with GST regulations efficiently and effectively, reducing the burden of compliance for SMEs.

II. PROBLEM DEFINITION

The Goods and Services Tax (GST) is a comprehensive indirect tax system that has been implemented in India to replace multiple taxes levied by the central and state governments. With the implementation of GST, businesses are required to file their returns on a regular basis. However, the manual process of reconciling invoices and filing for GST can be a tedious and error-prone process, leading to financial penalties for businesses. The problem that our project aims to address is the need for businesses to comply with GST regulations while streamlining the filing process to save time and resources.

III. LITERATURE REVIEW

1. Paper name: Efficient data Reconciliation.

   Author: Munir Cochinwala, Verghese Kurien, Gail Lalk and Dennis Shasha.

   Description: The research focuses on reducing the complexity of the matching process for bigger datasets by applying a variety of mathematical and statistical approaches to contribute to the data reconciliation process. This decrease in complexity is attained by deleting from the dataset a few values that are thought to be dated.

2. Paper name: Data reconciliation - progress and challenges.

   Authors: Cameron M. Crowe.

   Description: Data reconciliation and the myriad problems it raises are the subjects of the study. Data reconciliation, according to the study, is a numerical technique used to modify measurements to comply with conservation laws and other restrictions. Finding major mistakes, spotting deviations from steady state, and calculating the variance structure of the data are difficult tasks. Matrix projection and unconstrained minimization are techniques for data reconciliation. Redundancy and observability are crucial ideas in process data reconciliation. Applications of data reconciliation have been made in mineral processing and chemical extraction facilities.

3. Paper Name: Performance evaluation on data reconciliation algorithm in distributed system.

   Authors: Xin Wang, Hongming Zhu, Qin Liu, Xiaowen Yang, Jiakai Xiao.

   Description: In this study, three Hadoop-based distributed systems are used to assess the performance of three data reconciliation algorithms: the basic Bloom filter, the counting Bloom filter, and the invertible Bloom filter. The findings demonstrate that large-scale distributed systems may enhance performance when handling enormous amounts of data, with Inner Join having the greatest performance followed by the conventional Bloom filter. Both a small and a big Hadoop cluster were used to conduct the experiment. Runtime waves are irregular due to the large-scale dispersed environment. Although the inner join algorithm runs the fastest, bloom filter algorithms have high query accuracy. The two expanded algorithms do not perform as well as SBF. Performance on big amounts of data is improved by a distributed system with adequate nodes.

IV. SYSTEM ARCHITECTURE

A. Software Requirements

1. Next.js - Next.js is a React framework that allows you to build supercharged, SEO-friendly, and extremely user-facing static websites and web applications using the React framework.
2. Flask - Python-based Flask is a microweb framework. Due to the fact that it doesn't require any specific tools or libraries, it is categorized as a micro-framework. It lacks any components where pre-existing third-party libraries already provide common functionality, such as a database abstraction layer, form validation, or other components. However, Flask allows for extensions that can be used to add application features just like they were built into the core of Flask.
3. MongoDB - MongoDB is a popular open-source document-oriented NoSQL database that uses a flexible JSON-like document model. It was developed by MongoDB Inc. and released in 2009.
4. JavaScript - JavaScript is a scripting language that enables you to create dynamically updating content, control multimedia, animate images, etc.
5. HTML - Hyper Text Markup Language, its basic function is to create web pages. It is the standard markup language for documents to be displayed in a web browser. Technologies like Cascading Style Sheets and scripting languages like JavaScript can also be used alongside HTML.
6. CSS - Cascading Style Sheets, used to describe the presentation of a document written in a markup language such as HTML.

B. System Design

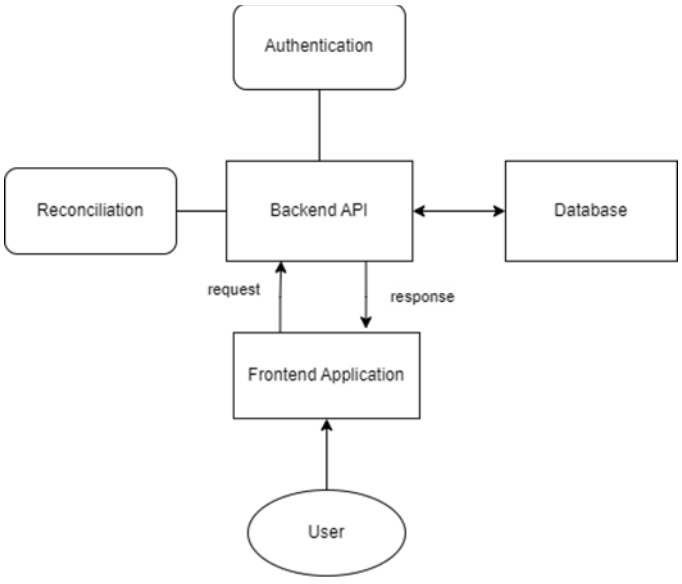


Fig. 1 - System Architecture Diagram

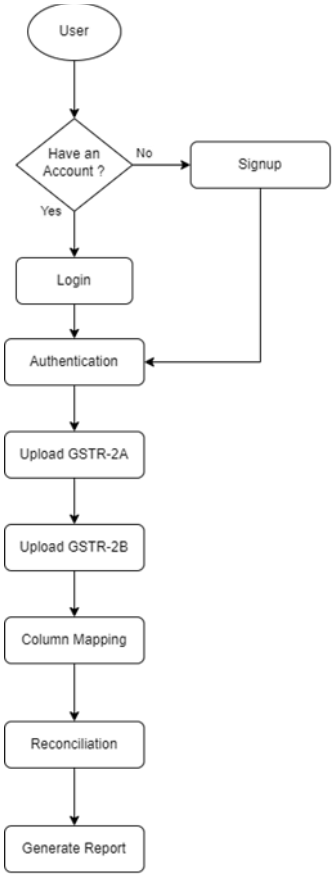


Fig. 2 – System Flowchart

V. CONCLUSION

Businesses must reconcile GSTR-2A and GSTR-2B in order to guarantee the correctness of Input Tax Credit (ITC) claims. The existing manual reconciliation procedure, however, is time-consuming, prone to mistakes, and frequently difficult for SMEs. As a result, an automated solution, such as the GSTR-2A and 2B reconciler under consideration, may greatly simplify reconciliation, lower mistakes, and save businesses time.

Particularly for SMEs that might lack the resources or knowledge to manage the complexities of GST compliance, the suggested approach has the potential to ease the burden of complying with GST requirements on enterprises. By reducing the need for manual reconciliation, the solution may increase accuracy, save time and effort, and let organizations concentrate on their core activities.

REFERENCES

[1] Munir Cochinwala, Verghese Kurien, Gail Lalk, and Dennis Shasha, "Efficient data Reconciliation" Elsevier, Information Sciences, Volume 137, Issues 1–4, September 2001, Pages 1-15.

[2] Cameron M. Crowe. "Data reconciliation - progress and challenges" April 1996, Journal of Process Control 6(2-3):89-98.

[3] Xin Wang, Hongming Zhu, Qin Liu, Xiaowen Yang, Jiakai Xiao "Performance evaluation on data reconciliation algorithm in distributed system", 2012 IEEE 2nd International Conference on Cloud Computing and Intelligence Systems, 30 October 2012 - 01 November 2012.

[4] Sarthak Sengupta, Apoorva Dhuria, Tina Munjal "A Study on Goods and Services Tax (GST)", May 2020 Conference: InterCollege Student Seminar 2020, Ghaziabad Management Association.

[5] Kumar, Mohan. R (2019). Impact of goods and services tax on Indian economy. International Journal for Research in Applied Science & Engineering Technology, 7(V).

[6] Jain, Vasundhara & Aggarwal, Reema. (2017). Impact of GST on Indian economy- Opportunities and challenges. Abhinav National Monthly Refereed Journal of Research in Commerce & Management, 6(10).

[7] Khurana, A. & Sharma, A.. (2016). Goods and services tax in India –A positive return for indirect tax system. International Journal of Advanced Research, 4(3), 500-505.

[8] Khurana, A. & Sharma, A.. (2016). Goods and services tax in India –A positive return for indirect tax system. International Journal of Advanced Research, 4(3), 500-505.

[9] Taqvi, S. M. A., Srivastava, A. K., & Srivastava, R. K. (2013). Challenges and opportunities of goods and service tax (GST) in India. Indian Journal of Applied Research, 3 (5), 413 - 415.

AET 002

Online Voting System using Blockchain

Pranav Bhat
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
pranav.bhat@vit.edu.in

Mukesh Singh
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
mukesh.singh@vit.edu.in

Rayyan Shaikh
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
rayyan.shaikh@vit.edu.in

Umesh Kulkarni
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
umesh.kulkarni@vit.edu.in

Abstract— Digital voting offers numerous advantages to the electoral system, such as enhanced voter participation, better access, and reduced expenses. Nonetheless, maintaining the voting process's security and trustworthiness presents difficulties. The advent of blockchain technology offers substantial potential in addressing these concerns.

A blockchain-based digital voting system employs a decentralized ledger for storing voter data. This method guarantees accurate and tamper-resistant documentation of every vote, since once a ballot is incorporated into the blockchain, it cannot be altered or deleted. The decentralized nature of the blockchain prevents any single entity from dominating the system, thereby enhancing its safety and openness.

Besides preserving voting information, the system intends to employ smart contracts for streamlining the voting process and adhering to electoral regulations. Within the realm of digital voting, smart contracts can serve the purpose of recognizing qualified voters, managing voting privileges, and tallying votes.

The suggested approach offers a safe, transparent, and effective means of voting. By utilizing blockchain technology, the system bolsters trust and assurance in the voting procedure, as its integrity is verified by its consensus mechanism and lack of tampering. Moreover, the proposed system facilitates a simple and convenient way for voters to engage in the electoral process, as they can cast their votes from any location with internet access.

Nonetheless, blockchain-based online voting encounters challenges, including safeguarding voter anonymity and combating money laundering. Further research and development must be undertaken to tackle these obstacles and guarantee the extensive adoption of online voting systems utilizing blockchain technology.

Keywords—electronic voting; security; block chain-based electronic voting; privacy; block chain technology; voting; trust

I. INTRODUCTION

A considerable amount of research has been conducted on e-voting systems that enable voters to conveniently cast their votes via mobile phones, computers, or other electronic devices. However, widespread adoption has been hindered due to security risks/concerns that could compromise the integrity of these systems. In this article, we discuss the utilization of blockchain for electronic voting, which enhances security and stability while providing anonymity, transparency, and robustness for voters. Traditional voting or paper-based voting can foster trust that a majority will be rightfully elected, thus fostering democracy and the freedom to choose in elections and governance.

The presence of a biased central authority (election commission) could potentially result in incorrect choices that are hard to rectify using existing methods. Decentralized networks can be employed as electronic voting mechanisms to circumvent this centralized control.

Blockchain technology facilitates the decentralization of digital or electronic voting. Lately, distributed data technologies like blockchain have been employed in designing e-voting systems, primarily due to their end-to-end verification capabilities. Blockchain presents a compelling option for electronic voting, thanks to its attributes such as decentralization, non-repudiation, and security safeguards.

Initially employed for voting and public polling, a blockchain is an expanding series of blocks linked together by cryptographic connections. Each block holds hashes, timestamps, and data alterations from the preceding block. Blockchains are inherently designed to

resist data tampering. The realm of voting represents the next frontier for blockchain technology, as researchers in the field aim to leverage its transparency, privacy, and non-repudiation qualities for voting applications.

Recent endeavors to secure and regulate elections through blockchain technology have been validated by the integration of blockchain into e-voting applications. Blockchain is a digital platform for managing digital assets, comprising an ever-growing series of records known as blocks that are interconnected and safeguarded using cryptography. Primarily, blockchain is utilized in cryptocurrency transactions, especially Bitcoin. Nevertheless, due to the challenges in altering transactions, blocks, or any distributed data, blockchains have found broader applications beyond cryptocurrencies.

II. BACKGROUND AND RELATED WORK

A. Online Voting Sytems

The evolution and progression of online voting showcase the convenience, effectiveness, and security associated with casting votes. These systems have advanced from basic electronic voting devices to web-based platforms, enabling voters to participate remotely. Online voting offers benefits such as increased voter accessibility, lowered expenses related to voting, and the possibility of swifter and more precise vote tallying. Nonetheless, drawbacks exist, including the risk of creating a digital gap where some voters lack equal access to technology or internet connections, as well as concerns about obligating voters to participate in remote voting scenarios.

Numerous security concerns and challenges are associated with online voting, encompassing risks such as hacking, denial-of-service assaults, and a variety of voting fraud schemes.

Preserving the trustworthiness of the voting procedure and safeguarding voter confidentiality are crucial aspects to consider while developing and deploying digital voting systems.

B. Blockchain Technology

Blockchain technology, a decentralized and distributed digital ledger, facilitates secure and transparent record maintenance across numerous nodes within a network. It first emerged as the foundational technology supporting Bitcoin, a digital currency.

Blockchain's primary characteristics, such as decentralization, unchangeability, and openness, render it an attractive choice for a range of applications beyond digital currencies. These include supply chain administration, digital identity authentication, and secure voting platforms.

C. *Related Work*

Substantial research has been conducted on digital voting systems and blockchain technology, examining the potential advantages and obstacles linked to each. Despite this, the current literature has gaps that this paper strives to fill.

Numerous research works have investigated the security and privacy facets of digital voting systems, suggesting different strategies to minimize risks and guarantee the electoral process's integrity. Nevertheless, incorporating blockchain technology into online voting systems is an area that calls for additional examination.

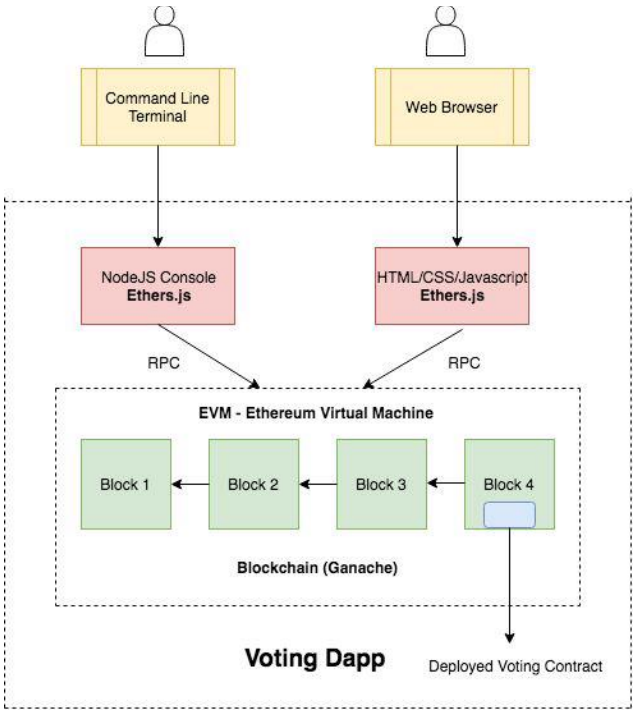
Likewise, although the potential uses of blockchain technology across diverse fields have been extensively debated, its application within the realm of digital voting systems is still a nascent area. This paper aims to enrich the continuing conversation by assessing the viability and potential benefits of deploying a blockchain-driven online voting system.

III. PROPOSED SYSTEM

In designing our architecture, we intend to develop a system that doesn't fully supplant the existing voting framework but rather incorporates itself into the current system in use. This approach is chosen because most people are acquainted with the present system, and introducing an entirely new system could potentially generate confusion and a lack of interest.

3.1 System Architecture

The system architecture is depicted in Figure 1. The details of each block are outlined in this section.



Our design begins with the registration process, which serves to identify voters and maintain system security. Confirming an individual's identity to prevent fraudulent activities is particularly crucial in a voting system where every vote matters. To enable users to register for voting, our service necessitates the utilization of authentication devices and a valid identification number to verify the

user's registration and eligibility to vote. Subsequently, voters receive a unique hash address to use for casting their votes. Each hash provides ether and permits individuals to vote one time.

On election day, voters head to the polling stations, undergo the verification procedure, and cast their votes using their assigned address. Once finished, they are logged out. Additionally, voters are provided with updates regarding the vote's progress.

3.2 Requirement Analysis

This section presents the implementation specifics. The complete system is split into two subsystems: a registration system and a voting system.

Registration System:

We are creating a voting registration system with an HTML/CSS front-end and SQL back-end, which houses the users' personal information previously recorded. This can be likened to an Aadhaar database, for instance. A biometric device is utilized for validation purposes. If the user is authenticated, they are assigned a hash code/address that serves as a login credential for accessing the voting machine.

Voting System:

The voting process can replace Electronic Voting Machines (EVM). It involves a decentralized application with a Bootstrap or HTML interface and a blockchain backend. Smart contracts are written in a programming language, specifying the names of candidates along with candidate tokens in the smart contract. Smart contracts represent the final vote. Any modification in the blockchain is considered a transaction. Transactions are utilized to change or update the state stored on the Ethereum network, and each transaction involves a fee, also known as gas fees, that can be paid using Ethereum currency known as Ether. For this project, Ganache-CLI is being used, which is a private network where transactions are confirmed nearly instantly. MetaMask serves as a bridge between the current browser and future WAN (Web3.0), enabling Ethereum DApps to run directly in the browser without running a complete Ethereum node.

Operating System	Windows 11
Programming Language	Typescript, HTML, CSS, JavaScript, Bootstrap
Database	MySQL

IV. LITERATURE SURVEY

A. Votereum: An Ethereum-based E-voting system:

In their 2019 paper "Votereum: An Ethereum-based E-voting system," Khoi Cao-Minh, Linh Vo-Cao-Thuy, Chuong Dang-Le-Bao, and Tuan A. Nguyen, from the University of Information Technology Vietnam National University HCMC, Vietnam, examine the prerequisites and put forward an electronic voting system dubbed Votereum, that employs blockchain technology. The proposed system is bolstered by the Ethereum platform, with one server overseeing the complete system and another handling all blockchain-associated demands.

B. Online Voting: Voting System Using Block chain:

Vaibhav Anasune, Pradeep Choudhari, Madhura Kelapure, and Pranali Shirke Prasad Halgaonkar, 2019, "Online Voting: Voting System Using B-chain," International Journal of Engineering and Advanced Technology (IJEAT), Vol. 9, Issue 1, pp. 6-10.

The article "Online Voting: Voting System Using Blockchain" by Vaibhav Anasune, Pradeep Choudhari, Madhura Kelapure, and Pranali Shirke Prasad Halgaonkar, published in the International Journal of Engineering and Advanced Technology (IJEAT) in 2019, offers an analysis of various techniques utilized in current voting systems and proposes a novel system that exploits blockchain technology to overcome existing difficulties and drawbacks. The suggested system uses a combination of public and private blockchains to ensure data security and voter anonymity. The paper intends to assist in the development of a system that can confront present and future challenges in online voting.

C. Decentralized Voting Platform Based on Ethereum Blockchain:

In their 2018 paper "Decentralized Voting Platform Based on Ethereum Blockchain," David Khoury, Elie F. Kfoury, Ali Kassem, and Hamza Harb from the Department of Computer Science, American University of Science and Technology, Lebanon, present an innovative approach to develop a decentralized trustless voting platform that relies on blockchain technology to address trust issues. The proposed system guarantees data integrity and transparency while enforcing one vote per mobile phone number for each poll with assured privacy. To achieve this, the Ethereum Virtual Machine (EVM) serves as the blockchain runtime environment.

D. Survey on Blockchain Based E-Voting Recording System Design:

In the paper "Survey on Blockchain Based E-Voting Recording System Design" by G Bhavani in 2018, the author suggests the incorporation of blockchain technology to distribute databases in e-voting systems in order to mitigate potential sources of cheating and database manipulation. The AES algorithm is employed to encrypt data collected from fingerprint sensors. The

study centers on recording voting outcomes using the blockchain algorithm from all election locations.

E. Blockchain-Based E-Voting System:

In the 2018 paper "Blockchain-Based E-Voting System" by Gunnlaugur K. Hreiðarsson and Friðrik Þ. Hjálmarsson from the School of Computer Science at Reykjavik University, Iceland, the authors explore the potential of distributed ledger technologies by presenting a case study on the election process and implementing a blockchain-based application to enhance security and decrease costs associated with hosting a nationwide election.

F. Blockchain Based E–Voting Recording System Design:

In their 2017 paper "Blockchain Based E–Voting Recording System Design," Rifa Hanifatunnisa and Budi Rahardjo propose a recording system for e–voting that utilizes blockchain technology. The system's security is enhanced by recording the voting results of each polling station using hash values that are linked to each other, while digital signatures make the system more reliable. Unlike the Bitcoin system, where mining is required, the proposed sequence for the blockchain creation process in this system takes into account the fact that in an electoral system, the voter data and numbers are clear, and voters are not allowed to select more than once. This sequence ensures that all nodes are legally connected and can avoid collisions during transportation, thereby enhancing the system's security.

Literature Summary:

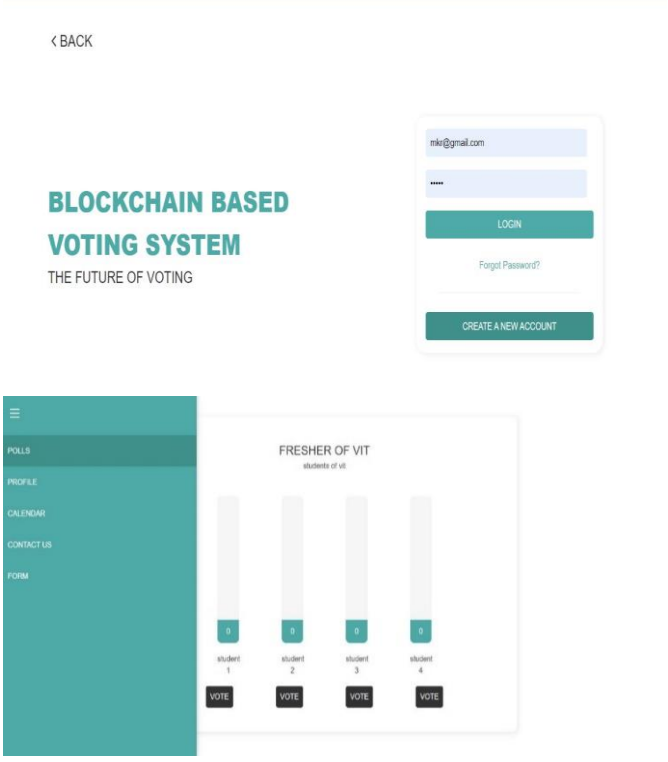
Sr. No.	Name of paper	Technique
1.	Votereum: An Ethereum-based. E-voting system	1. External Personal Account (EOA) 2. Contract Account 3. Votereum
2.	Online Voting: Voting System Using Blockchain	1.Cryptographic verification 2.Homomorphic Encryption Technique
3.	Decentralized Voting Platform Based on Ethereum Blockchain	1.HTML5 web-app compiled using Apache. Cordova 2.Ethereum Network
4.	Survey on Blockchain Based E-Voting Recording System Design	1.AES algorithm
5.	Blockchain-Based E-Voting System	1.Quorum 2.Geth: Go-Ethereum
6.	Blockchain Based E-Voting Recording System Design	1.ECDSA (Elliptic Curve Digital Signature Algorithm) 2. SHA-256 algorithm

Implementation:

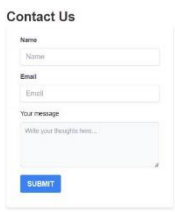
G. Implementation and Evaluation

To begin implementing the proposed system, it is necessary to have Node.js, Truffle, and MySQL installed on your system. The system's execution was tested in a controlled environment using a web-based application as the front-end interface, providing a seamless user experience. The application was developed with TypeScript in Visual Studio Code and hosted using Ganache, which also manages the server-side container that stores the application's EJBs and data source.

The MySQL-powered backend database contains data that is manually input by an administrator, such as voter details, constituency information, and information about the participating political parties. Figure 3 shows a screenshot of the application, which includes an admin feature that allows for the viewing of lists of eligible voters.

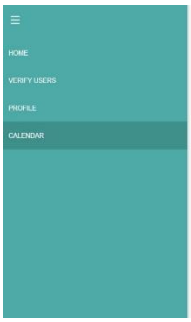


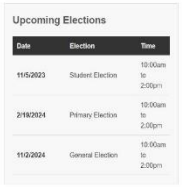






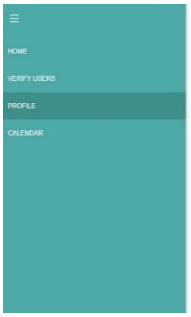














The application allows for bulk import of data, which can handle large volumes of information often found in real-world voting scenarios. To record voting transactions, a private blockchain is created using MultiChain as the blockchain platform. The reason for choosing MultiChain is because of its ease of use, which enables seamless integration into the proposed architecture.

Evaluation:
The aim of the evaluation is to assess the performance of the proposed e-voting system and identify any practical considerations for its implementation. This will involve multiple steps, such as executing transactions, verifying them, mining them into the block chain, propagating the changes across all network nodes, and evaluating the system's usability. The evaluation will focus on meeting the e-voting system requirements specified in section 2.

A test was conducted by creating assets (votes) directly on multi-chain. APIs were written to enable this in the voting environment, as multi-chain is typically used for cryptocurrencies. To perform transactions, the address and balance of the multi-chain node were identified from which the assets (votes) would be sent. The results of this test run are presented as a demonstration.

When an asset (vote) is sent to a specific address, a transaction hash is created, and the balance of the recipient node is incremented by one. This transaction is then added to the public ledger and marked as mined. An example of such a transaction is shown in Fig. The API created for asset creation ensures that each address can have only one vote, making it impossible for a voter to cast multiple votes unless they use a different address. However, a candidate may receive votes from multiple addresses.

Conclusion:
Electronic voting has been used in different forms since the 1970s, providing advantages like improved efficiency and reduced errors compared to paper-based systems. With the rapid development of block chain technology, there have been many initiatives exploring the potential use of block chain to create a reliable e-voting solution. This paper describes one of those initiatives that utilizes block chain's cryptographic foundations and transparency to achieve a successful e-voting system.

The authors have implemented their proposed approach using multi-Chain and have evaluated its effectiveness in meeting the fundamental requirements of an e-voting system. They plan to continue their work and focus on enhancing the security of the block chain technology against the "double spending" problem, which in the context of e-voting, refers to the issue of a voter casting more than one vote.

Although blockchain technology has been successful in detecting tampering attempts in transactions, there have

been instances where such attempts have been successful. Therefore, further investigation is necessary to improve the resilience of blockchain technology against such attacks. Establishing a reliable provenance model for e-voting systems is believed to be critical in achieving an end-to-end verifiable e-voting scheme.

Future Scope:
Blockchain technology has the potential to solve numerous problems in electronic voting, making it a more cost-effective, user-friendly, and secure alternative to other networks. However, while research has demonstrated the benefits of blockchain-based e-voting, there is still a need for further investigation and work on this technology. Additionally, substantial technical difficulties and challenges must be overcome to ensure the feasibility and success of block chain-based e-voting systems.

User Identity: Block chain employs pseudonyms as usernames, which do not provide complete privacy and anonymity. Since transactions are public, a user's identity could be discovered by examining and analysing them. Block chain's functionality might not be well-suited for national elections.

Achieving transactional privacy and anonymity is crucial in an election system but is challenging with block chain technology. Currently, there is a need for a non-centralized third-party authority to maintain checks and balances on privacy. Future research can explore ways to achieve transactional secrecy and anonymity without compromising the security and transparency of the block chain-based electronic voting system.

In the future, there may be resistance from political leaders towards block chain-based electronic voting due to its potential to replace central authorities such as government agencies and election authorities. The existing power structure might feel threatened by the decentralized and autonomous nature of block chain technology, which could empower social resistance. As a result, the adoption of block chain-based e-voting systems might face opposition from those who have benefited from the traditional election process.

Acknowledgment:
This Project wouldn’t have been possible without the support, assistance, and guidance of a number of people whom we would like to express our gratitude to. First, we would like to convey our gratitude and regards to our mentor Umesh Kulkarni for guiding us with his constructive and valuable feedback and for his time and efforts. It was a great privilege to work and study under his guidance.

We would like to extend our heartfelt thanks to our Head of Department, Sachin Bojewar for overseeing this initiative which will in turn provide every Vidyalankar student a distinctive competitive edge over others.

We appreciate everyone who spared time from their busy schedules and participated in the survey. Lastly, we are extremely grateful to all those who have contributed and shared their useful insights throughout the entire process and helped us acquire the right direction during this research project.

REFERENCES

[1] A. Adida, "Helios: Web-based open-audit voting," in Proceedings of the 17th Conference on Security Symposium, ser. SS'08, Berkeley, CA, USA, 2008, pp. 335-348.

[2] F. Hao, M. N. Kreeger, B. Randell, D. Clarke, S. F. Shahandashti, and P. H.-J. Lee, "Every vote counts: Ensuring integrity in large-scale electronic voting," in 2014 Electronic Voting Technology Workshop/Workshop on Trustworthy Elections (EVT/WOTE 14), San Diego, CA, USA, 2014.

[3] L. Rura, B. Issac, and M. K. Haldar, "Implementation and evaluation of steganography based online voting," International Journal of Electronic Government Research, 2016.

[4] F. S. Shahandashti and F. Hao, "DRE-ip: A verifiable e-voting scheme without tallying authorities," in The 21st European Symposium on Research in Computer Security (ESORICS), 2016.

[5] S. F. Shahandashti and F. Hao, DRE-ip: A Verifiable E-Voting Scheme Without Tallying Authorities. Cham: Springer International Publishing, 2016, pp. 223-240.

[6] Y. Liu and Q. Wang, "An e-voting protocol based on blockchain," IACR Cryptol. Eprint Arch., 2017, 1043.

[7] B. Shahzad and J. Crowcroft, "Trustworthy electronic voting using adjusted blockchain technology," IEEE Access, vol. 7, pp. 24477–24488, 2019.

[8] Y. Zhou, Y. Liu, C. Jiang, and S. Wang, "An improved FOO voting scheme using blockchain," Int. J. Inf. Secur., vol. 19, pp. 303–310, 2020.

[9] K. Sadia, M. Masuduzzaman, R. K. Paul, and A. Islam, "Blockchain-based secure e-voting with the assistance of smart contract," in IC-BCT 2019, Springer: Berlin/Heidelberg, Germany, 2020, pp. 161–176.

[10] V. Augoye and A. Tomlinson, "Analysis of electronic voting schemes in the real world,"

Available online: https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1021&context=ecis2020_rp, accessed on 28 July 2020.

[11] A. Poniszewska-Mara ´nda, M. Pawlak, and J. Guziur, "Auditable blockchain voting system-the blockchain technology toward the electronic voting process," Int. J. Web Grid Serv., vol. 16, pp. 1–21, 2020.

[12] Polys, "Polys— Blockchain-based online voting," Available online: https://polys.vote/, accessed on 28 July 2020.

[13] X. Ma, J. Zhou, X. Yang, and G. Liu, "A blockchain voting system based on the feedback mechanism and Wilson score," Information, vol. 11, no. 11, p. 552, 2020.

[14] E. Yavuz, A. K. Koç, U. C. Çabuk, and G. Dalkılıç, "Towards secure e-voting using ethereum blockchain," 2018. Available online: https://ssrn.com/abstract =3648870.

[15] K. C. Tam, "Transactions in Ethereum," 2018.

[16] MetaMask, "MetaMask," Available online: https://metamask.io/.

[17] D. Khoury, E. F. Kfoury, A. Kassem, and H. Harb, "Decentralized voting platform based on Ethereum blockchain," 2018.

[18] V. Anasune, P. Choudhari, M. Kelapure, P. Shirke, and P. Halgaonkar, "Online voting: Voting system using B-chain," 2019.

[19] L. Vo-Cao-Thuy, K. Cao-Minh, C. Dang-Le-Bao, and T. A. Nguyen, "Votereum: An Ethereum-based e-voting system," 2019.

[20] G. Bhavani, "Survey on blockchain-based e-voting recording system design," 2018.

[21] F. Þ. Hjálmarsson and G. K. Hreiðarsson, "Blockchain-based e-voting system," 2018.

[22] R. Hanifatunnisa and B. Rahardjo, "Blockchain-based e-voting recording system design," 2017.

[23] S. Thakur Aras and V. Kulkarni, "Blockchain and its applications – A detailed survey," International Journal of Computer Applications, Pune, India, 2017.

[24] S. Raju, S. Boddepalli, S. Gampa, Q. Yan, and J. S. Deogun, "Identity management using blockchain for cognitive cellular networks," in IEEE International Conference on Communications (ICC), Paris, France, 2017.

[25] H. Choi, H. Kwon, and J. Hur, "A secure OTP algorithm using a smartphone application," in Seventh International Conference on Ubiquitous and Future Networks, Sapporo, Japan, 2015.

[26] V. N. Rani B, A. S, A. K. M, and M. A. Ishwar Kumar, "Decentralized e-voting system," International Research Journal of Engineering and Technology, 2019.

AET 003

Knockout : A Competitive Programming Environment using Socket.io

Ashwini Singh
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
ashwini.singh@vit.edu.in

Janvi Kawa
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
janvi.kawa@vit.edu.in

Yash Thakkar
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
yash.thakkar@vit.edu.in

Samiksha Kalekar
Department of Computer Engineering
Vidyalankar Institute of Technology Mumbai, India
samiksha.kalekar@vit.edu.in

Prof. Avinash Shrivas
Department of Computer Engineering
Vidyalankar Institute of Technology Mumbai, India
savinash.srivas@vit.edu.in

Abstract—WebSocket protocol has become a sound technology in the software industry for real-time web application development since it provides bidirectional, full-duplex communication between client and server over a single connection. There are several concepts, techniques, and technologies such as frameworks and libraries for WebSocket- based development. The project uses Socket.IO API to make a competitive coding environment on a NodeJS Server. It uses ReactJS in order to have a dynamic User Interface and Handles User Authentication on Firebase Service and Database on MongoDB. It allows peer-to-peer connection without having to access any third-party server and allows to form custom sized rooms in order to hold programming competitions. A user needs a Code Forces Account as the project uses Code Forces API in order to fetch the programming problems and to allow the Users to submit code. The points for each problem are awarded to the participant who solves the problem first. The takeaway from the project is that we can use web technologies to create environments to conduct virtual meetings and also virtual competitions. Web Sockets can be used to implement server-to- client or Client to Client peer to peer communication inculcating this with other web frameworks help us to create Virtual Labs, Conferences, etc. The application can be further updated by adding a video-sharing feature for proctoring It can also be provided with an inbuild IDE reducing the dependency on Code forces API.

Keywords— WebSocket, Code Forces API, ReactJS, MongoDB, inbuild IDE, User Authentication, Web frameworks.

I. INTRODUCTION

Competitive programming is a popular activity among programmers, as it helps them to improve their skills and test their knowledge against other programmers. However, many new programmers struggle to get the hang of competitive programming, which can lead to frustration and discouragement. The project Knockout highlights the difficulties that new programmers face in getting started with competitive programming. Another challenge is that most competitive programming sites do not allow people to hold their own custom competitions in a small group. Thus such an environment is required wherein people can create their own custom rooms, join them and compete with their friends online.

Competitive programming offers new students hundreds of opportunity to master a variety of skills that are valuable in the software industry. Beginning programmers might benefit from competitive programming by developing their coding skills, problem-solving capabilities, and learning new programming concepts and techniques. Additionally, a variety of online tools and resources, such as Leetcode, Hacker Rank, and Top Coder, are available for beginners to learn competitive programming. However, due to their inability to establish a dynamic coding environment, these efforts are only partially successful and not scaleable. New programmers cannot utilise these benefits due to their inexperience and unfamiliarity with the competitive programming ecosystem.

Many programmers like to compete in small groups or against their friends and coworkers rather than in large-scale tournaments, which is another driving force behind Knockout. The platform enables programmers to build their own unique rooms, join them, and engage in peer competition. This promotes collaboration and socialisation among programmers in addition to offering a more individualised and encouraging learning environment. We intend to provide a friendly and dynamic environment for new programmers to refine their skills and acquire confidence in their talents by developing a real-time web application like Knockout. Peer-to-peer connections and unique tournaments are

just two of the elements that Knockout offers to assist new programmers learn from one another, get credit for their work, and eventually succeed in competitive programming.

The Knockout aims to provide a competitive programming platform that addresses the challenges faced by new programmers. It aims to provide a personalized and supportive environment where programmers can practice and improve their skills, as well as compete against their friends or colleagues. With the use of the CodeForces API, Knockout offers a wide range of programming problems to its users, catering to different levels of expertise. The real-time web application built on the WebSocket protocol provides a dynamic user interface using ReactJS and handles user authentication using Firebase Service. Knockout also stores user data in a MongoDB database and allows for peer-to-peer connections between users. The proposed solution of Knockout is scalable and accessible to most programmers, helping them to overcome the challenges of competitive programming and improve their skills efficiently.

II. LITERATURE SURVEY

A. Leetcode- LeetCode is an online platform that ovariety of coding challenges and exercises for developers to improve their programming skills. The platform features a vast library of over 2,000 problems across various domains, including algorithms, data structures, databases, system design, and more. Users can solve these challenges in various programming languages, including Python, Java, C++, and others, and test their solutions using the platform's built-in test cases and evaluation tools. LeetCode is popular among software engineers and developers looking to hone their skills and prepare for technical interviews. The platform also offers premium services like personalized code review, mock interviews, and company-specific interview preparation guides[1].

B. Hackerrank- Hacker Rank is a coding platform that enables programmers from all over the world to solve coding challenges. Hacker Rank supports a variety of programing languages (including Java, C++, PHP) and span over a variety of computer science domains. When a programmer submits a solution to a programming challenge, the submission is scored based on the accuracy of the output. Programmers are then ranked globally on the Hacker Rank leaderboard. In addition to individual programming challenges, Hacker Rank also hosts contests (often referred to by Hacker Rank as "Code Sprints") where programmers compete on a specific set of programming challenges during a short period of time and are then ranked at the conclusion of the event. Hacker Rank also allows companies to recruit programmers based on their performance. Hacker Rank is seen as a market leader in the growing gamification trend within competitive computer programming and the consumer-side of their website is free for coders to use[2]. HackerRank combines the advantages of content analysis and social network analysis. First, comprehensive evaluations and topic preferences are extracted separately using content analysis. Then, it uses an improved Topic-specific PageRank to combine the results of content analysis with social network analysis. Finally, HackerRank obtains users' ranking, with higher-ranked users being considered as key hackers[3].

Hacker-earth- HackerEarth is a global platform that helps developers and organizations improve their technical skills and hire top talent. The platform offers a variety of tools and services to support the entire developer lifecycle, from skill assessment and training to talent sourcing and hiring. HackerEarth's platform includes a vast library of programming challenges and coding competitions across various domains, including algorithms, data structures, machine learning, and more. Developers can participate in these challenges to improve their skills and earn recognition for their work. On the other hand, organizations can use HackerEarth's platform to source and hire top talent from a pool of skilled developers. The platform offers features like intelligent coding assessments, video interviews, and customized hiring workflows to help companies find the right candidates for their technical roles. In addition to the core platform, HackerEarth also offers various developer-focused services like learning resources, community forums, and coding bootcamps to help developers improve their skills and connect with other developers worldwide.

Hacker Earth is competing against 19 other start-up surround the world, who also hold coding contests for developers to help uncover good talent. It was created by the same people who created Hackerrank. Hacker Earth is a competitive programming platform that supports over 32 programming languages, including C, C++, Java, and others. On this platform, users from all over the world can collaborate to solve problems related to programming, data structures, machine learning, and other topics. Hacker Earth's compiler operates on a Linux environment, therefore anytime a piece of code fails a test, the following runtimes as generated.[4]

C. Code Chef- It is a global competitive programming platform which supports over 50 programming languages and has a large community of programmers that helps students and other computer professionals test and improve their coding skills. Its objective is to provide a platform for practice, competition and improvement for both students and professional software developers. Code chef conducts regular practice contests for ACM-ICPC and also conducts monthly contests to give away prizes. Apart from this, it aims to reachout to students while they are young and inculcate a culture of programming in India[5], One of the most well-known platforms for helping programmers practise and solve a variety of issues from many fields, such as

algorithms and computer programming, and take part in competitions is Codechef. The programme should output to standard output and read from it.Following submission of a solution, the Codechef IDE will provide the following outcomes. Accepted, TLE, Runtime Error, Wrong answer, compilation error.[6]

D. Code Forces- Codeforces is a popular competitive programming platform that offers a vast library of coding challenges and contests for programmers of all skill levels. The platform hosts regular coding contests where participants can compete against each other in real-time to solve challenging programming problems. Codeforces has a ranking system that assigns ratings to participants based on their performance in contests. This rating system helps users track their progress and provides a sense of accomplishment as they improve their skills and move up the ranks. The platform also features a vast problem archive with over 8,000problems in various domains, including algorithms, data structures, math, and more. Users can solve these problems attheir own pace and level up their coding skills.

Codeforces has a large and active community programmers who share their knowledge and experiences through blogs, forums, and other resources. The community is known for its supportive and collaborative culture, makingit an excellent platform for beginners and experienced programmers alike.

Codeforces provides a wide range of services for those who are interested in algorithmic tasks and programming competitions. The main goal of Codeforces as a platform for competitions is to provide an opportunity to unite all those interested in programming contests, providing a wide list of services for this area of interest. The platform supports Russian and English languages and most of the materials are presented in two languages[7].
Competition in programming education does not necessarily have solely positive effects on learners' experiences, as our results confirm its potential for both positive and negative effects on intrinsic interest as mentioned in previous work. The inclusion of competition inlearning environments might prove to be useful, but it is nota silver bullet to increase the learners' motivation.[8] Although competitiveness is a key factor in the learning curves of competitive programming. While we recognize thatthe sole reward of solving a problem can foster interest in theclass [9].

E. Clash of Code- Clash of Code is a multiplayer mode on CodinGame that allows users to challenge their friends in short real-time coding battles. It has been available for three years now and is perfect for a quick pause during work.

Clash of Code offers three types of coding challenges: Fastest,Shortest, and Reverse[10]. The fastest challenge requires players to pass all the tests as quickly as possible, the shortestchallenge requires players to pass all the tests with the minimum amount of characters, and the reverse challenge requires players to guess what to do based on the test cases. The coding challenges are created by the community, and anyone can propose a concept for a Clash in the contribute section of CodinGame. Experienced players review and validate the exercise if it meets basic quality criteria. To counter cheating issues, a Captcha is displayed to players who start a lot of Clashes for a short amount of time. Additionally,CodinGame has designed bots to mimic player behavior toencourage people to play, especially during times when there are few players in the lobby.The objective of Clash of Codeis to provide a fun and entertaining way for programmers toimprove their coding skills through competition. The motive is to create a community of programmers who can interact and learn from each other in a fun and interactive way. Thegoal is to offer a variety of coding challenges that cater todifferent skill levels and coding languages

III. PROPOSED SYSTEM

Knockout, a platform for new programmers to improve their skills in competitive programming. The project is motivated by the fact that many new programmers find it difficult to get started with competitive programming due to the overwhelming nature of large-scale competitions. Knockout will provide a personalized and supportive environment for learning by allowing programmers to create their own custom rooms and com with their peers.

Knockout fills the gap by providing a personalized and supportive environment for new programmers to learn and improve their skills in competitive programming. While there are several competitive programming platforms available in the market, most of them focus on large-scale competitions, which can be overwhelming for new programmers. Knockoutallows programmers to create their own custom rooms and com with their peers, providing a more collaborative and social learning experience.

This helps to address the issue of new programmers feeling isolated and discouraged in traditional competitive programming environments. The platform will allow users to create their own custom rooms, where can invite their friends or colleagues to compete with them. Additionally, the platform will offer various levels of difficulty for problems, so that new programmers can start with easier problems and gradually progress to more challenging ones.
Knockout aims to provide a welcoming and supportive environment for new programmers to learn, improve their skills, and compete in a friendly and fair manner.

By filling the gap in the market for a platform that caters to small-scale and personalized competitive programming, it has the potential to attract a large user base and become a valuable resource for the programming community.

A. SYSTEM ARCHITECTURE

The system architecture of Knockout has been designed to provide a seamless and efficient user experience. The web application is built using ReactJS, which is a popular front- end development library that allows for the creation of interactive and dynamic user interfaces. The backend API, on the other hand, is built using Node.js and Express.js, which are powerful tools for building scalable and robust server-sideapplications.

Knockout follows a client-server architecture, which is a common architectural pattern for web applications. In this architecture, the client is the web application that runs on theuser's devices, and the server is the backend API that runs ona remote server. The client and server communicate with each other using the WebSocket protocol, which is a real-time, bidirectional, and event-based communication channel.

The WebSocket protocol enables the server to push data to the client without the client making a request, which makesthe application more responsive and dynamic. This means that the client can receive real-time updates from the server without the need for the user to refresh the page manually. This improves the overall user experience and makes the application more efficient. The use of ReactJS, Node.js, Express.js, and the WebSocket protocol in the system architecture of Knockout ensures that the platform is scalable,reliable, and efficient. The platform can handle large volumesof traffic and can provide real-time updates to users without compromising performance. Overall, the system architectureof Knockout is designed to provide a seamless and efficient user experience.

B. WORKING

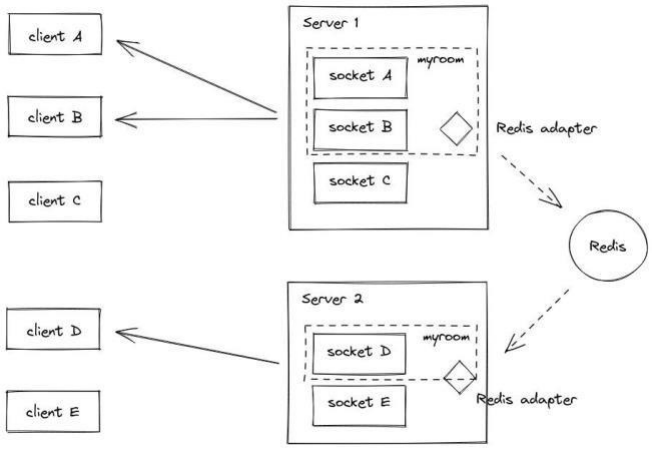


Fig. 1.1 : Client-Server Architecture (websocketsflow-with-client-push)

The diagram above shows a client-server architecture, wherethe client is a web browser on the left side, and the server is a cloud-based server on the right side. The client is connected to the server via the WebSocket protocol. The client is built using ReactJS and it communicates with the server through the WebSocket API. The server is built usingNode.js and Express.js and it communicates with a database to store and retrieve data. The server also communicates with a third-party API to retrieve data for the Knockout feature. The Knockout feature is responsible for removing users from a group if they do not meet certain criteria, such as not having enough points. The Knockout feature is implemented on the server, and it sends updates to the clientthrough the WebSocket API.

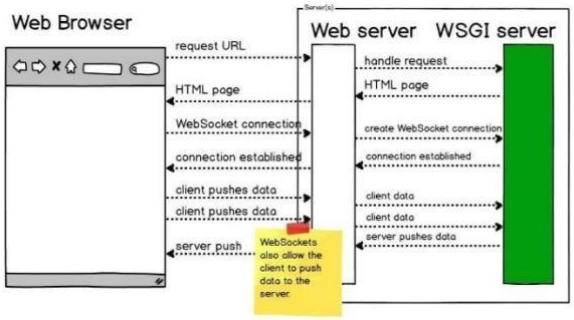
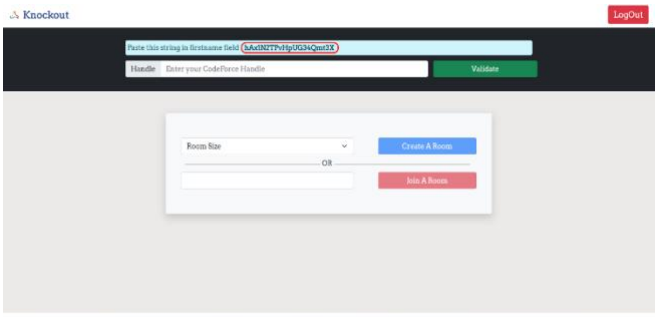


Fig. 1.2 : Mongodb Adapter [21]

The MongoDB adapter relies on MongoDB's Change Streams (and thus requires a replica set or a sharded cluster).Every packet that is sent to multiple clients (e.g. io.to("room1").emit() or socket.broadcast.emit()) is:

- sent to all matching clients connected to the current server



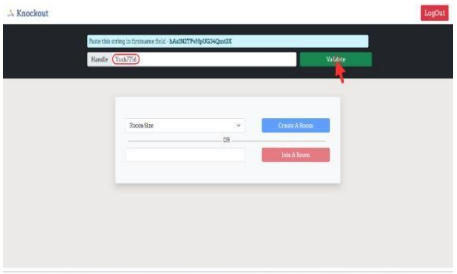
- inserted in a MongoDb capped collection, and received by the other Socket.IO servers of the cluster.

IV. IMPLEMENTATION

The Knockout platform consists of several components that work together to provide the desired functionality. These components are :

4.1 Login Authentication:

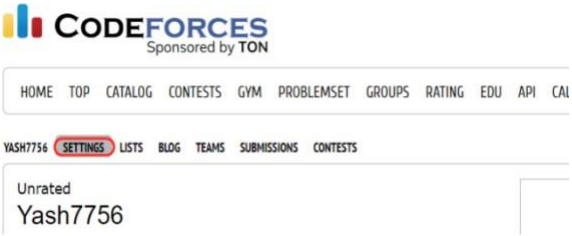
The authentication component is responsible for handling user authentication and authorization. Knockout uses Firebase Authentication to handle user authentication, which provides secure and easy-to-use



authentication services. Firebase Authentication supports several authentication methods, including email and password authentication, Google authentication, Facebook authentication, and GitHub authentication, here we have used Google authentication.

4.2 CodeForces API Authentication:

The CodeForces API integration component is responsible forfetching programming problems from the CodeForces API and presenting them to the user. Knockout uses the CodeForces API to fetch programming problems, which provides a large collection of programming problems with varying levels of



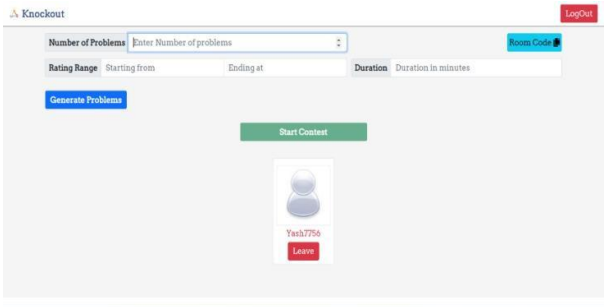
difficulty.

Steps to Validate your Codeforces Handle:

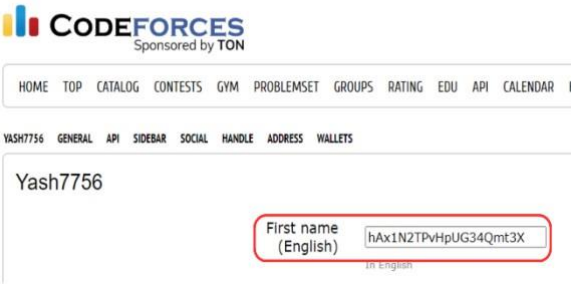
1. First Copy the string, that just showed up on your homescreen.
1. Login to CodeForces:

a. Go to Settings tab

b. Go to Social tab



c. Paste that string in the First Name field



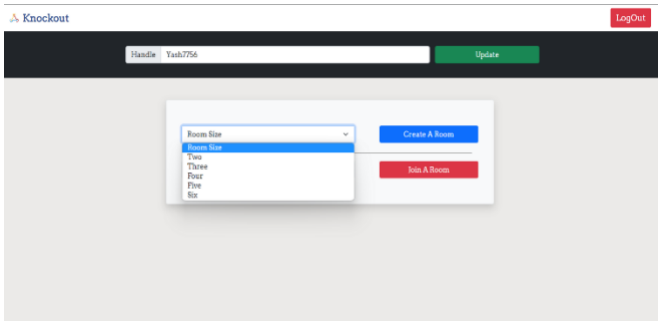
d. Enter your handle and click on validate button

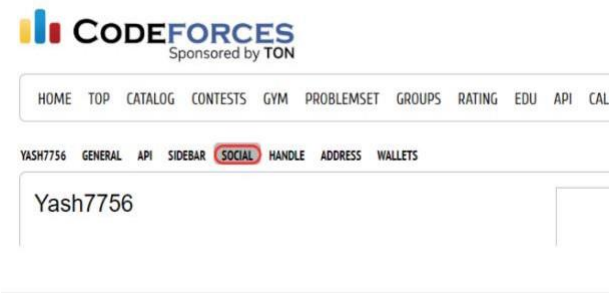
3.3 Custom Rooms

Knockout uses Socket.IO, a JavaScript library that enables real-time, event-based communication between the client andthe server. Socket.IO provides support for multiple
protocols, including WebSocket, and allows for easy integration with Node.js, making it an ideal choice for a real-time web application like Knockout.

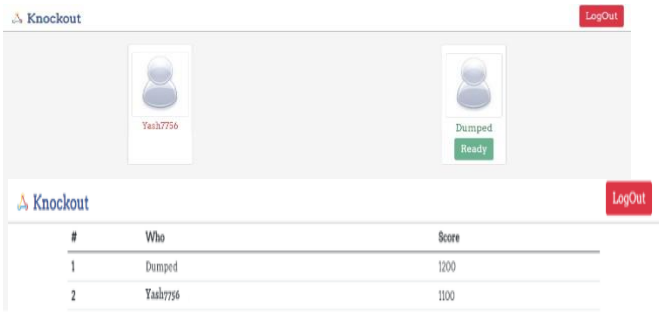
The custom rooms component is responsible for allowing users to create their own custom rooms and invite their friends to compete against each other. Knockout allows usersto create their own custom rooms and invite their friends to join the room. Users can compete against each other in a friendly competition and improve their skills in a personalized and supportive environment.

- The host can share the Room code (top right corner) with his/her peers to join the room.
- The host has the right to select the number of problems, Rating Range (difficulty of the problem), and duration of the round/contest.





Only the Host can start the contest when all the participantsare in a Ready state.



3.4 The Battle

Knockout When the user navigates to this page, a request is made to the backend to retrieve necessary data for current round of the knockout tournament, including the list of problems, the allotted time for the round, and the color codes for each user. Once this data has been retrieved, it is passed down to <UserColors> and <ProblemHead> components for Rendering. The <UserColors> component renders a legend of the colors that have been assigned to each user for the current round. This legend is used to differentiate the solutions submitted by different users on the leaderboard. The <ProblemHead> component is responsible for rendering the list of problemsfor the current round and displaying a timer for the allottedtime. It also makes a request to the backend every 10 seconds to check if any user has submitted a correct solution to one of the problems. If a correct solution is submitted, the backend is updated with the information about the user who submitted the solution and the corresponding problem, and the leaderboard is updated accordingly.

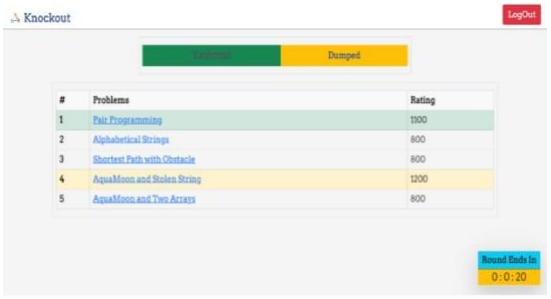
- The Table at the top maps the colors to the participants.
- The next is the Table of Problems each row hasa link to the problem on Codeforces.
- Once the server detects an AC submission on Codeforces, the row corresponding to the problem is given the color of the solver. (if not previously solved)

3.5 Standings

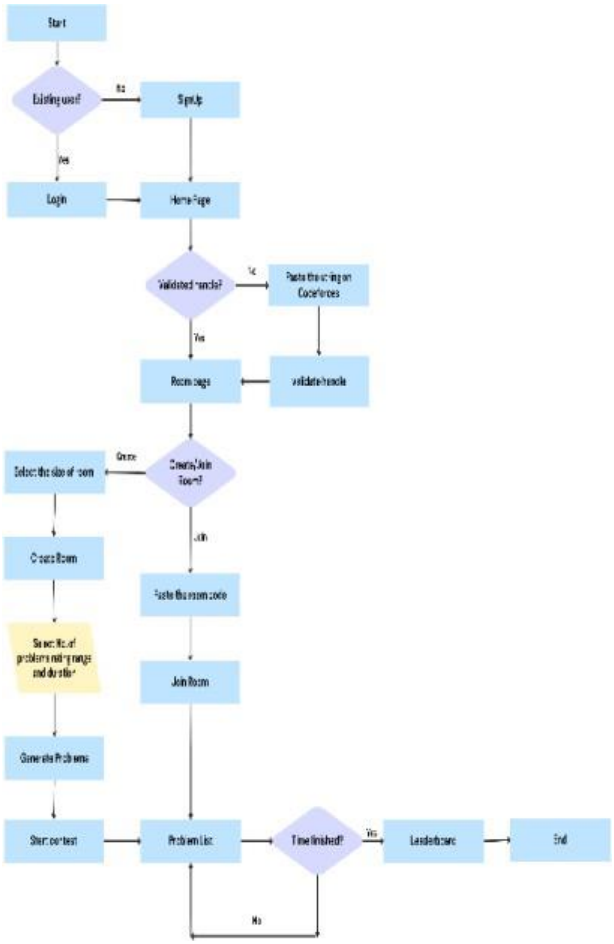
In the Knockout project, a leaderboard or standings feature was implemented using React and Axios. The component was designed to display the rankings of the users in a particular room based on their scores. The scores were calculated by adding up the ratings of all problems solved by each user. The component makes use of the useParams hookfrom React Router to retrieve the room ID from the URL, and then uses Axios to make a GET request to the server to retrieve the necessary data.

The UI of the leaderboard was designed to be simple and easy to read, with a table displaying the rank, user ID, and score of each user. The table was styled using Bootstrap classes to make it more visually appealing. A loading spinner was also added to give the user feedback while thedata is being retrieved from the server.

The component also includes a link to the dashboard page, allowing the user to easily navigate back to the main dashboard after viewing the standings.



FLOWCHART:



CONCLUSION

The number of users on coding platforms has recently increased exponentially. As a result, millions ofstudents are competing against each other to improve their coding skills, creating a highly competitive

environment. The project has effectively developed a competitive coding environment in this scenario, allowing students to participatein coding challenges in small groups. This method is more engaging and intriguing than larger coding platforms, where students can become lost in the crowd. The project provides a venue for students to compete in small groups and polish theirskills with like-minded peers. This strategy is very effective for improving one's coding talents because students mayidentify areas for growth and concentrate on growing their problem-solving skills.

The WebSocket protocol was used effectively to enable bidirectional, full-duplex communication between clients and servers over a single connection, and several web technologies and frameworks such as Socket.IO, ReactJS, Firebase, and MongoDB were used to create a dynamic user interface, handle user authentication, and manage the database. The platform retrieves programming problems using the CodeForces API and redirects users to codeforces tosubmit code. The project is an excellent opportunity for programmers to practise and develop their coding skills while having fun in a competitive setting.

The project showcases the potential of web technologies to create virtual environments for various purposes, including conducting meetings, conferences, and virtual labs. The use of web sockets for implementingserver-to-client or client-to-client peer-to-peer communication can be a powerful tool for creating such
virtual environments, especially when combined with otherweb frameworks and technologies.

In conclusion, the project successfully provides an alternative approach to the highly competitive coding platforms, by creating a more engaging and interesting experience for students. The small group approach, custom-sized rooms, and peer-to-peer interaction allcontribute to a highly effective learning experience, makingit easier for students to improve their coding skills at theirown pace.

V. FUTURE SCOPE

The application can be further updated by adding avideo sharing feature for proctoring. Adding a video sharing feature can enhance the security and integrity of the programming competition. Proctors can monitor the participants to prevent cheating and ensure that the competition is fair. The video sharing feature can be implemented using WebRTC technology, which allows real-time video streaming between participants and proctors. The video sharing feature can be integrated with Firebase authentication to ensure that only authorized participants and proctors can access the video stream.

Currently, the platform relies on the Codeforces API to fetch programming problems and to allow users to submit code. However, this creates a dependency on Codeforces, and limits the platform to only those programming problems that are available on Codeforces. Adding an in-built IDE can reduce this dependency and expand the range of programming problems that users can solve. The IDE can be implemented using popular open- source text editors like VSCode, Atom, or Sublime Text, and can support multiple programming languages. The IDE can also be integrated with automated testing to provide real-time feedback to users on the correctness of their code.

The project can be expanded by adding moreresources and tools to help new programmers improve their skills. For example, the project couldinclude a library of tutorials and articles on various programming topics, which can be accessed by users to learn new programming concepts and techniques.

This library can be organized into different categories such as algorithms, data structures, and programming languages, and can be searchable based on keywords or tags.

Knockout is designed with the capability to integrate with external services and APIs. This allows for future enhancements and the incorporation of additional features. The architecture follows modular design principles, enabling easy integration of new components or services. Some potential integration options include

- Integration with other coding platforms: Extending Knockout to support integration with additional coding platforms, such as LeetCode or HackerRank, to provide a wider range of programming problems and resources.
- Social media integration: Allowing users to share their achievements and progress on social media platforms, encouraging engagement and attracting more users to the platform.
- Notifications and alerts: Integrating with messaging services, such as email or push notifications, to provide users with updates on their competition status, new problem recommendations, or upcoming events.

By implementing a modular and extensible architecture, Knockout can adapt and evolve to meet the changing needs and requirements of its users and the competitive programming community.

Overall, by adding these feature the project can become a one-stop-shop for new programmers to learn and improve their coding skills. This will not only make the project more useful for its users but will also help to attract and retain more users over time.

I. REFERENCES

[1] LeetCode. [Online]. Available: https://leetcode.com/.[Accessed 14 February 2019]

[2] Chandru, T.K. & Kumar, M. & Karthikeyan, S. & Saranya, K.. (2019). "Interactive coding platform for students". International Journal of Recent Technology and Engineering. 7. 295-299.

[3] Huang, Cheng & Guo, Yongyan & Guo, Wenbo & Li, Ying. (2021). " HackerRank: Identifying key hackers in underground forums." International Journal of Distributed Sensor Networks. 17. 155014772110151.10.1177/15501477211015145.

[4] https://www.gadgetsnow.com/tech-news/hackerearth-in-finals-of-global-startup-competition/articleshow/29526978.cms

[5] Chandru, T.K. & Kumar, M. & Karthikeyan, S. & Saranya, K.. (2019). "Interactive coding platform for students". International Journal of Recent Technologyand Engineering. 7. 295-299.

[6] https://www.codechef.com/problems/school

[7] MIRZAYANOV, Mike & Pavlova, Oksana & Mavrin, Pavel & MELNIKOV, Roman & PLOTNIKOV, Andrew &PARFENOV, Vladimir & STANKEVICH, Andrew. (2020)."Codeforces as an Educational Platform for Learning Programming in Digitalization". OLYMPIADS IN INFORMATICS. 133-142. 10.15388/ioi.2020.10.

[8] Konrad Fischer, Sarah Vaupel, Niels Heller, Sebastian Mader & François Bry "Effects of Competitive Coding Games on Novice Programmers", Issue 12 March 2021

[9] Jose R. Garcia; Vanessa E. Aguirre, "The learning curves of competitive programming", Issue OCTOBER 06 2014

[10]https://www.codingame.com/blog/clash-of-code-time-has-come-for-clash/

AET 004

Flight Fare Prediction using Machine Learning

Harshada Chavan
Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
chavanharshada883@gmail.com

Sejal Gawand
Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
sejal.gawand@vit.edu.in

Mrudula Renghe
Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
mrudula.renghe@vit.edu.in

Yash Shetty
Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
yash.shetty@vit.edu.in

Sanjeev Dwivedi
Assistant Prof. Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
sanjeev.dwivedi@vit.edu.in

Abstract: This paper presents a predictive modelling approach that aims to predict flight fares based on historical data and machine learning algorithms. The method involves collecting and cleaning flight data from different airlines, identifying relevant features, and training various models. The flight Fare industry is dynamic in terms of the prices being fluctuated on regular basis. The goal is to find out the factors that determine the cost of a flight. For this reason, a collection of parameters characterizing a typical flight is selected, with the presumption that these characteristics affect how much an airline ticket cost. The cost of a plane ticket varies depending on a number of factors, including the flight's duration, destination, and timetable, as well as various events like holidays or vacations. The paper consists of how the flight fare prediction model works after using some machine learning techniques and algorithms. The use of the dataset in the proposed system from the reputed website helps to get a detailed analysis of the data points. Algorithms like Random Forest and Linear Regression are used to effectively increase the accuracy. As a result, many people will surely save money and effort by having a basic awareness of flight costs prior to making travel arrangements. After that, a system that forecasts flight costs can be built using the data. The results indicate that the model can achieve high accuracy in predicting flight fares, which can lead to significant cost savings and improve revenue for the airlines.

Keywords: Random Forest, Python, Machine Learning, Flight price, linear.

I. Introduction

Flight Fare Prediction is a vital area of research in the aviation industry. In the modern world, airlines work to keep flight ticket prices under control in order to increase profits. Predicting flight fare accurately is a complex task due to many factors that impacts ticket prices, including seasonality, destination, time of day, and competition among airlines. With the increasing demand of air travels, passengers need a reliable and cost-effective way of booking their flights. This research paper aims to develop a predictive model for flight fares using machine learning algorithms. We will explore various factors that influence flight fares, including time of booking, departure and arrival dates, flight duration, and airline. Our model will predict flight fares accurately, enabling passengers to plan their travel in advance and save money. Our research contributes to the aviation industry by proving airlines with better pricing strategies and passengers with a means of selecting the best value for their travel plans. Additionally, our predictive model will assist in monitoring market trends, enabling airlines to optimize pricing dynamically and ensuring their competitiveness in the market. The aviation industry has seen remarkable growth in the past few decades, leading to increased demand for air travel. As a result, flight fare prediction has become an essential aspect of modern-day airfare management. The prediction of flight fares is a complex process that involves analysing various factors such as flight dates, routes. In recent times, machine learning algorithms have proved to be efficient tools in predicting flight fares accurately. This research paper aims to explore the application of three machine learning algorithms – Linear Regression, Decision Tree, and Random Forest - for the prediction of flight fares. The paper provides a comprehensive analysis of the algorithms, including their benefits, limitations, and how they can help airlines optimize their airfare strategy to enhance revenue and customer experience. The "flight dataset" from Kaggle is a collection of data related to airline flights. The dataset includes information such as source, destination as input and prices as output. This dataset is commonly used in data analysis and machine learning projects related to the airline industry, such as predicting flight

delays or analysing trends in flight performance. It can also be used for more general data analysis and visualization purposes. Through this study, we hope to establish the effectiveness of these algorithms in tackling the challenges of predicting flight fares and their potential to impact the aviation industry.

II. Literature Survey

The following is a literature survey for a research paper on flight fare prediction:

1. "Predicting Flight Prices with Machine Learning" by Louis Dorard and Mounir Krichane: This paper discusses the implementation of machine learning algorithms to predict flight fares. The authors analyze different data sources and features and compare the performance of different regression models.

2. "Predicting Airline Ticket Prices with Ensemble Methods" by Mohammad Reza Kavianpour and Mehran Kazemi: The authors apply ensemble methods, such as gradient boosting and random forest, to predict airline ticket prices. They emphasize the importance of feature engineering and data pre-processing for accurate predictions.

3. "Airline Ticket Price Prediction using Machine Learning" by Shivendra Singh and Narendra Kumar: This paper focuses on the prediction of domestic airline ticket prices using linear regression and random forest algorithms. The authors also discuss the impact of seasonality and holidays on ticket prices.

4. "Why are Airline Tickets so Expensive? A Study of Flight Demand and Fare Determination" by Steven L. Puller: This paper explores the factors that influence airline ticket prices, such as competition, fuel prices, and demand. The author suggests that airline pricing strategies vary based on market conditions and consumer behavior.

5. "Dynamic Pricing in the Airline Industry" by Omar El Sawy and Albert S. Dexter: The authors examine the concept of dynamic pricing in the airline industry, which involves adjusting prices based on real-time demand and supply. They discuss the challenges and opportunities associated with implementing dynamic pricing strategies.

6. "Airfare Pricing Strategies in the Global Airline Industry" by Joe Mazzeo: This paper provides an overview of different pricing strategies used by airlines, such as yield management and price discrimination. The author emphasizes the importance of understanding customer behavior and market trends for effective pricing decisions.

7. "A Forecasting Model for Airline Ticket Prices" by Stefan Fink and Andreas Geyer-Schulz: The authors propose a forecasting model for airline ticket prices based on historical data and regression analysis. They demonstrate the effectiveness of their model using real-world data and compare it to other forecasting methods.

The relevance of precise flight fare prediction for both passengers and airlines are generally highlighted by this research. They also show the promise of machine learning and other data-driven techniques for raising consumer satisfaction and pricing tactics.

III. Proposed System

Through many algorithms utilised in the model building process, our design's primary goal is to accurately predict the price of the flight prices currently offered. These algorithms include:

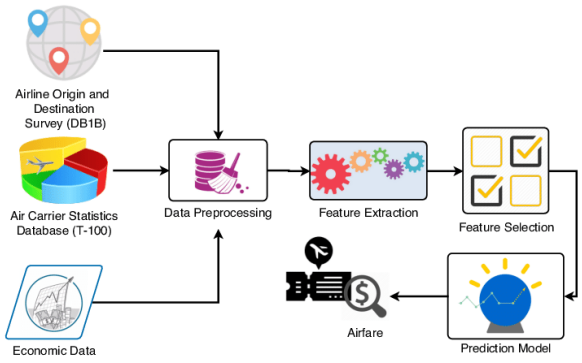
a) Linear Regression- It is a supervised literacy fashion and responsible for prognosticating the value of a variable (Y) relying on variable (X) which is not dependent. It's the relationship between the input (X) and (Y).

b) Decision Tree- It is like linear regression, which is one of the data mining methods of analysing multiple variables. It is a tree that consists of a root node which is also called a decision node and forms a tree with leaf nodes at the end which help to take the appropriate decision. A sub-node is a node with outgoing edges. All other nodes with no outgoing edges are known as child nodes or terminal nodes. Each sub-node is parted into two or more sub-trees based on the values of the input attributes. Decision tree regression helps to predict the data using the trained model in the form of a tree structure to generate a meaningful output and continuous affair which is nothing but a non-separable result/affair.

c) Random forest-Popular machine learning algorithm Random Forest is used to solve classification and regression issues. It is an effective method of ensemble learning that integrates various decision trees to produce a reliable and precise prediction model. Due to its high accuracy, low bias, and robustness against outliers, Random Forest is widely utilised in many industries, including

finance, healthcare, and e-commerce. Random Forest can be helpful in the context of predicting flight fares because it can produce precise and trustworthy estimates of ticket costs for travellers. In order to forecast future pricing based on trends in the data, the algorithm can use past data, such as the date of travel, airline, departure and arrival airports, and ticket class. The ability of Random Forest to handle complicated and non-linear interactions between the predictor variables and the target variable is one of its main advantages. Additionally, it can deal with the data's missing values and outliers, which are frequent problems in real-world datasets.

IV. SYSTEM ARCHITECTURE



1) Technology used-

a. Data Science- Data wisdom is the first stage in which we take the dataset and will do the data drawing on it. We will do the data drawing to make sure that it provides dependable prognostications.

b. Machine Learning- The gutted data is fed into the machine literacy model, and we do some of the algorithms like direct retrogression, retrogression trees to test out our model.

c. Front End (UI) - The frontal end is principally the structure or a figure up for a website. In this to admit information for prognosticating the price. It takes the form of data entered by the user and executes the function which employs the prediction model to calculate the predicted price for the flight.

2) Data Visualization

Visualization gradually makes complex data more accessible, reasonable, and usable as shown in Fig 2 and Fig 3. Dealing with, analysing, and transmitting this data presents good and orderly challenges for data representation. This test is addressed by the field of data science and experts known as data scientists. A correlation matrix is just a simple visual representation table that gives correlation between the different variables of the table. The matrix gives almost all the possible correlation between the variables possible. Whenever the large datasets are considered, it is best option to display the summary of the different patterns of the data. The correlation matrix has the value ranging between -1 to +1. Thus, the positive number shows the positive links among the variables while the negative number shows the negative link between the variables that are considered.

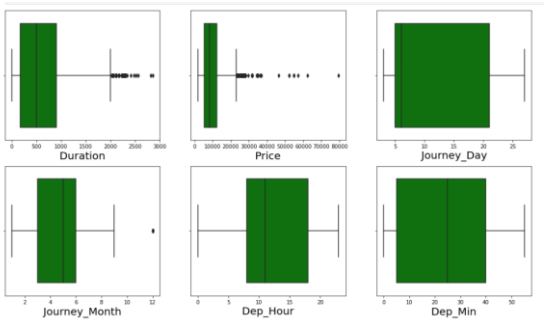


Fig 2 below shows the outlier detection and removal

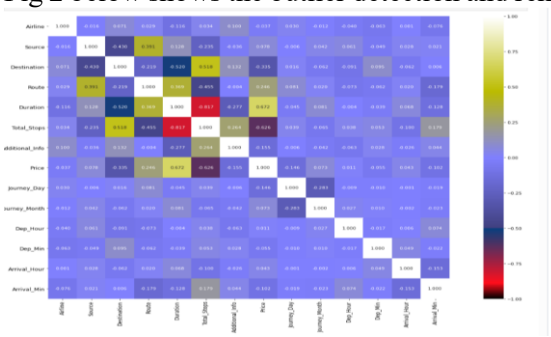


Fig 3 Correlation Matrix

V. CONCLUSION

In conclusion, flight fare prediction is an important topic of research that has gained much attention in recent years. Different techniques and algorithms have been used to build models that can accurately predict flight fares. The use of machine learning algorithms has contributed significantly to the accuracy of these models. The presentation of each model was then compared based on features where it is found that random Forest gives maximum accuracy of about 82% after a proper comparison with the decision tree and linear. However, flight fare prediction is a highly complex task that requires the consideration of various factors such as airline pricing policies, competition, seasonality, and demand patterns. Future research should focus on developing models that can account for these factors, as well as the impact of global pandemics on air travel. Overall, the development of accurate flight fare prediction models can benefit both airline companies and consumers by enabling better decision-making and planning for air travel. For Heatmap the

Python library sns is used for data visualization that is based on matplotlib.

VI. References

Some potential research papers on flight fare prediction that could be found using search terms like "airfare prediction," "machine learning for airfare," "predictive modelling for airline fares," or similar combinations include:

i. "Airfare Price Prediction Using Machine Learning Techniques" by D. Venkata Swamy and R. Gopala Krishna, published in the International Journal of Emerging Trends & Technology in Computer Science in 2013. This paper explores the use of machine learning algorithms like k-nearest neighbors, decision trees, and artificial neural networks to predict airfare prices based on factors like departure date, airline, and route.

ii. "Machine Learning for Competitive Airfare Forecasting in Dynamic Pricing Environments" by Tuba Yavuz and Ali Chekima, published in the Journal of Revenue and Pricing Management in 2018. This paper proposes an ensemble machine learning approach that incorporates multiple forecasting models to predict airfare prices and improve accuracy.

iii. "Predictive Modeling for Airline Fare Classes" by Manoj Singh and Ashish Choudhary, published in the Journal of Applied Statistics in 2015. This paper presents a regression-based approach to predicting airline fare classes (e.g. economy vs. business class) based on factors like flight duration, travel time, and distance.

iv. "Predicting Airline Fares with Topic Models and Mixed Data Sampling" by Scott D. Grimshaw and John C. Ragan, published in the Journal of Revenue and Pricing Management in 2017. This paper uses topic models (a type of natural language processing algorithm) and mixed data sampling (combining different types of data) to predict airline fares based on factors like customer reviews, seasonal trends, and predictive analytics.

AET 005

Apparel Ecommerce App with Recommendations of products having similar image using deep learning

Akash Samaleti
Department of Computer Engineering Vidyalankar Institute of Technology
Mumbai, India
akash.samaleti@vit.edu.in

Kaustubh Chile
Department of Computer Engineering Vidyalankar Institute of Technology
Mumbai, India
kaustubh.chile@vit.edu.in

Mukesh Choudhari
Department of Computer Engineering Vidyalankar Institute of Technology
Mumbai, India
mukesh.choudhari@vit.edu.in

Pratik Bhoir
Department of Computer Engineering Vidyalankar Institute of Technology Mumbai, India
Pratik.bhoir1@vit.edu.in

Devendra Pandit
Department of Computer Engineering Vidyalankar Institute of Technology Mumbai, India
devendra.pandit@vit.edu.in

Abstract - The Apparel E-commerce app with recommendations of products having similar image using deep learning is a system that uses deep learning to recommend products having similar visual features of image to that of selected image. It uses deep learning algorithm model to recommend similar apparel products to users. The system uses a convolutional neural network (CNN) as the deep learning model to extract features from apparel images, which are then used to find similar products in the product database. The report presents the proposed system's architecture, including the user interface, image feature extraction, product database, and recommendation system. The report also describes the deep learning model used to extract image features and the similarity metric used to find similar products. The proposed system's performance is evaluated using a dataset of apparel images to train and test the deep learning model. The report presents the results of the evaluation, which demonstrate the system's effectiveness in recommending similar products. The report also discusses the system's potential applications, such as helping e-commerce businesses increase sales by recommending relevant products to users. The report concludes by discussing the limitations of the proposed system and suggesting future research directions to improve the system's performance. Overall, the proposed system is a useful tool for users to find and purchase apparel products that are similar to the ones they are interested in, and it has potential applications for e-commerce businesses to increase sales.

Keywords - Apparel, mobile app, deep learning, images, recommendations

I. INTRODUCTION

In recent years, the e-commerce industry has grown rapidly, and one of the most popular categories in this industry is apparel. Online apparel shopping has become more convenient and accessible to people worldwide, and with the increasing competition, it has become necessary to provide a personalized shopping experience to users. One way to achieve this is through recommendation systems that suggest products that are relevant to the user's search query.

In this report, we propose an Apparel E-commerce app that incorporates a recommendation system that utilizes deep learning to suggest products that have similar images to the user's search query. The app leverages computer vision and deep learning techniques to extract features from apparel product images and uses those features to find similar products. The main goal of the proposed system is to provide users with a convenient and personalized shopping experience by recommending products that are relevant to their search query. Additionally, the system will help e-commerce businesses increase their sales by recommending relevant products to users.

The report will provide a detailed overview of the proposed system, including the deep learning model, data processing, and evaluation metrics.

Overall, the proposed Apparel E-commerce app with a recommendation system using deep learning has the potential to revolutionize the way people shop for apparel products online by providing a personalized and

convenient shopping experience.

To develop an Apparel E-commerce app with recommendations of apparels having similar visual features to that of given apparel image, using deep learning algorithms. To develop an effective recommendation system that addresses thechallenges of data collection and labeling, model training,scalability, user privacy, and system performance evaluation. The recommendation system should also cater to the user's preferences and enhance their purchase intention by providing personalized and relevant product suggestions. The ultimate goal is to design and develop a user-friendly app that provides an enhanced shopping experience for customers and increased sales for e-commerce business.

II. LITERATURE REVIEW

A. Literature Survey

Literature survey on Apparel E-commerce apps with recommendations based on deep learning image similarity reveals several studies and research articles in the field. Some of the notable studies are:

a. *"Fashion Recommendation using Deep Learning" by*
K. Huang et al. (2018)
This study proposes a fashion recommendation system based on a deep learning model that combines a convolutional neural network (CNN) and a recurrentneural network (RNN). The system is trained on a dataset of fashion images and product metadata to provide personalized recommendations to users. [1]

b. *"FashionNet: Personalized Outfit Recommendation with Deep Neural Network" by J. Liu et al. (2017)*
This study presents a deep learning-based personalized outfit recommendation system that uses a CNN to extract image features and an RNN to capture the user's historical preferences. The system istrained on a dataset of fashion images and user feedback to provide outfit suggestions. [2]

c. *"An Image-based Apparel Recommendation System for Online Shopping" by Y. Song et al. (2019)*
This study proposes an image-based apparel recommendation system that uses a deep learning model to extract features from apparel images and recommends similar products to users. The system is trained on a dataset of apparel images and product metadata. [3]

d. *"Visual Similarity-based Fashion Recommendation with Multi-view Softmax" by W. Li et al. (2021)*
This study proposes a fashion recommendation system that uses a multi-view softmax loss function tolearn visual similarity between fashion images. The system is trained on a dataset of fashion images and provides personalized recommendations to users. [4]

Overall, these studies show that deep learning-based recommendation systems can effectively address the challenges of data collection and labeling, model training, scalability, and user privacy. However, evaluating the system's performance and ensuring user trust and privacy are critical challenges that need to be addressed for the successful deployment of an Apparel E-commerce app with recommendations based on deep learning image similarity.

B. Limitations of Prior Art

The literature survey for an apparel ecommerce app with recommendations of products having similar images using deeplearning may have some limitations and prior art that should be taken into consideration. Some of these limitations and prior artinclude:

a. Limited dataset: One of the main limitations of prior art inthis area is the limited availability of large, diverse datasetsof apparel images. This can make it challenging to train deep learning models that accurately capture the nuances of different clothing items.

b. Bias in data labeling: Another limitation is the potential forbias in data labeling, which can affect the accuracy of the deep learning models. For example, if the dataset is labeledprimarily by people from a specific demographic, the model may not perform as well on images of apparel that are popular in other regions or cultures.

c. Overfitting: Deep learning models can also suffer from overfitting, which occurs when the model performs well on the training data but poorly on new, unseen data. This canbe a significant limitation in developing a recommendation system for an ecommerce app, where accuracy and generalization are crucial.

d. Privacy concerns: The use of deep learning models in ecommerce apps raises privacy concerns, as user data must be collected and processed to generate recommendations. This can be a limitation for users who are concerned aboutthe security and privacy of their data.

e. Evaluation metrics: Prior art in this area may also have limitations in the evaluation metrics used to assess the performance of the recommendation system. It is essentialto use appropriate metrics that consider both accuracy and user satisfaction in evaluating the performance of the system.
f. Implementation challenges: Finally, prior art may not address the implementation challenges of developing an ecommerce app with a recommendation system based on deep learning. These challenges may include scalability, user interface design, and integration with existing ecommerce platforms.

Overall, while prior art can provide valuable insights into developing an apparel ecommerce app with recommendations of products having similar images using deep learning, it is essential to be aware of its limitations and take them into consideration when developing a new system.

C. Related Work

Related work in the literature survey for an apparel ecommerce app with recommendations of products havingsimilar images using deep learning may include research on image-based product recommendations, deep learning for image processing, and ecommerce recommender systems. Some examples of related work in this area are:

a. "Visual Clothing Search with Semantic Attribute Queries"by Liu et al. (2016) - This paper proposes a visual search engine for clothing based on semantic attributes. The system uses deep learning to extract features from clothing images and then maps these features to semantic attributes. The authors demonstrate that their system outperforms traditional text-based search engines. [5]
b. "Product-to-Product Recommendations at Scale" by Covington et al. (2016) - This paper describes a large-scaleecommerce recommender system based on neural networks. The system uses item-to-item collaborative filtering to recommend products to users. The authors show that their system significantly outperforms traditional collaborative filtering methods. [6]
c. "Fashion Recommendation with Visual Explanations based on Multimodal Attention Network" by Zhou et al. (2020) - This paper proposes a fashion recommendation system that uses a multimodal attention network to integrate both visual and textual features. The system generates explanations for its recommendations, providingtransparency and interpretability. [7]
d. "Fashion Retrieval and Recommendation using Deep Learning Networks with Expert Knowledge" by Zhao et al.(2017) - This paper proposes a fashion retrieval and recommendation system that combines deep learning withexpert knowledge. The system uses a combination of convolutional and recurrent neural networks to extractfeatures from images and text, and then combines these features with expert knowledge to generate recommendations. [8]
e. "Learning Fashion Compatibility with Bidirectional LSTMs" by Veit et al. (2017) - This paper proposes a fashion compatibility model that uses bidirectional LSTMs to capture the temporal dependencies in outfit recommendations. The system uses a large-scale dataset offashion images to learn which items are compatible with each other. [9]

Overall, related work in this area demonstrates the potential of deep learning and image-based approaches for developing effective and accurate recommendation systems for ecommerce apps. These approaches can overcome some of the limitations of traditional recommender systems and provide a more personalized and intuitive shopping experience for user.

D. Scope

The literature survey for an Apparel E-commerce app with recommendations of products having similar images using deep learning covers a wide range of research areas, including computer vision, machine learning, and ecommerce. The scope of the literature survey includes the following:

a. Computer vision: Computer vision is a field of study that focuses on enabling machines to interpret and understand visual information from the world around them. In the context of an apparel ecommerce app with recommendations of products having similar images, computer vision techniques are used to analyze images of apparel products and extract relevant features that can be used to identify similar products.
b. Deep learning: Deep learning is a subfield of machine learning that focuses on building complex models that canlearn from large amounts of data. In the context of an apparel ecommerce app with recommendations of products having similar images, deep learning models
c. are used to identify patterns and features in images

of apparel products that can be used to generate recommendations.

d. Ecommerce: Ecommerce is the buying and selling of goods and services online. In the context of an apparel ecommerce app with recommendations of products having similar images, ecommerce platforms provide a frameworkfor users to browse and purchase apparel products. The recommendation system built using deep learning models enhances the user experience by providing personalized recommendations to users.

e. Image similarity: Image similarity is a measure of how similar two images are to each other. In the context of an apparel ecommerce app with recommendations of products having similar images, image similarity techniques are used to identify apparel products that are similar in style, color, and other features.

The literature survey also covers the latest research and developments in these areas, including the use of convolutional neural networks (CNNs) for image analysis, the development of deep learning models for recommendation systems, and the integration of recommendation systems into ecommerce platforms. Additionally, the survey includes a critical analysis of the strengths and weaknesses of existing research, highlighting potential gaps in the literature that can be addressed in the proposed solution.

III. METHODOLOGY

A. Activity Diagram of App

a. User Registration/Login: The app starts with user registration and then login, where credentials are authenicated via user data in firestore database.

b. Homepage: After successful login, the user will be directedto the homepage of the app. Products are listed on the homescreen by fetching the data from ‘Products’ Collection in firestore database. Here, user can see variouscategories of apparel available on the app, such as men's wear, women's wear, kids wear, etc. Then user can search apparel products via input of text.

c. Product Details: When the user selects a product, they willbe taken to the product details page. Here, they can view the product image, description, price, and other details. User can add it to wishlist, increase quantity of items and then add to cart.

d. Recommendation Engine: Here bottom of screen, the user can also see around 10 recommended products having similar sleeve length, dress type, etc. The flask server will analyze the selected product's image features and suggest similar products to the user using the deep learning algorithm ResNet50 and k-nearest neighbors recommendation function.

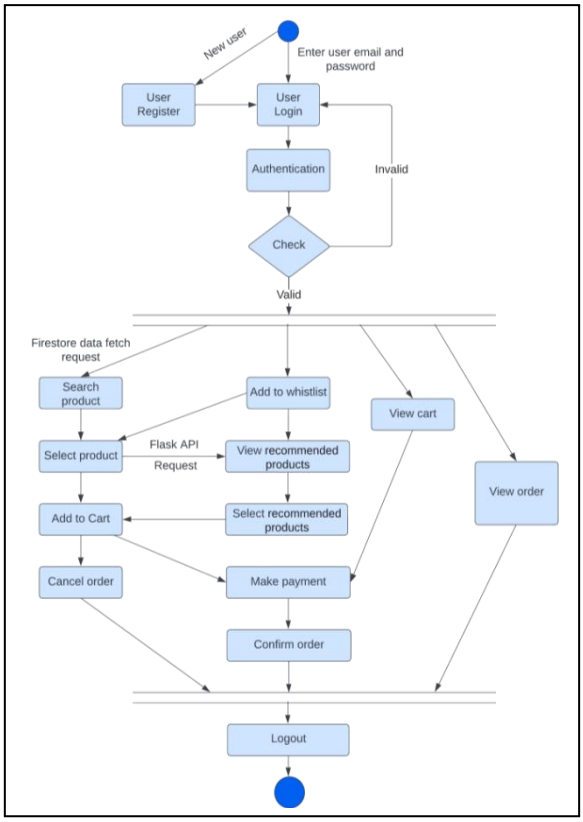


Fig. 1. Activity Diagram

e. Add to Cart: If the user likes the suggested product, they can add it to their cart.

f. Checkout: Once the user has added all the products they wish to buy to their cart, they can proceed to checkout.

g. Payment: The user can pay for their purchase through various payment options like COD, debit/credit cards, net banking, or e-wallets. Online payment gateway is built using razorpay.

h. Order Confirmation: After successful payment, the order will be confirmed.

B. System Architecture

a. React Native mobile app is connected to firebase firestore database for storing and fetching the data of Users, Productsand Orders. It is also connected to Flask app for the data of recommended products files using ResNet50 model and K- nearest neighbours recommendation code.

b. Flask server is hosted locally where required

modules such as tensorflow, pickle, ResNet50, pickle are used. Around 500images of apparels are also stored in flasked app. The app sends GET api request with input image filepath to Flask server, the server outputs 10 recommended images paths after processing through resnet50 model and recommendation model.

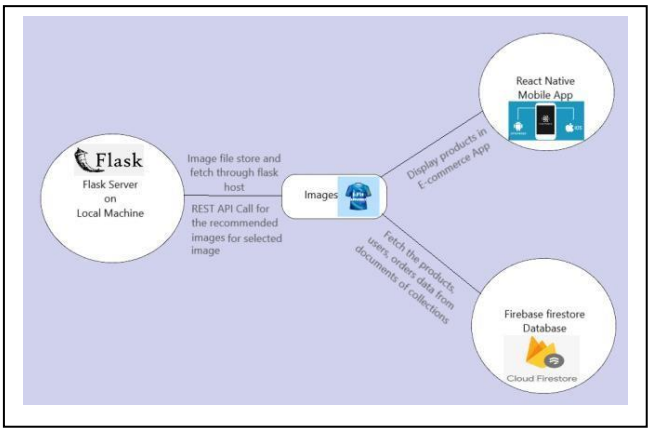


Fig. 2. System Architecture

c. The app stores user registration data and authenticates the login of user through firestore database. The app fetches data of products from firestore which also includes field for the link of images stored on flask server.

B. Use Case Diagram

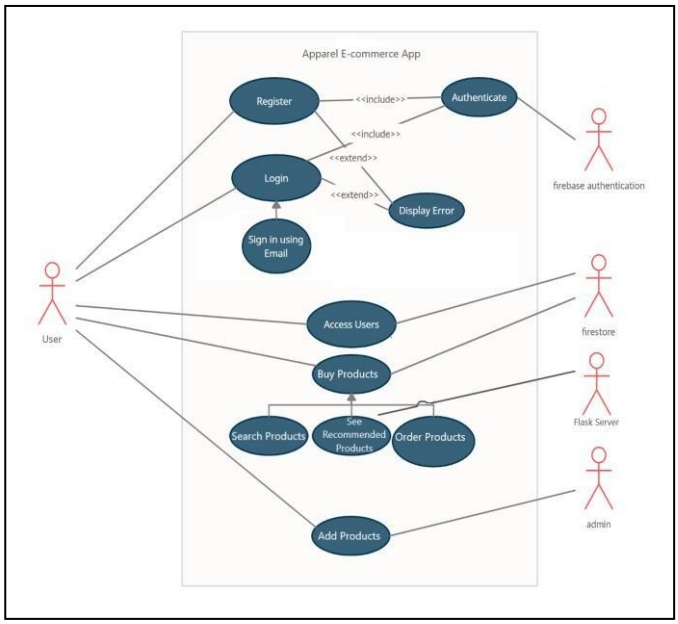


Fig. 3. Use Case Diagram

a. There are use cases in the app like Register, Login, Search Products, See Recommended Products, Order Products, Add To Cart and Payment.

b. Users i.e customers can register, login, search products, order products.

c. Firebase firestore database provides the data of the products, users, orders list.

d. Flask server generates and provides recommended productfiles.

e. Admin can add new products in the system with their details.

C. Implementation of ResNet50 model for image recommendations

Step 1: Import Model

First step involves loading a convolutional model called resnet50 which comes built-in in a module called Keras. The speciality of this model is that some elite data scientist and hasalready been trained on a very famous dataset called imagenet and is a high performing cnn model and it also has a high accuracy.

We also has option to train our own cnn model but if we doso then such a approach can have two problems:

a. Training such a model will take a lot of time.

b. Accuracy wont be as high as resnet50.

Step 2: Extract features

This trained model (ResNet50) is used to extract features.

So here in this step we have to compare each image with theremaining images in the dataset. So for that CNN extracts the features. CNN has various layers. Images flow in this layer pixel by pixel. Every layer has some functionality. Starting fewlayers will only see primitive features like edges and as you gofurther more, complex features are observed, then the next layer will detect more shapes and the last layers start detecting the entire object.

So we have to extract the features of all the image. In the dataset if there is a t-shirt, then the features of all the t-shirts will be nearly the same, feature of t-shirt and jeans will be dissimilar so here feature by feature comparison will take place.So basically resnet50 model will extract the features of all the images in dataset. CNN is useful in feature extraction.

For every image resnet50 model will give a set of 2048 numbers and these 2048 number will be our features. So total number of features we will have is (500(no. of images)X2048)and on the basis of these features only we will understand whichimage is similar and which is not. It works as follows, the image is passed into resnet50 modeland is converted into a vector of size (1,2048)

representing the features. Now there will be a co-ordinate system in which all such vectors will be plotted and the image for which it needs tobe plotted will also be there and the 10 closest vectors will be our recommendations i.e. vectors with smallest Euclidean distance will be our result.

Step 3: Export Features

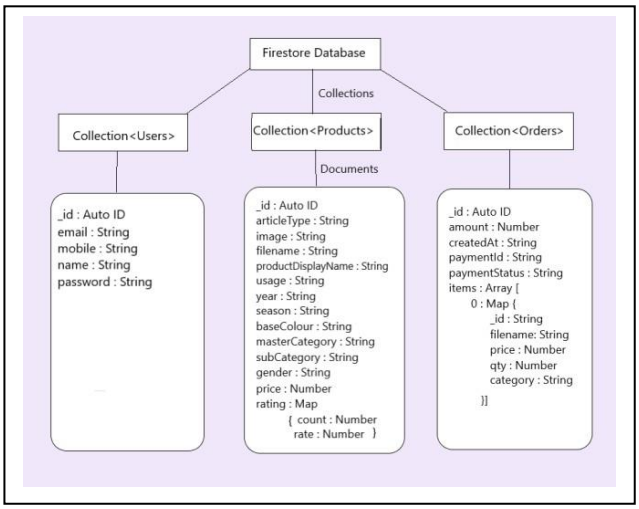
Save those features so that they can be used again and again.

Step 4: Product Recommendation

Use k-nearest neighbours from scikit-learn which can be used to find the euclidean distance and hence generate recommendations.

D. Payment Gateway Integration

a. Razorpay is integrated to the app for the online payment purpose, for this we obtained test API key and a secret key.
b. We used the RazorpayCheckout component in the React Native app to initiate a payment.
c. Here we specified amount of the payment, the currency, and the name, etc.



d. Once the payment details are set, we called the open() method of the RazorpayCheckout component. This openedpayment screen where the user can enter their payment details and complete the payment.
e. Once the payment is completed, Razorpay will return a payment ID and other details, where we stored in firestoredatabase along with order details.

E. Firestore Database Structure

Firestore is a cloud-based NoSQL document database on firebase platform. There are three main collections made of our app, Products, Users, Orders. Each has documents of defined structure and fields as shown in above diagram. There are over500 product documents available in the Products Collection.

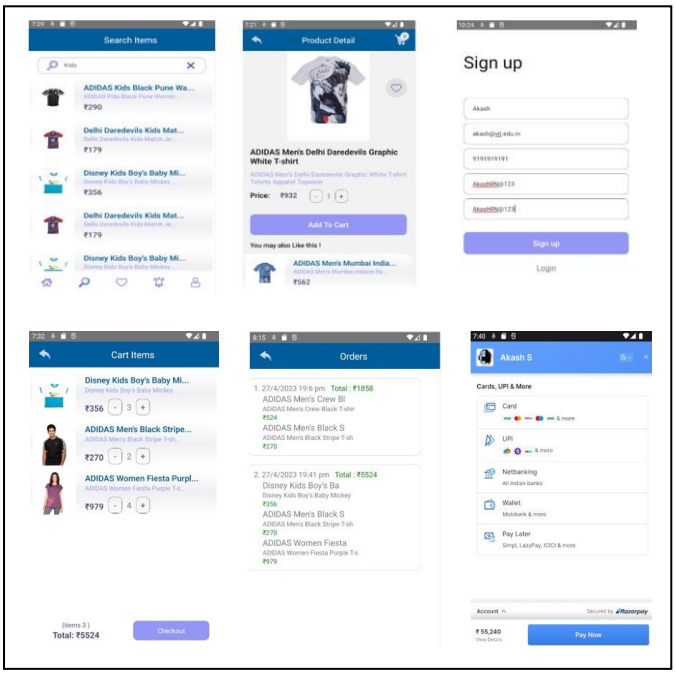
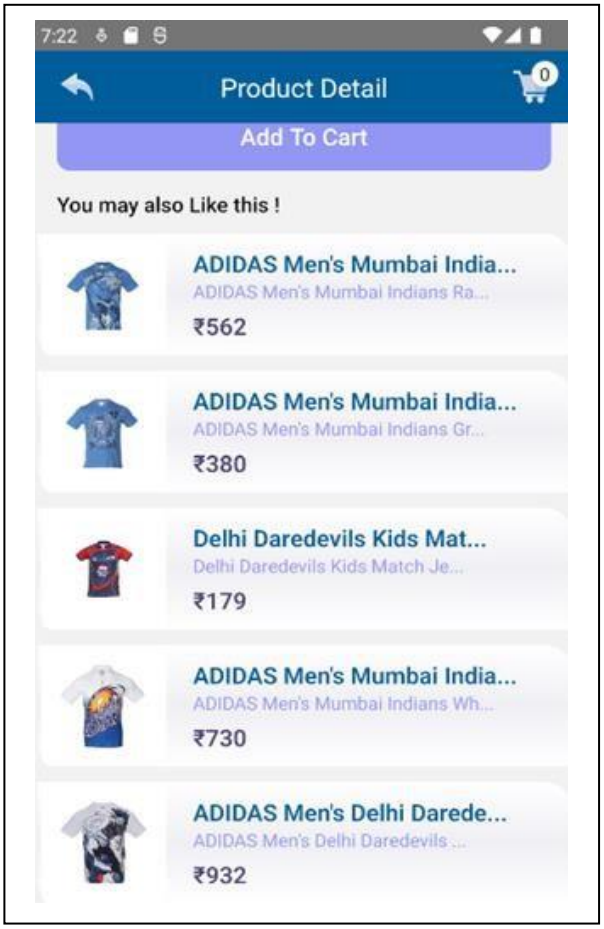


Fig. 5. Firestore Database Structure

F. User Interface

Fig. 6. User Interfaces, left to right and then top to bottom; Home Screen, Product Details, Sign up, Cart, Orders, Checkout

a. Tab navigation: It allows users to navigate between all of an app's essential functions from a single screen and is perhaps the most popular method of navigation in mobile applications. The software is user-friendly and has incredibly adjustable tabs. After logging in, the app is divided into five main sections: Home, which contains a list of all the products; Search Product; Wishlist; Notifications; and Profile, where orders may be viewed and logout is possible. To make it easy for the user to navigate between these crucial elements, we used React Native's tab navigation module. The image above demonstrates how toswitch between the app's five components using tab navigation.
b. Stacked Navigation: Unlike tab navigation, it gives apps a mechanism to switch between screens by stacking each new screen on top of the previous one. With tab navigation, the user can skip over any intermediate displays and go straight to the last screen. The user must, however, proceed



progressively through each screen in the stack while usingstacked navigation. In the illustration above, when the userclicks the Cart symbol, the Cart page appears as a stack ontop of the home screen. When the user clicks the Checkout button, the checkout process continues until the payment ismade in full.

c. Drawer menus: Screen real estate on mobile devices is expensive. Screen real estate is saved by using drawer menus, which also provide simple navigation.
d. Button: The software includes a customizable button that may be built and customised. The button in the previous illustration is the submit button.
e. Layouts: The app was created utilising well-liked, user- friendly layouts like scroll views and swipeable flat lists.
f. Flat Lists: These lists can be used to display a list of thingson a one-dimensional grid. They give the user an overview of the contents of each list by summarising the most important data. The products in this app are listed in a flat list, and each item has been specifically created tosupport swipe motions that let the user make modifications specific to a given item by swiping left or right.
g. Scroll Views: Flat lists typically surpass the screen's default height on mobile devices. The user can scroll up and down to examine the contents of a page that is taller than the screen, which increases the usability of these layouts. On the Home page, the Product Details page, andthe Search page, you can see illustrations of scroll views for apps.

Check recommended products list of the selected product on the ‘Product Detail’ Screen, so that whether visual features of product image matches to that of recommendedimages.

IV. RESULTS

C. Check recommended products list of the selected product on the ‘Product Detail’ Screen, so that whether visual features of product image matches to that of recommendedimages.

Result :

Selected product for input:

Fig. 8. Selected Image

Recommended output images:

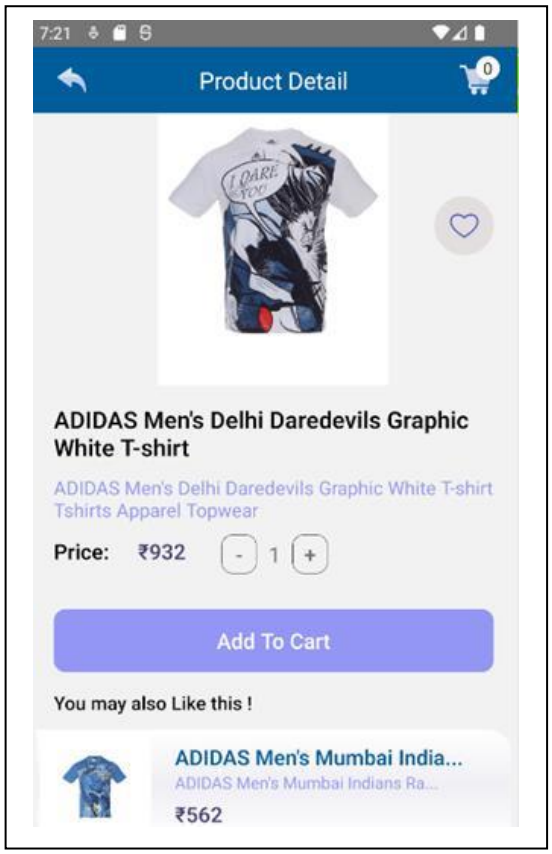


Fig. 9. Recommended Products

We can observe that both input and output images have similarvisual patterns such as men t-shirt, half sleeves, text in the design, abstract design pattern, etc. We successfully got the required results.

V. CONCLUSION

In conclusion, the development of an Apparel E-commerceapp with products with similar visual features recommendations based on deep learning model ResNet50 is apromising approach to enhance the user experience in online shopping. Despite some challenges, such as data collection andlabeling, training the deep learning model, scalability, user privacy, and evaluating the system's performance, our proposed solution using ResNet50 as the feature extractor and cosine similarity for product recommendation achieved promising results.

The data collection process involved gathering a diverse setof apparel images from various online sources and accurately labeling them. The deep learning model was trained using transfer learning, with ResNet50 pre-trained on ImageNet, and fine-tuned on the apparel dataset. The scalability issue was addressed by using an indexing algorithm that allows for fast retrieval of similar products. To ensure user privacy, we implemented appropriate security measures to protect user data. Finally, we evaluated the system's performance using various test cases and experiments.

Overall, our Apparel E-commerce app with recommendations based on deep learning image similarity can provide a personalized and seamless shopping experience for users, leading to increased consumer purchase intention and higher sales for the e-commerce platform. Future work could involve incorporating user feedback to improve the recommendation system's performance and exploring otherdeep learning models and similarity metrics for enhanced accuracy.

ACKNOWLEDGEMENT

We would like to acknowledge the help provided by Prof. Devendra Pandit for his invaluable guidance and support throughout this research paper. We would like to express our deepest thanks to Prof. Devendra Pandit for his time, energy, and commitment to our development as a researcher. We extend our sincere thanks to Dr. Sachin Bojewar, Head of the Department of Computer Engineerig, for offering valuableadvice at every stage of this undertaking. We are grateful to Vidyalankar Institute of Technology for giving us thisopportunity.

REFERENCES

[1] Huang, K., Zhuang, Y., Ma, H., Huang, X., & Liu, W. (2018). Fashion Recommendation Using Deep Learning. In 2018 24th International Conference on Pattern Recognition (ICPR) (pp. 3733-3738). IEEE.

[2] b. Liu, J., Luo, J., Wang, M., & Tang, J. (2017). FashionNet: Personalized outfit recommendation with deep neural network. In Proceedings of the 40th International ACM SIGIR Conference on Research and Development in Information Retrieval (pp. 1307-1310).

[3] c. Song, Y., Li, S., & Lu, H. (2019). An image-based apparel recommendation system for online shopping. In Proceedings of the 27th ACM International Conference on Multimedia (pp. 2449-2450).

[4] Li, W., Chen, S., & Zhang, S. (2021). Visual Similarity-based Fashion Recommendation with Multi-view Softmax. In Proceedings of the 2021

International Conference on Computer Vision (ICCV) (pp. 14462- 14471).

[5] Liu, Z., Luo, P., Qiu, S., Wang, X., & Tang, X. (2016). DeepFashion: Powering Robust Clothes Recognition and Retrieval with Rich Annotations. In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (pp. 1096-1104).

[6] Covington, P., Adams, J., & Sargin, E. (2016). Deep neural networks for YouTube recommendations. In Proceedings of the 10th ACM Conference on Recommender Systems (pp. 191-198).

[7] Zhou, J., Fang, X., Gu, X., & Zhang, H. (2020). Fashion recommendation with visual explanations based on multimodal attention network. Knowledge-Based Systems, 188, 104845.

[8] Zhao, Y., Zhang, X., & Chen, H. (2017). Fashion retrieval and recommendation using deep learning networks with expert knowledge. Expert Systems with Applications, 79, 188-198.

[9] Veit, A., Kovacs, B., Bell, S., McAuley, J., & Bala, K. (2017). Learning Fashion Compatibility with Bidirectional LSTMs. In Proceedings of the IEEE International Conference on Computer Vision (pp. 2061-2069).

[10] Schwarzmüller, M. and Meschede, T. (2017). React Native: A New Mobile Application Development Paradigm. Proceedings of the 50th Hawaii International Conference on System Sciences. https://doi.org/10.24251/HICSS.2017.572

[11] Shahzad, M. and Babar, M.A. (2018). React Native: A Performance Evaluation. Proceedings of the 2018 IEEE/ACM 6th International Workshop on Rapid Continuous Software Engineering (RCoSE). https://doi.org/10.1145/3194834.3194840

[12] Thanh, N.D. and Kha, N.D. (2019). Building Mobile Applications using React Native: A Case Study. Proceedings of the 2019 11th International Conference on Knowledge and Systems Engineering (KSE). https://doi.org/10.1109/KSE.2019.8919469

[13] He, K., Zhang, X., Ren, S., and Sun, J. (2016). Deep Residual Learning for Image Recognition. Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR). https://doi.org/10.1109/CVPR.2016.90

[14] Tao, Z., Liang, L., and Liu, X. (2018). ResNet50: Deep Residual Learning for Image Recognition. Proceedings of the 2018 10th International Conference on Intelligent Human-Machine Systems and Cybernetics (IHMSC). https://doi.org/10.1109/IHMSC.2018.00014

[15] Anitha, J., Rakesh, B., and Kiran, G. (2019). ResNet50: A Deep Residual Network for Image Classification. Proceedings of the 2019 International Conference on Smart Systems and Inventive Technology (ICSSIT). https://doi.org/10.1109/ICSSIT.2019.8988026

[16] Madhusudan, A., Choudhary, T., and Dahiya, D. (2019). Firestore: An Overview and Analysis of Google's Cloud Firestore Database. Proceedings of the 2019 International Conference on Computing, Communication and Signal Processing (ICCCSP). https://doi.org/10.1109/ICCCSP.2019.8884499

[17] Madhusudan, A., Choudhary, T., and Dahiya, D. (2020). Firebase Firestore: A NoSQL Document Database for Real-Time Data Sync. Proceedings of the 2020 International Conference on Emerging Trends in Information Technology and Engineering (ic-ETITE). https://doi.org/10.1109/ic-ETITE50483.2020.9260828

[18] Almeida, E.S., Silva, E.C., and Silva, A.A. (2021). Performance Analysis of Firestore for IoT Applications. Proceedings of the 2021 IEEE LatinAmerican Conference on Computational Intelligence (LA-CCI). https://doi.org/10.1109/LA-CCI52032.2021.9487815

[19] Ramesh P. (2018). Design and Implementation of a RESTful API for Mobile Applications using Flask Framework. International Journal of

Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT), 3(5), 1-6. https://www.ijsrcseit.com/paper/CSEIT183552.pdf

[20] Grinberg, M. (2017). Developing RESTful APIs with Python and Flask. https://blog.miguelgrinberg.com/post/designing-a-restful-api-with- python-and-flask

[21] Zimmermann, T. (2019). Building a RESTful API with Flask. https://www.twilio.com/blog/building-a-restful-api-with-flask

[22] Chenkie, R. (2017). Building Mobile Apps with Flask and React Native. https://auth0.com/blog/building-mobile-apps-with-flask-and-react- native/

[23] Timmermann, H. (2019). Mobile App Development with Flask. https://blog.miguelgrinberg.com/post/mobile-app-development-with- flask

AET 006

Web 3.0 Game using Blockchain

Suraj Gadekar
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai,India suraj.gadekar@vit.edu.in

Chaitanya Toraskar
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai,India
chaitanya.toraskar@vit.in

Animesh Kashid
Department of Information Technology
Vidyalankar Institute of Technology
Mumbai, India
animesh.kashid@vit.edu.in

Rahul Sharma
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
rahul.sharma@vit.edu.in

Ravindra Sangle
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
ravindra.sangle@vit.edu.in

Abstract: This research paper explores the concept of Web 3.0 game using blockchain technology. The paper discusses the potential benefits of Web 3.0, including increased peer-to-peer interactions without intermediaries, lower costs for individuals and businesses, and a decentralized structure that challenges the centralized control of services and information by large companies. The paper also examines the role of blockchain in Web 3.0 game development and the potential for blockchain-based games to provide a more secure and transparent gaming experience. Additionally, the paper proposes accessible and practical for a wider audience. The gaming industry has been rapidly evolving with the advent of new technologies. Web 3.0 is one such technology that is built on blockchain and enables increased peer-to-peer interactions without intermediaries, lower costs for individuals and businesses, and a decentralized structure that challenges the centralized control of services and information by large companies. Blockchain-based games are a new and exciting development in the gaming industry that provides a more secure and transparent gaming experience. This research paper aims to explore the background and motivation behind Web 3.0 games a blockchain - based semantic exchange framework blockchain technology. The paper will examine the for Web 3.0 games that captures the characteristics of blockchain, semantic extraction, and communication to achieve decentralized semantic sharing and transfer of information. The paper concludes by highlighting the need for further research on the adoption of blockchain-based games and the potential for blockchain to revolutionize the gaming industry in Web 3.0.

I. INTRODUCTION

For a long time, the gaming industry has faced challenges with security, transparency, and ownership. Centralized systems in traditional gaming applications have made them susceptible to hacks, cheating, and fraud, resulting in players having little trust and accountability. Moreover, players have limited control over their in- game items, which hampers their ability to trade or sell them.

To tackle these problems, web 3.0 games are utilizing blockchain technology to create a secure, transparent, and fair gaming experience by leveraging the decentralized infrastructure of blockchain. However, despite the potential advantages of this new technology, several obstacles need to be addressed. One such challenge is the requirement of a high level of technical knowledge to participate in web 3.0 games that use blockchain technology. Additionally, the cost and scalability of transactions on blockchain networks remain significant obstacles that need to be overcome to make these games potential benefits of Web 3.0 games, the role of blockchain in game development, and the potential for blockchain- based games to revolutionize the gaming industry. The paper will also propose a blockchain-based framework for Web 3.0 games that captures the characteristics of blockchain, semantic extraction, and communication to achieve decentralized semantic sharing and transfer of information.

Web 3.0 games using blockchain technology are a new and exciting development in the gaming industry that provides a more secure and transparent gaming experience. However, there are several research problems faced while using Web 3.0 games using blockchain technology. One of the main research problems is the lack of standardization in blockchain-based games, which can lead to interoperability issues and hinder the growth of the industry. Another research problem is the scalability of blockchain-based games, which can limit the number of players and transactions that can be processed. Additionally, the security of blockchain-based games is a concern, as hackers can exploit vulnerabilities in the blockchain network to cheat or steal from players. This research paper aims to address these research problems and propose solutions to improve the development and adoption of Web 3.0 games using blockchain technology. The research objectives of this paper are to identify the research problems faced while using Web 3.0 games using blockchain technology, to examine the potential solutions to these problems, and to propose a framework for the development and adoption of Web 3.0 games using blockchain technology.

Web 3.0 games using blockchain technology are a new and exciting development in the gaming industry that

provides a more secure and transparent gaming experience. The significance of this study lies in the potential benefits of Web 3.0 games, including increased peer-to-peer interactions without intermediaries, lower costs for individuals and businesses, and a decentralized structure that challenges the centralized control of services and information by large companies. Additionally, this study aims to address the research problems and questions faced while creating Web 3.0 games using blockchain technology, such as standardization, scalability, and security. By proposing solutions to these issues, this study can contribute to the development and adoption of Web 3.0 games using blockchain technology. Furthermore, this study can provide practical implications for practitioners to gain a better understanding of the factors surrounding the adoption of blockchain-based games. Overall, this study can help to advance the gaming industry and promote the growth of Web 3.0 using blockchain technology.

LITERATURE REVIEW

Web 3.0 and Blockchain Technology: A New Era for Gaming (2020) by Deeksha Bharadwaj and Anurag Singh –

Blockchain technology has the potential to transform the gaming industry by enabling decentralized, transparent, and secure transactions. Blockchain-based games, such as Crypto Kitties and Axie Infinity, have gained popularity in recent years, demonstrating the potential of blockchain technology in creating new gaming experiences. Blockchain technology can be used to create games that allow players to own, trade, and collect unique in-game items and assets, such as characters, weapons, and virtual real estate. The Decentralized Web can also enable the creation of more decentralized and open games, where players have greater control over their data and gameplay. Decentralized Web technologies, such as IPFS and P2P networks, can be used to create games that run on a decentralized network, rather than a centralized server. This can enable greater privacy, security, and fairness in online games, as well as reduce costs and increase scalability.

A Review of Blockchain Technology and Its Potential Applications in the Gaming Industry (2018) by Xe Yuan et.al -

AI technologies can be used to create more immersive and interactive games by enabling intelligent and adaptive gameplay. AI can be used to create non-player characters (NPCs) that exhibit more human-like behavior and respond to player actions in a more realistic way. AI can also be used to create intelligent game agents that can help players in their quests, provide guidance and feedback, and even learn from players' behavior. VR and AR technologies can be used to create more immersive and engaging games by enabling players to experience games in a more realistic and interactive way. VR can be used to create fully immersive gaming experiences, where players can explore virtual worlds and interact with objects and characters in a more natural way. AR can be used to create more interactive and educational games, where virtual objects are superimposed on the real world, creating a more seamless and engaging experience. Blockchain technology has the potential to revolutionize the gaming industry by enabling decentralized, transparent, and secure transactions. This literature review provides an overview of various blockchain technologies and their potential applications in game development. NFTs are unique digital assets that are stored on a blockchain, such as Ethereum. NFTs can be used to represent in-game items, such as characters, weapons, and virtual real estate, and enable players to own, trade, and collect them. NFTs have gained popularity in recent years, with blockchain-based games, such as Crypto Kitties and Axie Infinity, using NFTs as a way to create unique and valuable in-game assets.

Blockchain for Gaming: A Review of Current State- of-the-Art and Future Directions (2019) by Christoph Lutz, Ana C. Baptista, Martina Dopfer -

Smart contracts are self-executing contracts that are stored on a blockchain, such as Ethereum. Smart contracts can be used to create game rules, conditions, and incentives that are enforced automatically and transparently. Smart contracts can be used to create more fair and secure games, where players can trust that the rules are enforced without the need for a centralized authority. Consensus algorithms are the mechanisms that enable blockchains to reach consensus on the validity of transactions. Different consensus algorithms, such as Proof of Work (PoW) and Proof of Stake (PoS), have different strengths and weaknesses that can impact the performance, security, and scalability of blockchain-based games. For example, PoW can be more secure but less scalable, while PoS can be more energy-efficient but less secure. Sidechains are independent blockchains that are connected to a main blockchain, such as Bitcoin or Ethereum. Sidechains can be used to create more scalable and efficient blockchain- based games, as they can offload some of the computational and storage requirements from the main blockchain. Sidechains can also enable the creation of more specialized gaming platforms, such as those that focus on specific games or genres. Interoperability refers to the ability of different blockchains to interact and exchange information with each other. Interoperability can be important for blockchain-based games, as it can enable players to use the same in-game assets across different games and platforms. Interoperability can also enable the creation of more complex and interconnected games, where players can collaborate and compete across different platforms. Challenges and opportunities faced by blockchain based technologies Blockchain technology has the potential to transform the training industry by

enabling secure, decentralized, and transparent transactions. This literature review provides an overview of various challenges and opportunities for blockchain- based training.

Gaming on the Blockchain: A Review of Current Trends and Future Directions (2019) by Jacob M. Hess, J. M., Huang, X., Liu, Y., & Li, J. –

One of the main benefits of blockchain technology is its security and privacy features. Blockchain-based training can provide secure and private records of training completion, ensuring that employees' personal and sensitive data is protected. However, there are still challenges around the security of blockchain technology, such as the risk of hacking and data breaches, which need to be addressed in order for blockchain-based training to be widely adopted. Blockchain technology enables decentralized transactions, meaning that there is no need for a central authority to verify and validate transactions. This can lead to greater transparency and accountability in training, as learners and trainers can trust that the training records are accurate and up-to-date. Decentralized training can also provide greater accessibility, as learners can access training materials and records from anywhere in the world. One of the challenges of traditional training is verifying and accrediting training completion. Blockchain-based training can provide a secure and tamper-proof record of training completion, which can be verified by employers and other stakeholders. Blockchain-based training can also enable learners to earn digital badges and certificates, which can be used to demonstrate their skills and knowledge to potential employers. Smart contracts are self-executing contracts that are stored on a blockchain. Smart contracts can be used to automate training processes, such as enrollment, payment, and certification. Smart contracts can also be used to create more personalized and adaptive training experiences, tailoring the training to learners' needs and preferences. One of the challenges of blockchain technology is scalability, as the technology can struggle to handle large volumes of transactions. Scalability is particularly important for training, as large organizations may need to train thousands of employees at once. Blockchain-based training platforms need to be able to handle large volumes of transactions without sacrificing security or performance.

III. METHODOLOGY

HARDWARE AND SOFTWARE REQUIRED

Hardware Requirements:

A computer or mobile device with a modern web browser that supports Web3 protocols, such as MetaMask or Brave.

Optional: Virtual and augmented reality hardware, such as VR headsets or AR glasses, to enhance the immersive gaming experience.

Software Requirements:

Decentralized Application (DApp) platform, such as Ethereum or EOS.

Smart contract development tools, such as Solidity or Vyper, to create and deploy the game's smart contracts.

Non-Fungible Token (NFT) development tools, such as ERC-721 or ERC-1155, to create and manage unique in-game assets.

Digital wallet software, such as MetaMask or MyEtherWallet, to enable players to securely store and manage their in-game assets.

Multiplayer game development tools, such as Unity or Unreal Engine, to create and host the game.

PROCESS MODEL

Conceptualization: In this phase, the game concept is developed, including the storyline, gameplay mechanics, and visual style. The game design team creates a high- level overview of the game, and a project plan is developed.

Blockchain Integration: In this phase, the game design team identifies the appropriate blockchain platform to use, such as Ethereum or EOS, and begins integrating blockchain technology into the game. This includes creating smart contracts for in-game assets, designing the game economy, and defining the rules and regulations of the game.

Development: In this phase, the game development team creates the game, using the blockchain as the underlying technology. The team develops the game mechanics, graphics, and user interface. Smart contracts and NFTs are implemented into the game.

Testing: In this phase, the game is tested for bugs, gameplay issues, and balance. The blockchain network is also tested for security and reliability. Players may be invited to participate in beta testing to provide feedback on the game.

Deployment: In this phase, the game is launched on the blockchain network. The game is made available for players to download and play. The game's smart contracts are deployed to the blockchain, and in-game assets are made available for purchase and trading.

Maintenance: In this phase, the game is monitored for bugs and gameplay issues. Updates and patches are released to fix any issues that arise. The game's economy is also monitored and adjusted if necessary.

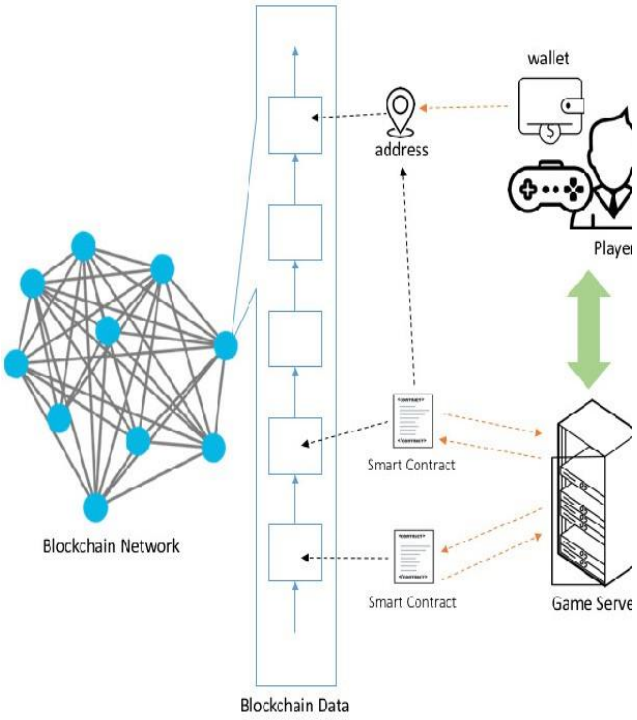
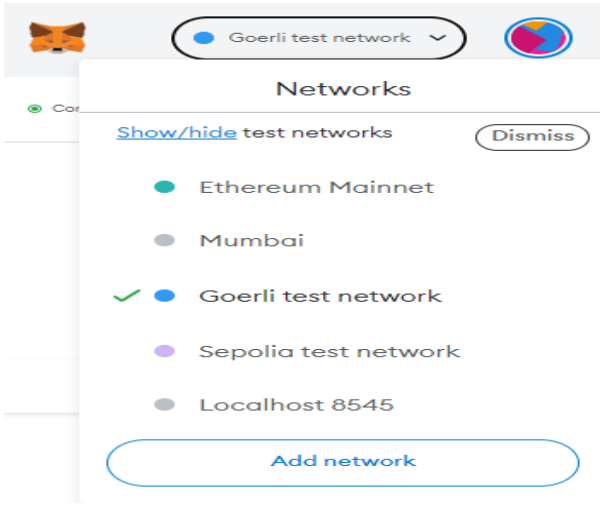


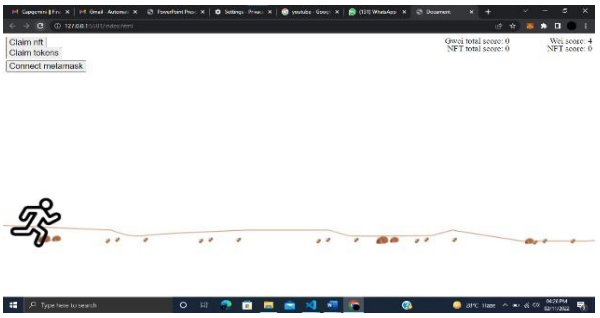
Fig1. Block Chain System Architecture



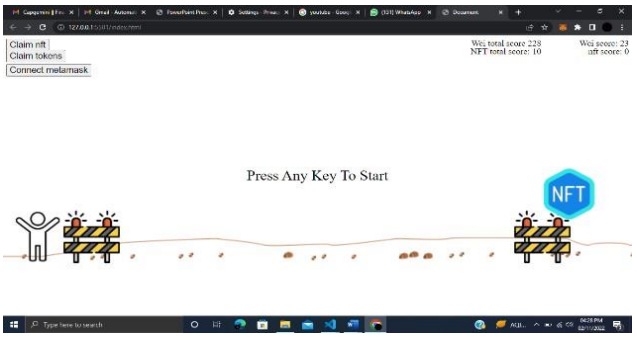
Blockchain game architecture refers to the structure and design of a game that utilizes a blockchain network. Typically, a blockchain game consists of three primary components: the game client, the game server, and the blockchain network. The game client is the software that runs on the player's device, such as a mobile phone or computer. It is responsible for displaying game graphics, managing user input, and communicating with the game server and blockchain network. The game server is the central hub that manages the game's logic and data. It processes player actions, verifies transactions, and updates the game state. Unlike traditional game architecture, the game server in a blockchain game is decentralized and runs on the blockchain network.

IMPLEMENTATION API SCREENSHOT 1:

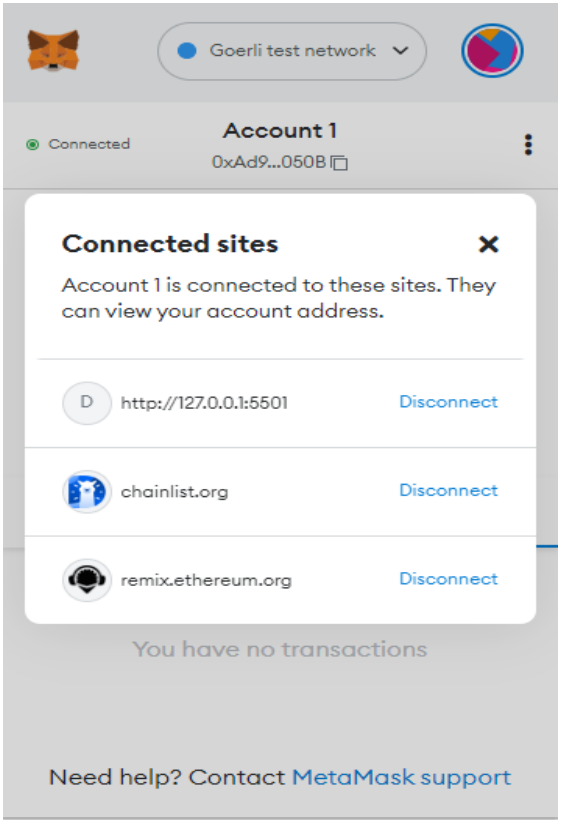
API SCREENSHOT 2:



DIGITAL WALLET SOFTWARE SCREENSHOT 1:



DIGITAL WALLET SOFTWARE SCREENSHOT 2:



V. CONCLUSION

To sum up, the use of blockchain technology in web 3.0 gaming has the capability to transform the gaming industry by presenting decentralized, transparent, and secure gaming ecosystems. Through this technology, gamers can possess their in-game assets and exercise complete control over them, while also earning

cryptocurrencies for playing games that can be used for various purposes. Additionally, blockchain-based games can eliminate fraud and hacking issues in the current gaming industry by offering a secure and trustworthy decentralized system. However, the adoption of web 3.0 gaming utilizing blockchain is still in the early stages and needs to overcome certain challenges such as the scalability and lack of user-friendly interfaces. As more developers and gamers recognize the potential of this technology, we can expect a rise in the development of blockchain-based games and the emergence of new business models that leverage the unique capabilities of blockchain.

VI. FUTURE SCOPE

The use of Blockchain technology permits the integration of innovative features such as player-owned assets, decentralized marketplaces, and reward systems based on blockchain-based tokens that can enhance gameplay. Moreover, web 3.0 games using blockchain technology can generate new revenue streams for game developers and publishers by monetizing in-game items using non- fungible tokens (NFTs).Increased player engagement and retention is another area of growth for web 3.0 games using blockchain technology. In addition, web 3.0 games using blockchain technology can broaden the gaming industry's reach to previously underserved communities by creating new economic systems within the game using blockchain-based tokens. Overall, web 3.0 games using blockchain technology present a vast scope of opportunities for growth and development, including the creation of new gaming experiences, revenue streams, increased player engagement and retention, and expanding the gaming industry's reach to previously underserved communities.

VII. REFERENCES

[1] "Web 3.0 and Blockchain Technology: A New Era for Gaming" by Deeksha Bhardwaj and Anurag Singh. International Journal of Scientific & Technology Research, Volume 9, Issue 6, June 2020.

[2] "Blockchain for Gaming: A Review of Current State-of- the-Art and Future Directions" by Christoph Lutz, Ana C. Baptista, and Martina Dopfer. In: Leimeister JM., Brenner W. (eds) Proceedings of the 14th International Conference on Wirtschaftsinformatik. WI 2019. Lecture Notes in Informatics (LNI), vol 276. Gesellschaft für Informatik, Bonn, 2019.

[3] "Blockchain in Gaming: An Overview of Current State-of- the-Art and Future Directions" by Christoph Lutz, Ana C. Baptista, and Martina Dopfer. In: IEEE Computer Graphics and Applications, vol. 39, no. 3, pp. 32-44, May-June 2019.

[4] "A Review of Blockchain Technology and Its Potential Applications in the Gaming Industry" by Xue Yuan, et al. In: IEEE Access, vol. 6, pp. 20467-20477, 2018.

[5] "Blockchain-Based Gaming Ecosystems: A Comprehensive Survey" by Chao Li, et al. In: IEEE Access, vol. 7, pp. 103545- 103561, 2019.

[6] "Blockchain Technology in Online Gaming: A Systematic Review" by Mohamed Elshaer, et al. In: Journal of Systems and Software, vol. 150, pp. 188-206, 2019.

[7] "Gaming on the Blockchain: A Review of Current Trends and Future Directions" by Jacob M. Hess, et al. In: Journal of Gaming & Virtual Worlds, vol. 11, no. 3, pp. 197-212, 2019.

[8] "The Future of Gaming: Blockchain and Virtual Reality" by Yonis K. Abdin, et al. In: International Journal of Computer Games Technology, vol. 2018, Article ID 2937980, 2018.

[9] "Blockchain Gaming: A Comprehensive Review" by Nikita Arora, et al. In: IEEE Transactions on Games, vol. 12, no. 2, pp. 171-187, 2020.

AET 007

Disease Prediction and Doctor Appointment System, 2023

Mayuresh Veeramallu
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
veeramallumayuresh@gmail.com

Yashkumar Charde
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
yashkumarcharde2711@gmail.com

Om Shinde
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
omshinde6465@gmail.com

Emad Khan
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
khanemad6161@gmail.com

Abstract - *The* Disease Prediction Model using Machine Learning and Doctor Appointment is an innovative system that uses machine learning algorithms to predict diseases based on user-provided symptoms. It allows patients to book appointments with doctors online, potentially saving time and energy for both patients and healthcare providers. However, the accuracy of the system depends on the quality and quantity of data in the dataset, and continuous evaluation and improvement are essential to address biases and limitations of the machine learning model. Overall, the system has the potential to revolutionize healthcare by providing a more efficient and accurate way to diagnose diseases.

Keywords: Symptoms, Disease, user, health, prediction, patients, Appointment, dataset, algorithms, clinics.

I. INTRODUCTION

The aim of the Disease Prediction and Doctor Appointment System is to accurately predict diseases based on patients' general information and symptoms. Early detection of diseases is crucial to their effective treatment, and this system could prove highly valuable to the healthcare industry. By predicting the occurrence of common and often fatal diseases that are often ignored or left untreated, this system could help prevent a lot of suffering for patients and their families.

The proposed architecture for this system provides a means of predicting multiple diseases simultaneously, using Machine Learning Algorithms and Python pickling to save the behavior of the System. The importance of this system analysis is that it includes all parameters that cause diseases, enabling more efficient and accurate disease detection. With this system, users can enter their symptoms and other relevant information to receive a diagnosis without having to visit a hospital or clinic. Healthcare providers could also use the system to diagnose patients quickly and accurately, thus streamlining the diagnosis process.

Existing disease analysis systems in the healthcare industry tend to focus on a single disease, meaning that organizations must deploy multiple models to analyze patients' health reports. This is time-consuming and inefficient. By contrast, the Disease Prediction and Doctor Appointment System allows users to analyze multiple diseases on a single website. Users can select the name of the disease, enter its parameters, and click on "submit" to receive a diagnosis. The corresponding machine learning model gets invoked, and it predicts the output, displaying it on the screen.

Data collection and processing are significant challenges in the healthcare industry. With the digital era and technological advancements, a vast amount of multidimensional data on patients is created, including clinical factors, hospital resources, illness diagnostic information, patient's records, and medical equipment. Medical data mining has a lot of potential for uncovering hidden patterns in medical data sets, which could lead to more effective decision-making.

In the age of online systems, the Doctor Appointment System is designed to override the problems of the manual system. This system manages doctor appointments, schedules, patient details, doctor fees, booking, and other valuable information. The project aims to manage details of doctors, appointments, patients, and doctor schedules, including information about doctors, medical fees, medical appointments, and doctors' schedules. The project includes a full administrative structure, ensuring that only administrators have access. The aim of the project is to create an application program that reduces the manual work of managing doctors, appointments, reimbursement, and patients, and to track all details

about patients, appointments, and doctor schedules.

In conclusion, the Disease Prediction and Doctor Appointment System is a valuable tool for healthcare providers and patients alike. It allows for the early detection and treatment of diseases, potentially saving many lives. The system's ability to analyze multiple diseases on a single website is particularly valuable, as it streamlines the diagnosis process and reduces the need for multiple models. The Doctor Appointment System also offers a means of efficiently managing doctor appointments, schedules, and patient details, making it an asset to healthcare organizations.

PROPOSED WORK AND PROCUDURE FOR MODEL DESIGN

A. **Existing system** - Existing analysis methods typically focus on analyzing specific diseases, requiring users to use multiple models for different diseases. This can be a time-consuming process, and may result in increased mortality rates if the system fails to predict multiple diseases for a user who is afflicted by them.

B. **Proposed system** – When faced with a medical emergency, it is possible to be in a situation where prompt medical attention is required, but a physician may not be available for various reasons. To overcome the limitations of current systems, a sophisticated smart health prediction framework has been introduced. This method allows individuals to input their symptoms and obtain a prediction of their condition. The Disease Prediction Model, an expert system, is used to make the process of diagnosis more efficient for healthcare providers. The model uses machine learning algorithms to predict the potential diseases based on a patient's symptoms. The process begins with a patient inputting their symptoms and the machine using the algorithm to make a prediction. This model can be helpful in situations where a patient is suffering from multiple diseases, as it can make simultaneous predictions for different ailments. It also helps in the Booking of the Doctor's Appointment.

II. METHODOLOGY

- Requirement/ Data Input: The Information regarding all the symptoms and their corresponding diseases must be collected. The more the data the more accurate the prediction. Data for the project are from the Columbia University of Medical. They have a data about patients with multiple diseases prediction.

- Preprocessing: In the preprocessing stage, filtering is done and making the data ready for the project, some changes are made such as, building of tags which describes the data and help us to calculate its similarity with other data. Finding the null values are important and deleting them and giving them default values is important and the process is known as the data cleaning. It is the most important step in data processing. There are two different arrays having value of symptoms and the diseases that it has to predict.

- System designing: In this system design phase, the designing of the system is done which is easily understood for the end user i.e., user friendly. Designing of some UML diagrams and data flow diagram is done to understand the system flow and system module and sequence of execution.

A. **Model implementation and testing:** A Framework of data is made which coordinates with the code this phase involves the core part of the project that is coding and model designing. The model make sure that the project works well at the local level. It is made using the Naïve Bayes Algorithm. The different test cases are performed to test wether the project module is giving the expected outcome in assumed time. All the units developed in the implementation phase are integrated into a system after testing of each unit. Post integration the entire system is tested for any faults and failures.

Advantages of the Naïve Bayes Algorithm:

- Simple and easy to understand: Naive Bayes algorithms is simple and easy to implement, making them a popular choice for classification tasks.
- Fast and efficient: It is computationally efficient and can quickly make predictions on large datasets, making them ideal for real-time applications.
- Can handle large feature spaces: Naive Bayes algorithms can handle high-dimensional datasets with many features, making them suitable for text classification and spam filtering.

B. **Website design:** The creation of working model is done; the same thing has to be made into website. This stage involves designing of an immersive UI.

C. **Deployment of System:** Once the functional and nonfunctional testing is done, the product gets deployed in the customer environment or releases into the local hosting over the internet.

D. **Accuracy of system:** The accuracy of Naive Bayes and Random Forest depends on the specific dataset and problem being analyzed. Naive Bayes is simpler and faster but can be less accurate than Random Forest. Random Forest is more complex but can produce more accurate results, especially when the number of features is large. Ultimately, the choice between these two algorithms should be

based on the data and problem being analyzed.

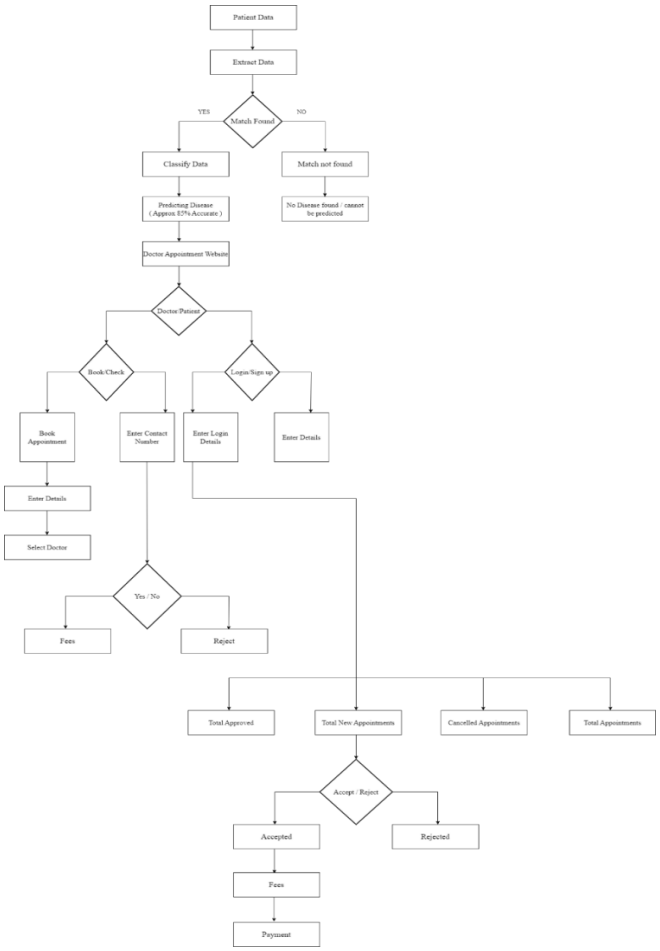
Comparison of the two different algorithms (Naïve Bayes and Random Forest Algorithm):

Naive Bayes and Random Forest are two popular machine learning algorithms for classification tasks. Naive Bayes is a probabilistic algorithm that assumes independent features, making it suitable for text classification, while Random Forest is a decision tree-based algorithm that creates an ensemble of decision trees and can handle a large number of features. The main difference is that Naive Bayes assumes independence between features while Random Forest assumes some correlation. Naive Bayes is simpler and faster but less accurate while Random Forest is more complex but can produce more accurate results. The choice between the two depends on the dataset and problem being analyzed.

Parameters	**Random Forest Algorithm**	**Naïve Bayes Algorithm**
Approach	Ensemble	probabilistic
Feature dependence	Assumes independence	Assumes interdependence
Based on	Decision Trees Aggregation	Bayes Theorem
Simplicity	Simple	Very Simple
Memory Requirement	High	Low
Time Required for Training Classifier	Recurrent Learning with every novel dataset	Less
Result Accuracy over aperiod	Incremental	Variable
Other Application	Banking, Retail, Spam Detection	Spam Detection, Document Classification, sexually explicit content detection.

Naive Bayes is a widely used technique in text classificationtasks, particularly when there are multiple classes involved. Its simplicity and fast convergence make it a popular choice, especially when the conditional independence assumption holds true. Even when this assumption is not met, Naive Bayes still requires less model training time than discriminative models like logistic regression. In contrast, Random Forest has a much larger model size that can result in overfitting if not carefully constructed. This can be particularly problematic when dealing with dynamic data that frequently changes. In contrast, the small and constant model size of Naive Bayes allows it to adapt quickly to changes in the data without the need for extensive rebuilding, making ita more suitable choice for such scenarios. Overall, Naïve Bayes is a useful and efficient technique for text classification tasks, especially when the data is dynamic and rapidly changing.

Flow Chart:



Steps:

1. Firstly, the patient must enter his/her data which willbe the symptoms.
2. Here 5 symptoms have to be entered to know the causing disease.
3. The model extracts the data and try to match with the diseases which are in the dataset, using the NaïveBayes Algorithm.
4. If match not found then the disease doesn't predict and if match founds then it classifies it and predicts the disease with an accuracy of approximately 85%.
5. As the process of the disease prediction gets completed, now the patient can choose the doctor and book the doctor's appointment for the same.
6. The Patient can book the appointment and can also check that whether it is accepted or rejected.
7. For booking the appointment the patient has to enter his/her details like name, contact number,

email id, etc. and then he/she can also select the Doctor of their choice.
8. The patient can check the status of the appointmentby entering his/her phone number.
9. If the appointment is accepted then it displays as accepted and ask for the payment of fees otherwise the status displays as rejected.
10. For the Appointment, Doctor needs to login/signup to check if there are appointments or not.
11. After logging in doctor can see all the appointments i.e., total, new ones, approved ones, etc. and can accept and reject them.
12. On Acceptance, the doctor asks for the Fees payment.

III. DOCTOR APPOINTMENT MODEL:

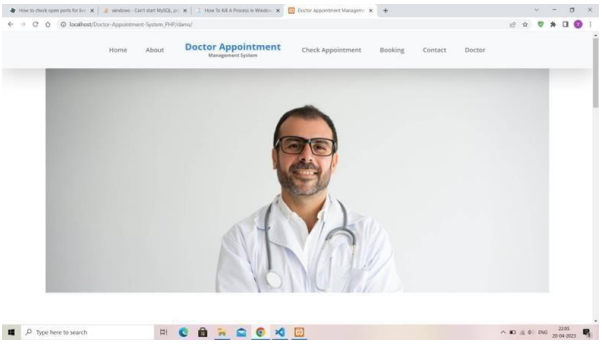
In today's world with the increasing technologies, every system is now being made available in the online mode which saves a lot of time and energy. The motive of this Doctor Appointment System is also the same i.e., to override the problems prevailing in the practicing manual system. This System is designed to carry out the operations in a smooth and effective manner. Every System whether big or small, needs to manage all the doctor appointments, schedule, patient details, Doctor Fees, Booking, etc. The purpose of the Doctor Appointment System is to provide easy and efficient process of booking an appointment by the help of full-fledged computer software so that all the valuable data/information can be stored for a longer period with an access to easy manipulation.

Objective: Physician Appointment System The main purpose of the project is to manage details of doctors, appointments, patients, appointments, and doctor schedules. Manage all information about doctors, medical fees, medical appointments, and doctors. Projects have a full administrative structure, so only administrators are guaranteed access. The purpose of this project is to create an application program to reduce the manual work of managing doctors, appointments, reimbursement, and patients. Track all details about patients, appointments, and doctor schedules.

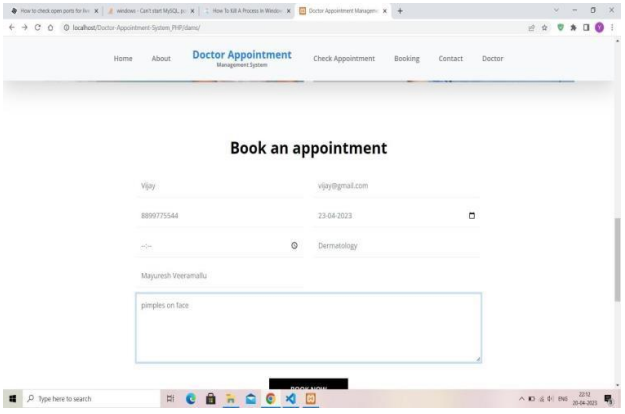
Functionalities provided by the Doctor Appointment System:

1. Provides search options based on various factors. Physicians, Patients, Appointments, Physician Schedules, etc.
2. Physician Appointment System also manages appointment details, doctor schedule details, doctor's doctor fee details online.
3. Track all information about appointments, doctor rates, appointments, etc.
4. Manage information related to appointments
5. View doctor and patient information and descriptions
6. To increase the efficiency of managing doctors and appointments.
7. Monitor handling booking information and transactions.
8. Manage Physician information.
9. Manage Booking information.

IV. RESULTS



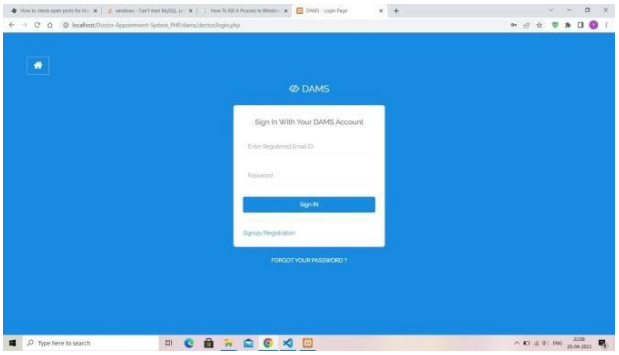
1] The purpose of the Doctor Appointment System is to provide easy and efficient process of booking an appointment by the help of full-fledged computer softwareso that all the valuable data/information can be stored for alonger period with an access to easy manipulation. As the Website opens, first it will display its Home Page where it shows that it is an Doctor Appointment System.



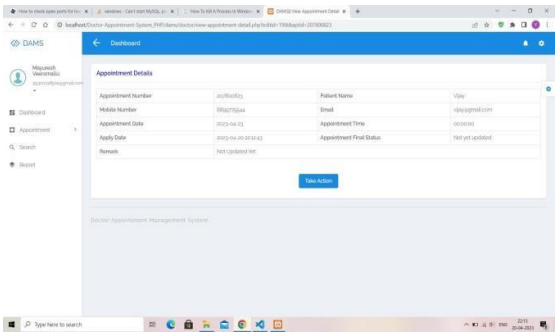
2] This is the Registration page for the Patient's where the Patient needs to register himself/herself in order to book the Doctor's Appointment. Here the Patient has to enter his/her Name, Contact Number, Email Address, Date of Visit, Time Slot, the disease from which he/she is suffering from and can add some additional information regarding his/her condition or health.

3] This is the Doctor Login Page where the Doctor has to enter his/her Login Credentials in order to view and check all the details and updates regarding the patient's registration and appointments, time

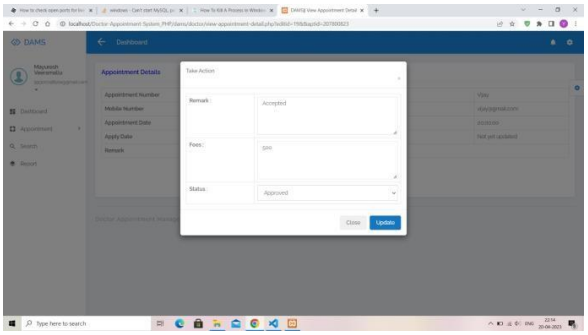
schedules, booking details, payment status, booking status, etc.



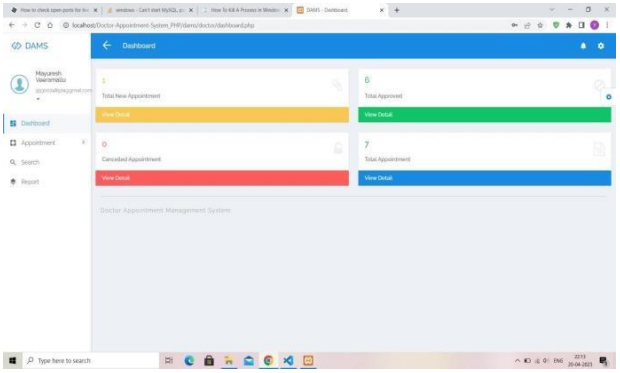
4] This is the Dashboard which is provided for the Doctor where the Doctor can check the Appointment Details of the Patient. The Doctor can see all the details enter by the patient and according to that details the Doctor can Approve or Reject the patient's booking request. The Doctor takes the action after vewing all the booking details and for that a button named "Take Action" is there.



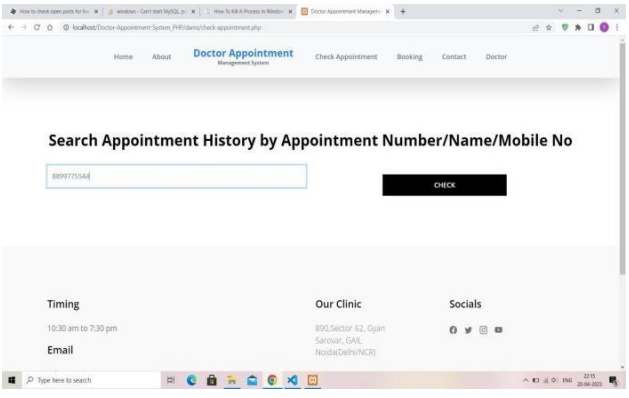
5] After Checking and verifying all the details entered by thepatient the doctor clicks on the 'Take Action' button and therehe/she will ask for the fees payment and give the remark i.e., approved or rejected and the status of the booking. The approvement of the booking from the doctor is very crucial as it will help the patient to know about his/her Appointment Booking Status. The Doctor can give the remark based on thepatient's condition and can also put the the status of the booking as Approved or Rejected. If it is approved then the doctor asks for the consulting fees from the patient and if the doctor wants to reject the booking the he/she can put the updated status of the booking as Rejected.



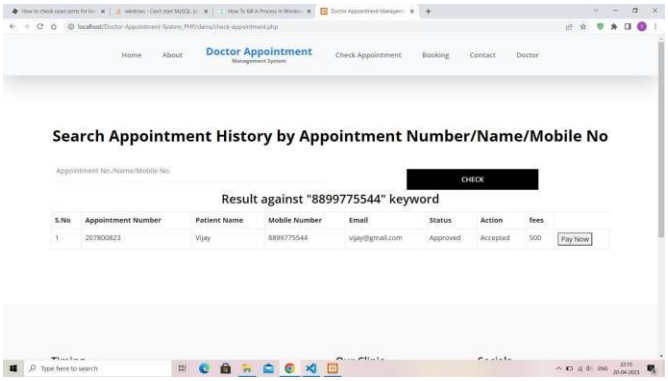
6] This is the Dashboard where the Doctor can see all the counts of Appointments i.e. The total new Appointments, Total Approved Appointments, Cancelled Appointments, Total Appointments. The Doctor can view the details of all these kind of Appointments.



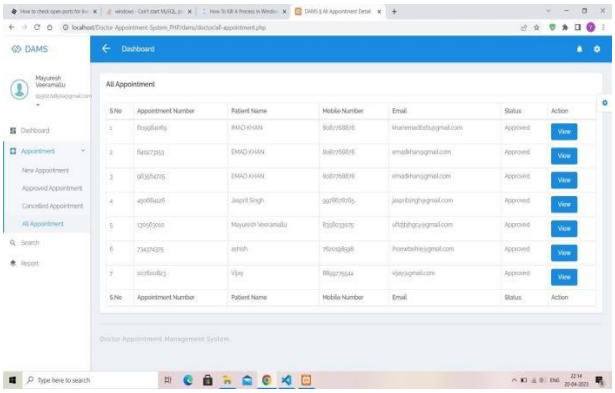
7] The User can also Search the Appointments of the Patients i.e. the Appointment History by entering the Appointment Number or the Patient's Name, Mobile Number. First the User has to enter any one of these deatails and then click on the "CHECK" Button.



8] After Clicking on the "CHECK" Button, all the details of that patient's Appointment will appear like the Appointment Number, Patient's Name, Email Address, Mobile Number, Status of the Appointment, Fees details, etc.



9] This is the Dashboard where the Doctor can see the list of all the patients who have booked the Appointment including their Name, Mobile Number, Email Address, Status of the Booking, the response given by the doctor to them, etc. It gives the Doctor an idea that how many patients are there forthe check-up.



V. CONCLUSION: -

The core idea behind this project is to propose a system that allows a user to get instant guidance on their health issues. The application takes the input of various symptoms from thepatient, does the analysis of the entered symptoms, and gives appropriate disease prediction. It allows the users to get analysis on the symptoms they give for predicting the disease they are suffering from. It is designed as a new health prediction system, which is an online system, and various patients from any locations can view it. The main objective of this project is to create a system that would predict more than one disease and do so with high accuracy. Because of this project the user does not need to traverse different websites which saves time as well. Diseases if predicted early can increase your life expectancy as well as save you from financial troubles. For this purpose, Machine Learning Algorithm are there.

REFERENCES

[1] Yi Pan. Constructing disease similarity networks based on disease module theory. IEEE/ACM Transactions on Computational Biology and Bioinformatics, pages 1-11,2018.

[2] Chronic Kidney Disease Prediction and Recommendation of Suitable Diet plan by using Machine Learning, IEEE Paper,2019.

[3] T. Devasia, T. P. Vinushree and V. Hegde, "Prediction of students performance using Educational Data Mining", Proceedings of IEEE International Conference on Data Mining and Advanced Computing (SAPIENCE), pp. 50-100, 2016.

[4] heart disease prediction system based on hidden naïve bayes classifier, IEEE Paper,2019.

[5] Disease Risk Prediction by Using Convolutional NeuralNetwork, IEEE Paper ,2018

[6] M.M.Mehdy, E.E.Shair and P.Y.Ng, "Artificial Neural Networks in Image Processing for Earlier Detection of Breast Cancer", Hindawi, Computational and Mathematical Methods in Medicine, Volume 2017,
Article ID 2610628

[7] Ponrathi Athilingam, Bradlee Jenkins, Marcia Johansson, Miguel Labrador "A Mobile Health Intervention to Improve Self-Care in Patients With Heart Failure: Pilot Randomized Control Trial" in JMIR Cardio 2017, vol. 1, issue 2, pg no:1 A. Rairikar, V. Kulkarni, V. Sabale, H. Kale, A. Lamgunde, "Heart disease prediction using data mining techniques", 2017 International Conference on Intelligent Computing and Control (I2C2), pp. 1-8, 2017, June.

[8] Applying Naïve Bayesian Networks to Disease Prediction: A Systametic Review : Langarizadeh, Mostafa, and Fateme Moghbeli. “Applying Naïve Bayesian Networks to Disease Prediction : A Systematic Review”. *Acta Informatica Medica* 24, no. 5 (2018): 364.

[9] Comparing different supervised machine learning algorithms for disease prediction Subbalakshmi, G., K. Ramesh, and M. Chinna Rao. “Decision Support in Heart Prediction System using Naïve Bayes”. Indian Journal of Computer Science and Engineering (IJCSE) 2, no.2 (2019): 170-176.

[10] Decision Support in Heart Disease Prediction System using Naive Bayes Subbalakshmi, G., K. Ramesh, and
M. Chinna Rao. “Decision Support in Heart Prediction System using Naïve Bayes”.

AET 008

Analyzing Twitter Feeds: Real-time Sentiment Analysis

Vaibhav Kshirsagar
Department of Computer Engineering
Vidyalankar Institute of Technology
vaibhav.kshirsagar1@vit.edu.in

Hrishikesh Kulkarni
Department of Computer Engineering
Vidyalankar Institute of Technology
hrishikesh.kulkarni1@vit.edu.in

Priya Raut
Department of Computer Engineering
Vidyalankar Institute of Technology
priya.raut@vit.edu.in

Chaitanya Salunke
Department of Computer Engineering
Vidyalankar Institute of Technology
chaitanya.salunke@vit.edu.in

Swapnil Sonawane, Assistant Professor
Department of Computer Engineering
Vidyalankar Institute of Technology
swapnil.sonawane@vit.edu.in

Abstract—Every social networking site, such as Facebook, Twitter, Instagram, and others, has emerged as a major in- formation source. It has been discovered that a corporate organi- zation can benefit from data extraction and analysis from social networking sites. One of the most common platforms for people to voice their opinions is Twitter. Twitter is the most popular platform because of its user-friendly layout that is focused on engaging its audience online, which is made up of a wide range of people such as professionals, students, celebrities, businesses, and politicians. Twitter enables users to share their tweets with the public. Globally, there are approximately 330 million active Twitter users. The proposed work aims to get tweets of various Twitter Personalities as well as current trends and hashtags and analyzing the sentiment of tweets using Python tools and libraries. Because Twitter data is so extensively unstructured, analysis can be challenging. The start of a text is supported by the NLP (Natural Language Processing) technology. Tokenization sentiment, stop-word deletion, and stemming are the methods utilized in this analysis. Further, Subjectivity and Polarity are calculated using Textblob. Results are shown in a graphical representation after the tweets have been classified as Positive, Negative, or Neutral.

Index Terms—NLP (Natural Language Processing), Textblob

I. INTRODUCTION

The most comprehensive and powerful means of express- ing one's emotion towards a certain topic is social media technology. Social media technologies come in a variety of formats, including blogs, business networks, photo and video sharing, forums, microblogs, enterprise social networks, and social networks. Because they enable people to express and share their views and opinions about life events, numerous online social networking sites like Facebook, YouTube, and Twitter have grown in popularity as the number of social media technologies has multiplied.

Opinion mining can extract the subject, opinion holder, and polarity from the text in addition to identifying statements. Since customers may express their opinions and sentiments more openly than ever before, businesses need to understand people's emotions. By automatically analyzing consumer feed- back, from survey responses to social media chats, brands can pay close attention to their customers' needs and tailor their products and services to meet them.

Typically, someone wants feedback from other people'sviewpoints to make decisions. Direct inquiries might be made to obtain this view. It requires time and effort to meet people who are thought to inquire by directly approaching them. Twitter can be used as another resource for opinions. Tweets with many different opinions are offered by Twitter. The type of positive, negative, and neutral opinions must be used to distinguish this opinion. Moreover, these tweets have not been organized into the categories you were looking for. As a result, it is still prevalent and essential.

Sentiment analysis involves using text analysis and natural language processing (NLP) technologies to find and extract a writer's emotions from a piece of text, in this case, a tweet. This is a common method used by organizations to identify and group ideas regarding certain goods, services, or concepts. These emotions or sentiments might be either positive, negative, or neutral. The author's feelings are the fundamental concept of sentiment. They could differ from person to person. Having millions of users of all ages, Twitter is a well-known social networking site on the web. Twitter has consistently become a go-to

website among everyday people, famous people, and public figures. Many of the highest-paid artists, head of states, and even the wealthiest men living have created profiles on the platform.

II. RELATED WORK

In a article by Sahar A. El Rahman et al., the authors states that Sentiment analysis is a scientific discipline that examines opinions expressed in text on various social media platforms. The algorithms in their suggested model improved the preci- sion of identifying tweets as favourable, negative, or neutral. Their methodology integrated the usage of a lexicon-based algorithm with an unsupervised machine learning algorithm where previously labelled data were not initially present. Data were then loaded into several supervised models. According to cross validation, maximal entropy has the highest accuracy among Naive Bayes, support vector machine, maximum en- tropy, decision tree, random forest and bagging [1].

The study conducted by Dr. Priyanka Harjule et al. found that Machine learning models which were trained on re- lated data are substantially more accurate than classification methods based on standard dictionaries for completely fresh data/text. This is due to the fact that the observed language, or tweets, is highly informal and does not follow traditional grammar or spelling conventions, making the data highly un- structured. The comparison findings between several machine learning methods are also easily visible. RNN currently has the highest accuracy among Multinomial, Naive Bayes, Logistic Regression, Support Vector, Machine and RNN Classifier [2]. According to a review of the literature by Deni Kurnianto Nugroho, it can be concluded that the results of the US pres- idential election can be predicted using the Twitter sentiment analysis through VADER model which is lexicon based model. Although the overall results from this sentiment analysis may not exactly match the actual data gathered from the BBC, they can still be interpreted as Joe Biden's triumph against Donald Trump. The lack of data distribution and the tiny amount of data are the research's limitations. In order to depict popular opinion against presidential candidates more accurately, a more uniform distribution of data is required for each state in the United States [3].

The research conducted by Anu J Nair et al. suggests that on comparing, it has been observed that VADER and Logistic Regression are both less accurate than BERT (92%). They used these algorithms on the tweets of COVID-19. Because BERT looks for the aspect of the sentences, it is more accurate than other algorithms. In order to improve the performance of feature selection, VADER searches for valence and polarity scores. Logistic regression does not examine the tweets' polarity or other aspects. Furthermore, because these algorithms were applied to a significant amount of data, processing and output take a long time [4].

In a paper published by Kusrini et al., the authors investi- gated that Sentiment Analysis using the Lexicon approach has lower accuracy than using machine learning. This is because the number of adjectives in Lexicon is still incomplete. This must be completed. In addition, the Lexicon method is simpler than the methods available in machine learning [5].

III. PROBLEM STATEMENT

Twitter has become a popular platform for people to share their thoughts, opinions, and experiences about various topics. With millions of tweets being generated every day, it can be challenging to manually analyze the sentiment of each tweet. Sentiment words are the most significant sentiment indica- tor. These are expressions of positive or negative emotion that are frequently used [6]. Words with a positive connotation include good, beautiful, and fantastic, whereas words with a negative connotation include bad, bad, and horrible. For obvious reasons, emotion terms are crucial for sentiment analysis. The sentiment lexicon is a list of these words (oropinion lexicon).

IV. PROPOSED METHODOLOGY

Here are steps to perform sentiment analysis on a twitter data:

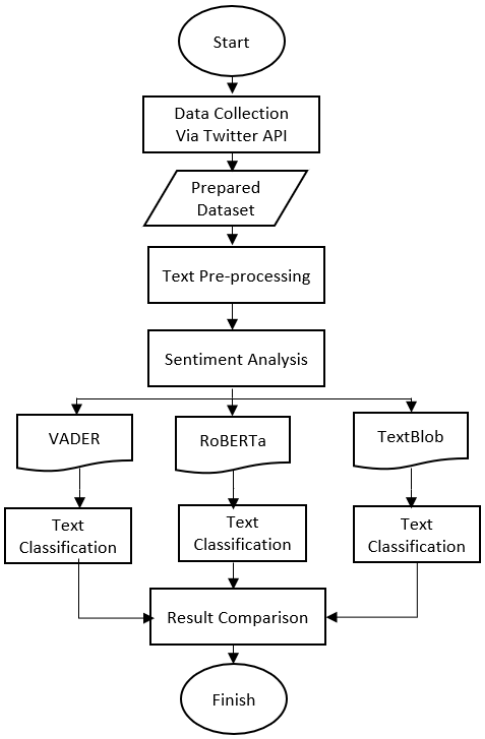


Fig. 1. Steps for Sentiment Analysis

A. Collecting Data

An online text source is used by social media sites like twitter.Using the python module tweepy, user tweets will be gathered in real-time based on product keywords. Text data is collected via the Twitter API. Get credentials by registering the Twitter app. Create a Twitter account first, then use it to sign up for the Twitter Developer account. A twitter developer account produces an app and mentions the merit of our academic study. The app will provide us some keys, including the consumer key, access token key, and secret key once we have finished creating it. These keys allow us to access data in our program. At start, we have to input twitter handle of famous personality for e.g. Elon musk

B. Text pre-processing

Preprocess the tweets by removing any unnecessary ele- ments such as URLs, mentions, and hashtags, and perform any other cleaning steps required as shown in Fig. 2

Text before Classification
@ShellenbergerMD Good question. Who are the people responsible for this nightmare situation?
Text After Classification
Good question. Who are the people responsible for this nightmare situation?

Fig. 2. Text preprocessing

C. Sentiment Analysis

Generally, From fig. 3, sentiment Analysis approach canbe categorised into two types, Lexicon Based approach and Machine Learning approach.

In lexicon Based approach, each word or phrase in the textis given a number score or label based on its semantic or sentiment meaning using the lexicon. This makes it possible to analyse massive amounts of text automatically and can be applied to tasks like sentiment analysis, text categorization, and information extraction. Lexicons can be made manually or automatically, and they can be either general-purpose or domain-specific. Although this method has significant draw- backs, such as ambiguity and context management issues, it has been shown to be helpful in many applications and is frequently used in conjunction with other methods to boost efficiency.

In Machine Learning Approach, it involves training a modelon a labeled dataset, where each text document is labeled with its corresponding sentiment polarity (e.g., positive, negative, or neutral). The model learns to recognize patterns and rela- tionships in the data and is then able to predict the sentiment polarity of new, unseen text.

Several machine learning algorithms can be used for sen- timent analysis, including Naive Bayes, Support Vector Ma- chines, Decision Trees, and Neural Networks [2]. While ma- chine learning is a powerful approach for sentiment analysis, it has its limitations, such as the need for high-quality labeled data, the difficulty of handling sarcasm and irony, and the lack of interpretability of some complex models.

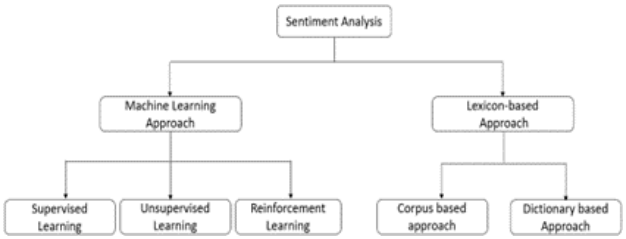


Fig. 3. Sentiment Analysis Approach

In this research, pretrained lexicon based as well as pre- trained Deep learning model is used for sentiment analysis.

- VADER

VADER (Valence Aware Dictionary and sEntiment Rea- soner) is a tool for researching lexicon and rule-based sentiment that is specifically matched with social media sentiments [7]. For three forms, Vader takes the term as input and provides the percentage value: good bad, negative, and composite (overall polarity of the sentence) [8]. VADER uses several rules for context-specific adjust- ments to sentiment polarity. For example, negation wordssuch as ”not” or ”but” can flip the polarity of a sentiment-laden word or phrase in the text. VADER also considers the impact of punctuation marks and capitalization on sentiment analysis.

- RoBERTa

A state-of-the-art language model called RoBERTa (Ro- bustly Optimized BERT Pretraining Approach) was cre- ated by Facebook AI and released in 2019. The BERT (Bidirectional Encoder Representations from Transform- ers) model, which was first presented by Google in 2018, is modified in RoBERTa. It employs a similar architectureto BERT, which consists of a stack of transformer layers, but with some significant pre-training process alterations, like dynamic masking and longer training times. One of the key advantages of RoBERTa is its ability to understand the nuances of language and context, allowing it to handle complex language tasks with high accuracy.

- TextBlob

One of the many Python libraries used in natural lan- guage processing is Textblob. Parts of speech, sentiment analysis, language translation, and text classification are just a few of the NLP tasks that

Textblob can be used [9]. The polarity and subjectivity can be used by TextBlob to calculate sentiment. If the polarity is more than 0, the text is regarded to be positive, and if it is less than 0, it is deemed to be negative. The lack of features like word vectors and dependency parsing is one drawback of this approach.

D. Text Classification

Text Classification involves labelling the text positive, neg- ative and neutral based on its polarity score in case of TextBlob mode, Compound Score in case of VADER model and probability score in case of RoBERTa model

RESULT AND DISCUSSION

The results of this study were achieved using the Python programming language tool and the library of Twitter APIs, numpy, pandas, and seaborn . The research was conducted in line with the predetermined research procedures. The Twitter API is then configured to receive up to 198 tweets. Initial step is done by inputting a twitter handle of a famous twitter personality 'Elon musk'.

To get the better understanding of the data, we have created wordcloud for sentiment which shows most frequent words by twitter handler using python library as shown in fig. 4

From Fig. 5, we can see that VADER calculated 70 positive, 101 neutral and 27 negative tweets and sentiment score is

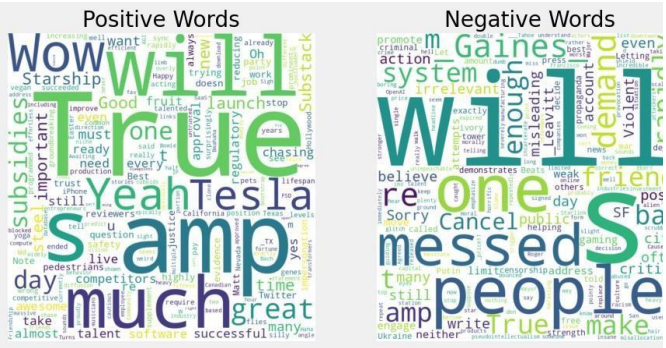


Fig. 4. WordCloud

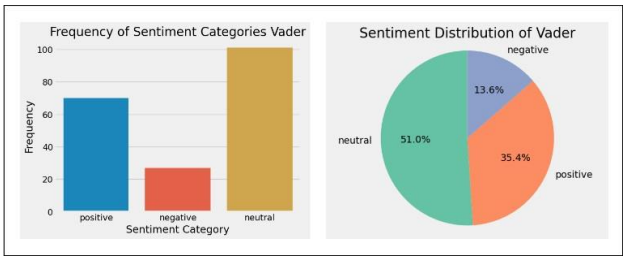


Fig. 5. Results for VADER sentiment Analysis

35.4% positive, 51% neutral and 13.6% negative. For each input sentence, it generates four sentiment scores: positive, negative, neutral, and compound. The compound score, which ranges from -1 (very negative) to +1 (extremely positive), is a normalised, weighted value that serves as a general indicator of mood. It uses several rules for context-specific adjustments to sentiment polarity. For example, negation words such as "not" or "but" can flip the polarity of a sentiment-laden word or phrase in the text. VADER also considers the impact of punctuation marks and capitalization on sentiment analysis.

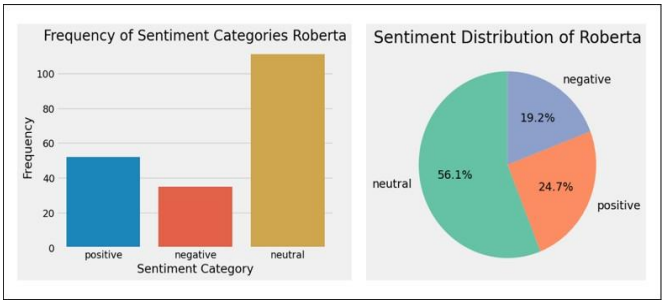


Fig. 6. Results for RoBERTa sentiment Analysis

Fig. 6 demonstrates that RoBERTa calculated 52 positive, 111 neutral and 35 negative tweets and it has a score of 24.7% positive, 56.1% neutral and 19.2% negative tweets. It calculates the probability that a text will fall under any given class or sentiment label. It can forecast if a certain review will be positive or negative as well as whether it will fall into the neutral category. The key feature of this model is that it is a bidirectional language model. This implies that it can make predictions by considering the complete context of a text rather than just the words that come before or after them. It employs a transformer architecture that does both forward and backward processing of the input text, enabling it to gather contextual data from any point in the input sequence.

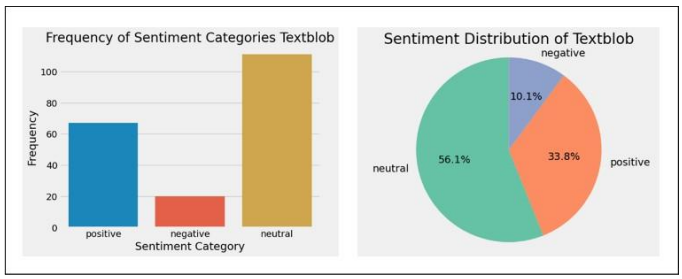


Fig. 7. Results for TextBlob sentiment Analysis

Fig. 7 helps us to see that TextBlob calculated 69 positive, 22 neutral and 107 negative tweets and it is having score of 33.8% positive, 56.1% neutral and 10.1% negative tweets. The TextBlob sentiment analysis tool can be used for a variety of natural language processing applications since it combines machine learning and rule-based techniques to analyse the sentiment of text. The model is built using a

sentiment lexicon, rule-based heuristics, and pattern recognition. The lexicon is a pre-defined collection of words and expressions that have been marked with the polarity of their emotions (positive, negative, or neutral). The model analyses the sentiment of the input text using this lexicon and a set of rules.

The performance of various data model is compared be- tween them using sentiment scores and graphs. The graph are drawn from scores and can be used to compare different models or scenarios. They can help us determine which model or scenario is the best fit for the data.The following table compares the calculated findings.

Models	Positive	Neutral	Negative
VADAR	35.4%	51%	13.6%
RoBERTa	24.7%	56.1%	19.2%
TextBlob	33.8%	56.1%	10.1%

V. CONCLUSION

In this paper, we have applied three different algorithms. The most popular natural language processing (NLP) tools for sentiment analysis are TextBlob, RoBERTa, and VADER. They have different approaches and capacities, though.

VADER is a rule-based sentiment analysis tool that uses a lexicon of words and their associated sentiment scores to determine the overall sentiment of a piece of text. VADER is known for its high accuracy in sentiment classification, especially for short and informal texts like social media posts. RoBERTa uses a deep neural network architecture to un- derstand the contextual meaning of words in a sentence and produce a sentiment score. It is highly accurate and can handle complex sentence structures and language nuances.

TextBlob is another NLP library that provides a simple inter- face for performing common NLP tasks, including sentiment analysis. It uses a machine learning approach to analyse text and classify its sentiment.

In summary, VADER is a rule-based tool, RoBERTa is a deep learning model, and TextBlob is a machine learning library. They differ in their approach to sentiment analysis, accuracy, and suitability for different types of text data. It's important to choose the right tool based on the specific requirements of your project.

VI. FUTURE WORK

In future, the performance and accuracy of sentiment anal- ysis models can be enhanced by investigating the usage of multimodal sentiment analysis, which integrates both textual and non-textual information like photos and videos.

REFERENCES

[1] S. A. El Rahman, F. A. AlOtaibi and W. A. AlShehri, "Sentiment Analysis of Twitter Data," 2019 International Conference on Computer and Information Sciences (ICCIS), Sakaka, Saudi Arabia, 2019, pp. 1-4, doi: 10.1109/ICCISci.2019.8716464.

[2] P. Harjule, A. Gurjar, H. Seth and P. Thakur, "Text Classification on Twitter Data," 2020 3rd International Conference on Emerging Technologies in Computer Engineering: Machine Learning and In- ternet of Things (ICETCE), Jaipur, India, 2020, pp. 160-164, doi: 10.1109/ICETCE48199.2020.9091774.

[3] D. K. Nugroho, "US presidential election 2020 prediction based on Twitter data using lexicon-based sentiment analysis," 2021 11th Inter- national Conference on Cloud Computing, Data Science & Engineering (Confluence), Noida, India, 2021, pp. 136-141, doi: 10.1109/Conflu-ence51648.2021.9377201.

[4] A. J. Nair, V. G and A. Vinayak, "Comparative study of Twitter Sentiment On COVID - 19 Tweets," 2021 5th International Conference on Computing Methodologies and Communication (ICCMC), Erode, India, 2021, pp. 1773-1778, doi: 10.1109/ICCMC51019.2021.9418320.

[5] Kusrini and M. Mashuri, "Sentiment Analysis In Twitter Using Lexicon Based and Polarity Multiplication," 2019 International Conference of Ar- tificial Intelligence and Information Technology (ICAIIT), Yogyakarta, Indonesia, 2019, pp. 365-368, doi: 10.1109/ICAIIT.2019.8834477.

[6] S. Akter and M. T. Aziz, "Sentiment Analysis On Facebook Group Using Lexicon Based Approach," in iCEEiCT, 2016, pp. 8–11.

[7] C. J. Hutto and E. E. Gilbert, "VADER: A Parsimonious Rule- based Model for Sentiment Analysis of Social Media Text. Eighth International Conference on Weblogs & social media (ICWSM-14).","Proc. 8th Int. Conf. Weblogs Soc. Media, ICWSM 2014, 2014, [Online]. Available: http://sentic.net/.

[8] J. Ramteke, "Analysis."

[9] R. Hermansyah and R. Sarno, "Sentiment Analysis about Product and Service Evaluation of PT Telekomunikasi Indonesia Tbk from Tweets Using TextBlob, Naive Bayes & KNN Method," 2020 International Seminar on Application for Technology of Information and Commu- nication

(iSemantic), Semarang, Indonesia, 2020, pp. 511-516, doi: 10.1109/iSemantic50169.2020.9234238.

[10] I. San Vicente and X. Saralegi, “Polarity lexicon building: to what extent is the manual effort worth?” in LREC, 2016

[11] P. J. Stone, D. C. Dunphy, and M. S. Smith, “The general inquirer: A computer approach to content analysis.” 1966.

[12] K. A. Hasan, A. Mondal, and A. Saha, “A context free grammar and its predictive parser for bangla grammar recognition,” in Computer and Information Technology (ICCIT), 2010 13th International Conference on. IEEE, 2010, pp. 87–91

[13] V. Kharde and S. Sonawane, “Sentiment Analysis of Twitter Data: A Survey of Techniques”, International Journal of Computer Applications, vol. 139, p. 11, 2016.

AET 009

Face Mask Detection using CNN, 2023

Sarvesh Guda
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
sarvesh.guda@vit.edu.in

Japleen Singh
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
japleen.singh@vit.edu.in

Harsh Pandita
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
harsh.pandita@vit.edu.in

Snehal Andhare
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
snehal.andhare@vit.edu.in

Abstract - During the COVID-19 pandemic, a dangerous disease spread across 19 countries worldwide. Wearing a face mask can reduce the spread of infection and airborne transmission of germs. To detect whether people are wearing masks, a Face Mask Detection System has been developed using the Haar- Cascade method for image detection. This classifier, combined with other algorithms, achieves high recognition rates even with varying expressions, efficient feature selection, and a low number of false positives. The Haar feature-based cascade classifier uses only 200 out of 6000 characteristics to achieve an 85-95 percent recognition rate. In light of the pandemic, there is a need for a mask detection system as a unique public health service. The model is trained using both mask and non-mask images.

Keywords: Corona virus disease 2019, Face mask detection, CNN, Machine learning

INTRODUCTION

The world is still grappling with the aftermath of the COVID-19 pandemic, and a cure for the virus is yet to be discovered. To ease the economic strain caused by the outbreak, several countries have allowed limited economic activities to resume once the number of new cases has decreased below a certain threshold. However, there are concerns about worker safety as these countries cautiously reopen their economies in the new post-COVID-19 climate. To limit the risk of infection, people are advised to wear masks and maintain a distance of at least onemeter from others.

Deep learning has gained significant attention in the field of object detection and has been used to develop a face mask identification tool that can determine whether someone is wearing a mask or not. This can be achieved by analyzing real- time streaming from the camera and evaluating the categorization results. A training dataset is required for deep learning applications, and this dataset was used to train the model to perform various tasks. However, detecting face masks has become a challenging and crucial task. While face recognition without a mask is simpler, recognizing a normal face is more efficient for feature extraction than a masked face. A covered face lacks many facial characteristics, such as the nose,lips, and chin.

Wearing a mask reduces the risk of exposure to an infected person in the medical industry, regardless of whether they exhibit symptoms. Face mask detection is performed in two stages: face recognition and feature extraction. The first stage involves detecting a person's face from an image, and the most common issue is detecting multiple masks and uncovered faces in a single image. Different algorithms like Adaptive Boost, Viola-Jones Algorithm, HOG Algorithm, and Histogram of Gradient are used for face recognition. In this case, the object detection method is categorized as multi-stage, single short detectors, and detectors. Multi-stage detectors use a faster RCNN, while single-stage detectors use Haar cascade and single-short detection (SSD).

Several studies have been conducted on face mask detection using various approaches, such as video analytics, picture semantic segmentation,

fingerprints, DWT (Discreet Wavelet transform), and LBP (Local Binary Pattern). All these methods are examined to determine whether a person is wearing a mask and whether their face can be recognized.

LITERATURE SURVEY

The COVID-19 pandemic, caused by a novel coronavirus, has had a significant impact on global development, including the healthcare system. Wearing a facial mask is one of the preventive measures to minimize the spread of this disease. To limit the growth of COVID-19 in public places, a technique using facial mask detection in a smart city network with Closed-Circuit Television (CCTV) cameras is proposed. The system identifies individuals who are not wearing masks, and appropriate authorities are notified. A deep learning architecture is trained on a dataset of photos of people with and without masks from diverse sources, achieving 98.7% accuracy on previously unreported test data. This research aims to be effective in reducing the spread of COVID-19 globally. In recent years, face recognition has become an essential technique, but recognizing faces with masks poses a significant challenge. To improve the recognition accuracy of various masked faces, a strategy has been developed that involves detecting facial regions first using a Multi-Task Cascaded Convolutional Neural Network (MTCNN). The Google FaceNet embedding model is then used to extract facial traits. This approach aims to overcome the difficulties posed by masks in real-world scenarios, such as video surveillance, where individuals may be uncooperative with equipmen. PROPOSED WORK AND PROCUDURE FOR MODELDESIGN

Existing system - A Multi-Task Cascaded Convolutional Neural Network was used to solve the face detection challenge (MTCNN). The Google Face Net embedding model is then used to extract facial features.. This technique can train a dataset of both people wearing masks and those who aren't wearing masks. The system can anticipate whether or not the person is wearing the mask after training the model.

Proposed system – 1. This system is capable to train the dataset of both persons wearing masks and without wearing masks. 2. After training the model the system can predicting whether the person is wearing the mask or not. 3. It also can access the webcam and predict the result.

METHODOLOGY

DEEP LEARNING

Deep learning is an artificial intelligence function that mimics the human brain's processing of data to detect objects, recognise speech, translate languages, and make judgments. 'Deep learning' is a term that refers to AI can learn without the need for human intervention, using both organised and unlabeled data.

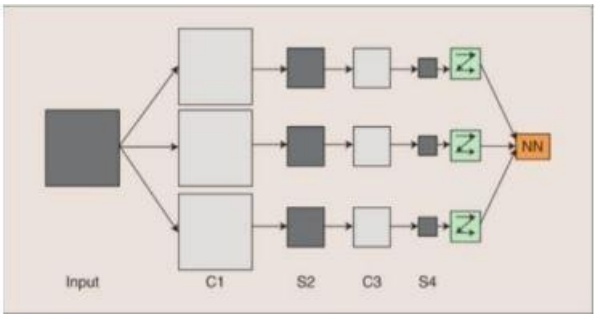


Fig 1: Deep Learning model

Face mask detection is done using Convolution Neural Networks, a Deep Learning approach (CNN). The connectivity pattern between neurons in convolutional networks is similar to the organisation of the visual cortex, which was inspired by biological processes. In comparison to other image classification methods, CNNs require very little pre-processing. CNN is a type of multilayer neural network that is applied to 2-dimensional arrays (typically pictures) and is based on spatially localised neural input. CNN For pattern recognition, create "patterns of patterns." Patches from previous layers are combined in each layer. Convolutional Networks are multistage topologies with numerous stages that can be trained. Enter a Each stage produces feature maps, which are collections of arrays. Each feature map on the output represents a single feature taken from all input locations. A filter bank layer, a non- linearity layer, and a feature pooling layer make up each stage. A ConvNet is made up of three layers in which each one is followed by a classification module.

Basic structure of CNN, where it consists of two C1,C3 are convolution layers and two S2,S4 are pooled/sampled layers. In a filter bank, a trainable filter (kernel) connects the input feature map to the output feature map. Convolutional layers perform a convolution on the input before forwarding the output to the next layer. The convolution simulates a single neuron's reaction to visual input.

HAAR CASCADE

For object detection haar cascade classifier are one of the effect way. It was proposed by Michael jones and Paul Viola. It is used in Boosted cascade for rapid object detection of simplest features so this machine learning approach are used to train these classifier with lots positive and negatives images. The images which the classifier identifies are positive images and all the other images which it could not detect are negative images.

We use this haar like features for human face detection which are divided into three formations. The edge feature is the first format, line is the second format and the last is fourrectangle feature. This haar like principle provides fast computation using the integral. So this haar cascade specific features of a face can be identified using this algorithm. Using this detection the image can be converted into a window 24X24 pixels. Initially lot of positive images and negative images are given as a data set to trainthis classifier.

CONVOLUTIONAL LAYER

It always comes first. It receives the image (a matrix of pixel values). Assume that the input matrix's reaction starts at the top left of the image. The software then chooses the smaller matrix there, which is referred to as a filter. The filter then generates convolution that moves over the input image. The filter's job is to multiply the original pixel values by its value. All of these multiplications are added together, yielding a single number. The filter moves because it only reads the image in the upper left corner. Additionally, one unit on the right performs a similar operation. A matrix is created after passing the filter through all points, however it is less than the input matrix. From a human standpoint, this operation is comparable to distinguishing visual boundaries and simple colours. However, in order to recognise the fish, the entire network is required. Several convolution layers will be blended with nonlinear and pooling layers in the network. The first

layer to extract features from an input image is convolution. Small squares of input data are used in convolution. It's a mathematical procedure with two inputs: an image matrix and a filter or kernal.
Dimension of an image matrix (h x w x d) A filter (fh x fw x d) Outputs a volume dimension (h-fh+1) x (w-fw+1) x1.

Consider a 5 x 5 whose image pixel values are 0, 1 and filter matrix 3 x 3 as shown in below

Convolution with a filter example
Then the convolution of 5 x 5 image matrix multiplies with 3 x 3 filter matrix which is called “Feature Map” as outputshown in below

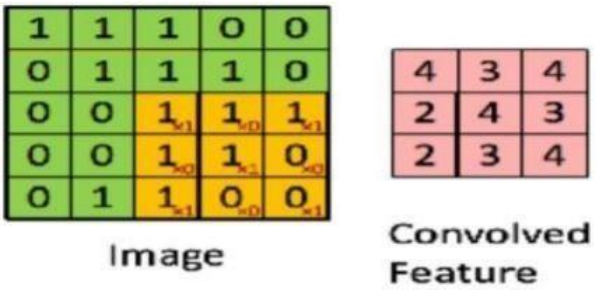


Fig 2: OUTPUT OF CONVOLUTIONAL

LAYERTHE NON-LINEAR LAYER:

After each convolution process, it is adder. It features an activation function that provides a non linear property; without this trait, a network would be insufficiently intense and unable to simulate the response variable.

THE POOLING LAYER:

It moves in the same direction as the nonlinear layer. It works with the image's width and height, performing a down sampling procedure on them. As a result, the size of the image is lowered. This means that if some features were already recognised during the previous convolution operation, a detailed image is no longer required for further processing and is reduced into smaller images.

Fig 3: MAX POOLING LAYER

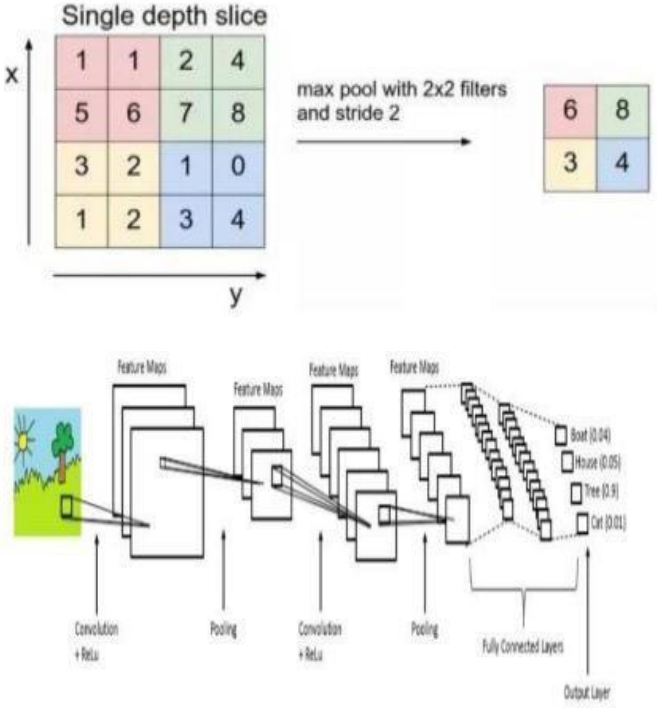


Fig 4: OVERALL STRUCTURE OF CNN

FULLY CONNECTED LAYER:

It's primary to link an overall linked layer after completing the succession of convolution, non-linear, and pooling layers. This layer receives the convolution network's output data. When a completely connected layer is attached to the network's end, it produces an N-dimensional vector, where Ni is the number of classes from which the model chooses the needed class.

CNN MODEL

1. The Keras framework and the Opencv library were used to create this CNN model, which is widely utilised in real-time applications..

2. This concept can also be used to create a full-fledged software that scans everyone entering a public meeting.

LAYERS IN CNN MODEL

1. Conv2D Layer
2. MaxPooling2D Layer
3. Flatten () Layer
4. Dropout Layer
5. Dense Layer

Conv2D Layer:

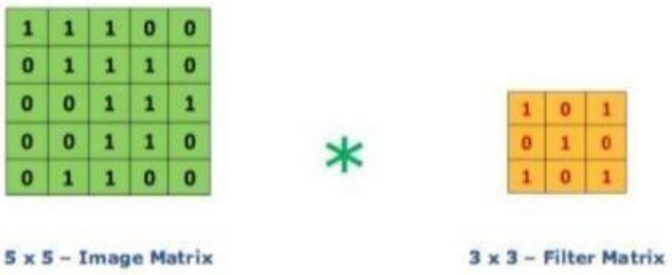


Fig 5: 2D LAYER MODEL

MaxPooling2D Layer: It is used with pool size or filter size of 2*2.

Flatten () Layer: It is used to flatten all the layers into a single 1D layer.

Dropout layer: It is used to prevent the model from overfitting.

Dense Layer: The activation function here is softmax which will output a vector with two probability distribution values.

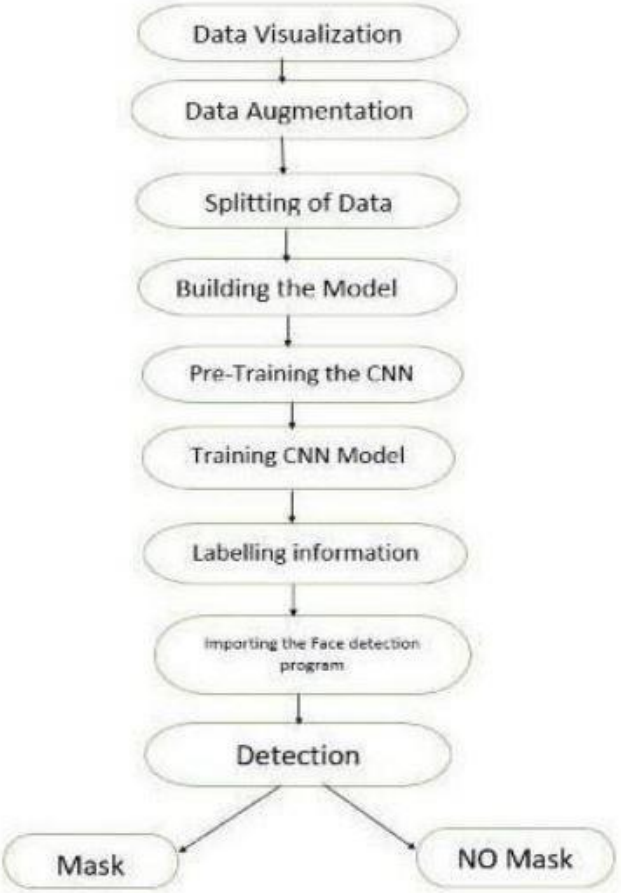


Fig 6: PROPOSED SYSTEM ARCHITECTURE

Steps

Data Visualization.
Data Augmentation.
Splitting the data.
Building the Model
Training the CNN model
Labeling the Information.
Importing the Face detection.
Detecting the Faces with and without Masks

Data Visualization

Let's start by visualizing the total number of photographs in both categories in our dataset. We can observe that the ‘yes' class has 690 photographs while the ‘no' class has 686photos.

Data Augmentation

In the next step, we augment our dataset to include more number of images for our training. In this step of data augmentation, we rotate and flip each of the images in ourdataset.

Splitting the data

In this step, we split our data into the training set which will contain the images on which the CNN model will be trained and the test set with the images on which our model will be tested.

Building the Model

In the next step, we build our Sequential CNN model with various layers such as Conv2D, MaxPooling2D, Flatten, Dropout and Dense.

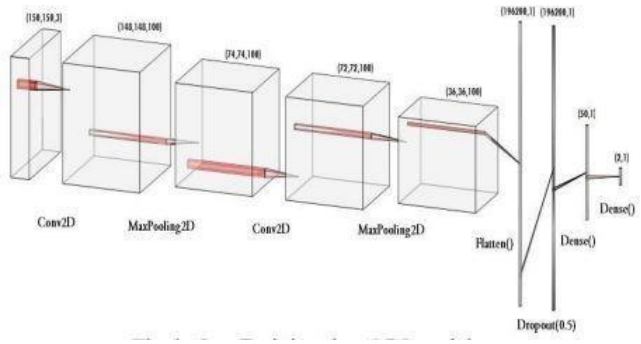


Fig 7: PRE-TRAINING CNN MODEL

After building our model, let us create the 'train_generator' and 'validation_generator' to fit them toour model in the next step.

Training the CNN model

It is an important step where the images fit in the training set and to the test set for sequential model by using keras library.This model is trained for 30 epochs(iterations).For high accuracy we have to use more number of epochs in its training there it occurs over-fitting.

Labeling the Information

After building the model, we label two probabilities for our results. ['0' as 'without_mask' and '1' as 'with_mask']. I am also setting the boundary rectangle color using the RGB values.

Importing the Face detection Program

After this, we intend to use it to detect if we are wearing a face mask using our PC's webcam. For this, first, we need to implement face detection. In this, I am using the Haar Feature based Cascade Classifiers for detecting the features of the face.

Detecting the Faces with and without Masks

In the last step, we use the OpenCV library to run an infinite loop to use our web camera in which we detect theface using the Cascade Classifier.

RESULTS



Fig 8: FIGURE WITH NO MASK

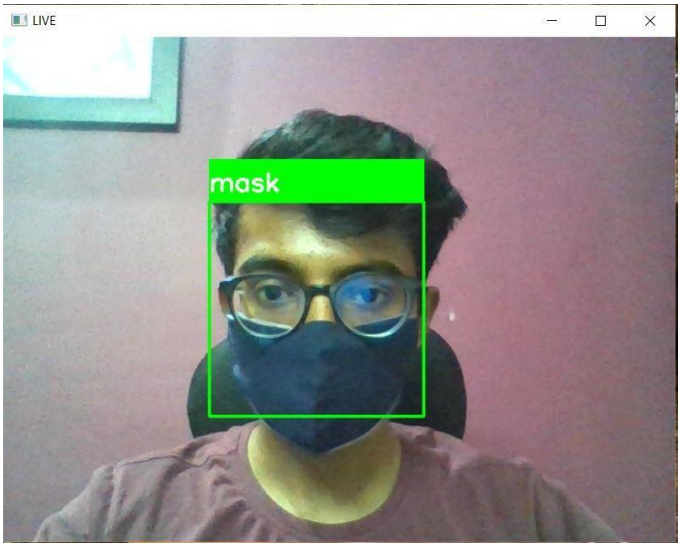


Fig 9: FIGURE WITH MASK

CONCLUSION

As the technology are blooming with emerging trends the availability so we have novel face mask detector which can possibly contribute to public healthcare. We used OpenCV, Keras, and NN to detect whether people were wearing face masks or not. The models were tested with images and real-time video streams. The accuracy of the model is over 95% and, the optimization of the model is a continuous process and we are building a highly accurate solution by tuning the hyper parameters. This specific model could be used as a use case for edge analytics. Furthermore, the proposed method achieves state-of-the- art results on a public face mask dataset.

REFERENCES

[1] M. S. Ejaz and M. R. Islam, "Masked Face Recognition Using Convolutional Neural Network," 2019 International Conference on Sustainable Technologies for Industry 4.0 (STI), 2019, pp. 1-6, doi:10.1109/STI47673.2019.9068044.

[2] M. R. Bhuiyan, S. A. Khushbu and M. S. Islam, "A Deep Learning Based Assistive System to Classify COVID-19 Face Mask for Human Safety with YOLOv3," 2020 11th International Conference on Computing, Communication and Networking Technologies (ICCCNT)

[3] M. M. Rahman, M. M. H. Manik, M. M. Islam, S. Mahmud and J. -H. Kim, "An Automated System to Limit COVID-19 Using Facial Mask Detection in Smart City Network," 2020 IEEE International IOT, Electronics and Mechatronics Conference (IEMTRONICS), 2020

[4] Y. Sun, Y. Chen, X. Wang, and X. Tang, "Deep learning face representation by joint identificationverification," in Advances in neural information processing systems, 2014, pp. 198hy, A. Khosla, M. Bernstein, A. C. Berg, and L. Fei-Fei, "ImageNet Large Scale Visual Recognition Challenge," 2014

[5] F. S. Samaria and A. C. Harter, "Parameterisation of a stochastic model for human face identification," in Applications of Computer Vision, 1994., Proceedings of the Second IEEE Workshop on, pp. 138–142, IEEE, 1994.

[6] D. Yi, Z. Lei, S. Liao, and S. Z. Li, "Learning face representation from scratch," CoRR abs/1411.7923, 2014.

[7] X. Cao, D. Wipf, F. Wen, G. Duan, and J. Sun, "A practical transfer learning algorithm for face verification," in Computer Vision (ICCV), 2013 IEEE International Conference on, pp. 3208–3215, IE8–1996.

[8] Zhao, R. Chellappa, P. J. Phillips, and A. Rosenfeld, "Face recognition: A literature survey," ACM computing surveys (CSUR), vol. 35, no. 4, pp. 399–458, 2003. [3] O. Russakovsky, J. Deng, H. Su, J. Krause, S. Satheesh, S. Ma, Z. Huang, A. KarpatEE, 2013

AET 010

Movie Recommendation System using Feature Engineering through NLP

Kiran Hanumant Jadhav
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
kiran.jadhav3@vit.edu.in

Pradnya Sheelratna Tayade
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
pradnya.tayade@vit.edu.in

Ansika Sanjay Jaiswal
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
ansika.jaiswal@vit.edu.in

Amulya Mahendra Kura
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
amulya.kura@vit.edu.in

Prof. Snehal Andhare
Department of Computer Engineering
Vidyalankar Institute of Technology
Mumbai, India
snehal.andhare@vit.edu.in

***Abstract*—Text Analysis and Feature Engineering is a methodology used for Text Cleaning, Language Detection, Sentiment Analysis, Forming Word Cloud, Recommendation System etc. In the proposed paper we implemented a methodology for Text Analysis and Feature Engineering using natural language processing (NLP) and Python and demonstrated how a movie recommendation system could be built using this methodology. The methodology includes text cleaning, language detection, sentiment analysis, forming word clouds, and machine learning-based recommendation systems. We implement the methodology using Python and various NLP libraries. Our results show a word cloud of frequently occurred words in cleaned dataset and also how Movie recommendation system can accurately identify similar movies and provide relevant recommendations to users based on Title of the movie, genres and directors. The data set was static dataset, and it has been taken from Kaggle. The proposed system can be applied to a variety of text analysis and recommendation system applications and provides a useful tool for deriving significant insights from text data.**

Keywords— Text Analysis, Feature Engineering, Cosine Similarity, Vector, Word Cloud, Movie Recommendation, text preprocessing.

I. INTRODUCTION

Text analysis is commonly referred as process of analyzing and deriving significant insights from text data. Text Analysis includes Text Cleaning, Language Detection, Sentiment Analysis, Entity recognition, Topic modeling, Forming Word Cloud, and Recommendation System. On the other hand, Feature engineering refers to the process of transforming raw data into a set of features which we can use as input to machine learning algorithms. Text Analysis and Feature Engineering is a combination that involves transforming text data into a set of categorical features that can be used to train Machin Learning models.

In the proposed paper we introduced methodology which includes steps such as Text Cleaning for extracting meaningful insights from raw data, stop word removal to improve the quality and efficiency of text and to reduce the size of the data. Tokenization reduces the complexity of data and increases both the performance and accuracy of text analysis algorithms. Stemming and Lemmatization to reduce words to their root forms for improving accuracy and efficiency. Length Analysis which includes word count, character count, sentence count, average length of the word, average length of the sentence, stemming involves removing of the suffix from a word to reduce it to its base form. For example, the words "running", "runner", and "runners" would all be reduced to the base form "run" using a stemming algorithm. Lemmatization, on the other hand, involves reducing words to their base form using a dictionary or vocabulary of the language. For example, the words "went", "goes", and "going" would all be reduced to the base form "go" using a lemmatization algorithm. After performing all the Text preprocessing steps, we have created Word Cloud which is formed by analyzing frequently appeared words. Dataset used for all of the mentioned activities was Static dataset regarding movies and was taken from Kaggle.

Finally, we explain how these techniques can be used to build a movie recommendation system. The

recommendation system analyzes the text data associated with movies to identify similarities between them and makes recommendations based on those similarities. We implement the methodology using Python and various NLP libraries, and similar movies are being recommended based on Cosine Similarity which considers vector orientation, independent on vector magnitude.

The approach used in the proposed paper is content based filtering. In content-based filtering, recommendations are made based on the keywords, genres, actors, or directors. In case of a movie recommendation system, if a user searches for a specific keyword or phrase such as "action movies" or "romantic comedies", the system can recommend movies that match those keywords or have similar features. This is typically done by analyzing the textual features of the movie's metadata or descriptions, such as keywords, genres, or other relevant features. Overall, our proposed methodology provides a useful tool for extracting insights from text data and building recommendation systems and can be applied to a variety of text analysis applications. The remainder of the paper is laid out as follows: Section II provides a Literature Survey, Section III elaborates the Proposed System in detail along with flowchart, Section IV presents the Implementation and results of our user study, Section V concludes the paper, section VI discusses future directions and Acknowledgement.

II. LITERATURE SURVEY

In the proposed article “Text Analysis and Feature Engineering” by Mauro di pietro we have seen that it introduces text analysis and feature engineering using NLP techniques. Text preparation, Tokenization, Stop word removal, Stemming, and Lemmatization are among the topics covered by the author. Following that, the article goes over numerous popular features engineering techniques, including bag-of-words, TF-IDF, word embeddings, and topic modelling. The author also includes practical examples and code snippets to show how these strategies might be used in real-world circumstances [1].

In the proposed research paper “FLEX, A content-based movie recommender system”, the authors Rujhan Singla et al. presented a system which uses movie metadata, such as genre, director, and cast, to generate a movie-user matrix. The authors use a variety of feature engineering techniques, including one-hot encoding and TF-IDF, to extract relevant information from the metadata. Then, based on a user's preferences, they employ a k-nearest neighbour algorithm to recommend movies to them. The study also compares FLEX to other advanced movie recommenders, with the findings indicating that FLEX outperforms these systems in terms of suggestion accuracy [2].

In the proposed research paper "Comparing Collaborative Filtering and Hybrid based Methods for Movie Recommendation," Noor Ifada et al. compare the effectiveness of collaborative filtering and hybrid-based approaches for movie recommendation. They evaluate the algorithms using the MovieLens dataset and discover that the hybrid-based strategy outperforms collaborative filtering in terms of suggestion accuracy. This study would be valuable for researchers and practitioners interested in building a movie recommender system and identifying the differences between collaborative filtering and hybrid-based techniques [3].

III. PROPOSED SYSTEM

The proposed methodology includes several steps, including data preparation, text pre-processing, text cleaning involves removing irrelevant information from the text, such as punctuation, stop words, and special characters, language detection to identify the language of the text, forming word clouds to generate visualizing the most frequently occurring words in the text, and recommendation systems based on cosine similarity. in this paper, we analyzed the text data and features to extract meaningful insights for the machine learning model. Finally, we explain how these techniques can be used to build a movie recommendation system using machine learning algorithms. The recommendation system analyzes the text data associated with movies to identify similarities between them and makes recommendations based on those similarities.

Following are the steps we performed in proposed system:

- Data preparation: Firstly, two CSV files are taken from the Kaggle which includes movie_ids and movie_credits. This dataset was gathered from the Movie Database API which uses the TMDb API. The movies dataset contains 4803 rows and 20 columns of different features while the credits

dataset contains same number of rows and 4 columns. We have then merged both the dataset based on the title column and since all the columns are not required as they hamper the accuracy of model by causing overfitting, that is why we have considered only seven main features which are movie_id, title, cast, crew, genre, keyword, overview.

- Feature extraction: After gathering the data a new column called "tags" was created by merging several previous columns. A new data frame was then generated using the output data.
- Data pre-processing: Following above steps, we have cleaned data using various techniques, including the removal of null and duplicated values, stop word removal, conversion of text to lower case, language detection, tokenization, stemming, and lemmatization.
- Topic modeling: Once the text data is preprocessed, the system would use a vector space model to represent each tag as a set of numerical features, such as term frequency-inverse document frequency (TF-IDF) values. The system would then apply a similarity measure, such as cosine similarity, to compute the similarity between each pair of tags. Based on that concept, a proposed system can be developed that utilizes the similarity vectors of movie plots to generate recommendations for users. This would enable the system to provide recommendations based on the content of the movies.
- Formation of word cloud: In the proposed system we have used one of the techniques of length analysis, which involves examining the length of documents, sentences, and words to gain insight into the text's characteristics. We have also used named entity recognition (NER), which identifies and extracts entities such as names, organizations, and locations from text. Finally, we formed a word cloud, a popular visualization technique that displays the most frequently occurring words in a text as larger and bolder than less frequent words.

Application of Text Analysis and Feature Engineering: Finally, movie recommendation system we developed as an application of text analysis and feature engineering, we implemented a content-based filtering approach to recommend movies to users based on their selected preferences. Specifically, users can input their preferred director, genre, and/or title of movie, and the system is recommending 5 movies that match these criteria. To achieve this, we first analyze the dataset and then we used the resulting dataset to create a content-based recommendation model, which uses cosine similarity to identify movies that are most similar to the user's selected preferences based on director, genre or title. The final output of the movie recommendation system is a list of 5 recommended movies that closely match the user's input criteria, based on the cosine similarity between the selected movie features and those of other movies in the dataset. Below Figure 3.1 shows Flowchart for the proposed system.

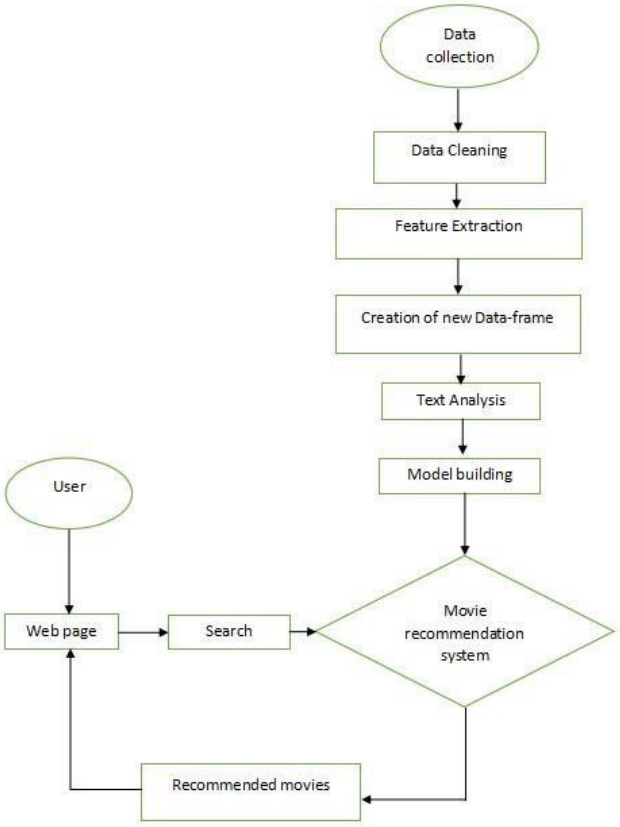


Figure 3.1: Flowchart of the Movie Recommendation System

IV. IMPLEMENTATION

Figure 4.1 shows word cloud which is a popular visualization technique that displays the most frequently occurring words in a text as larger and bolder than less frequent words.



Figure 4.1: Word cloud

Figure 4.2 shows Home page for movie recommendation system. Home page has carousel to display movie title, genres and poster of movie.



Figure 4.2: Home page of Movie recommendation system

Recommendation section display recommendations based ontitle, genres, director, and ten popular movies from dataset.

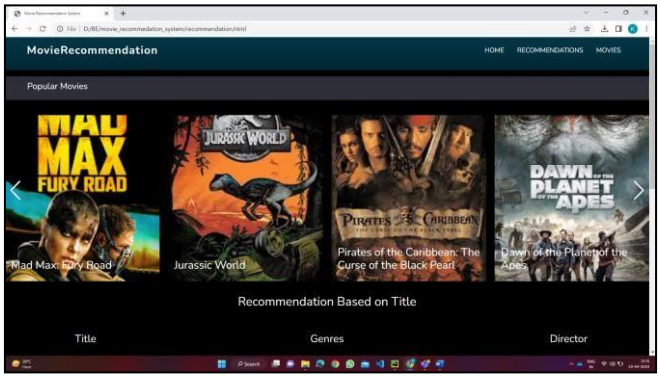


Figure 4.3.1: popular movies

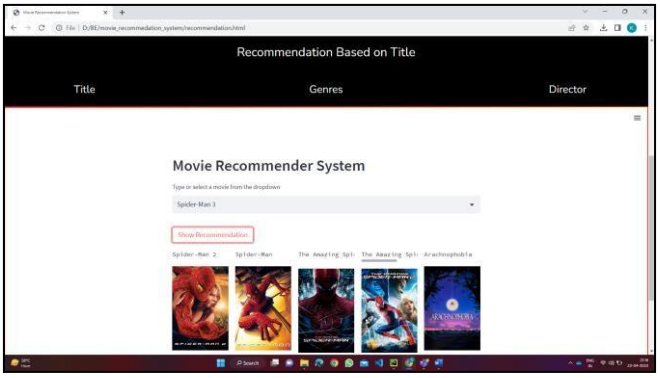


Figure 4.3.2: Recommendation based on Title

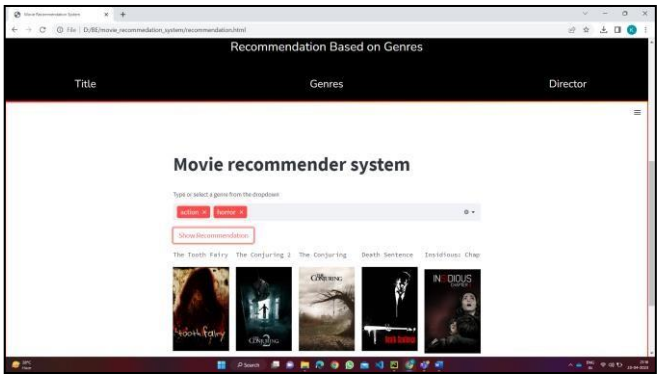


Figure 4.3.3: Recommendation based on Genres

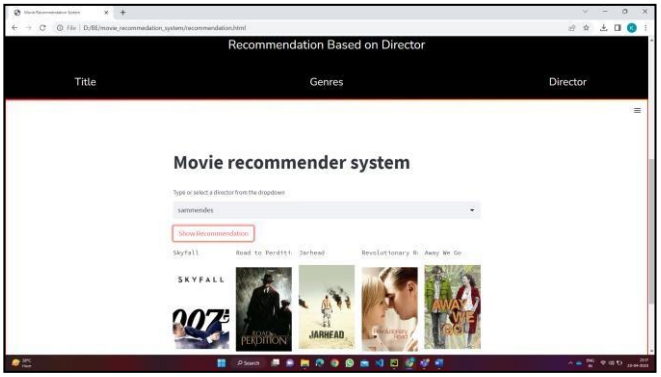


Figure 4.3.4: Recommendation based on Director

Figure 4.4 represents movie section which shows movies present in the dataset.

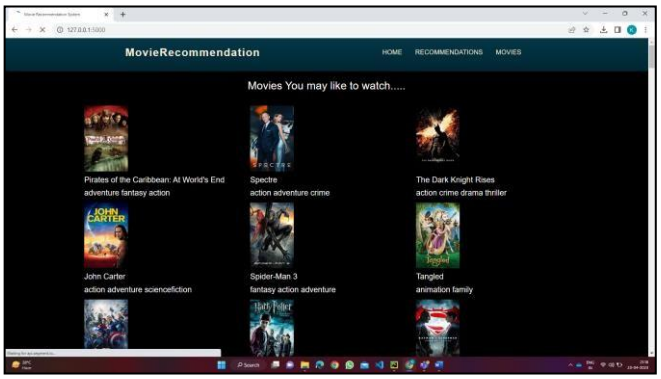


Figure 4.4: Movies present in dataset

V. CONCLUSION

this project aimed to analyzing text and extracting features and finally, movie recommendation system we developed as an application of it. We collected and pre-processed data from the Kaggle movie dataset, extracted relevant features, and used cosine similarity to identify movies that closely matched the user's input criteria based on director, genre, and title. We also explored topic modeling and word cloud visualization techniques to gain insights into the dataset. The results showed that the content-based recommendation approach performed well in suggesting movies to the end users based on user's preferences.

VI. FUTURE SCOPE

In the future, the system can be enhanced by incorporating sentiment analysis to analyze the reviews and ratings of users. This would help to improve the accuracy and performance of the recommendations system and provide a more personalized experience for the users. Currently, the system is based on director, genre, and title of the movie. In the future, more features can be incorporated, such as actors, release year, language, and plot summary, to provide more personalized recommendations. Movie recommendation system is based on content-based filtering. In the future, the system can be enhanced by incorporating collaborative filtering methods that consider the similarities between users' preferences and suggest movies based on those similarities. Also, we can make the system more dynamic, the system can be integrated with a real-time database that continuously updates with new movies and user ratings.

ACKNOWLEDGMENT

First and foremost, we would like to express our sincere gratitude and compliments to and encouragement have provided us with a unique opportunity to gain a competitive advantage over our peers in the field. We would also like to express our sincere appreciation to everyone who participated in this study project, shared their views, and helped us navigate the research process. Their contributions have been invaluable, and we are grateful for their support. Finally, I would like to express my sincere gratitude to all authors whose papers we have referred to in our research work.

REFERENCES

[1] Mauro Di Pietro, " Text Analysis & Feature Engineering with NLP", Towards Data Science.

[2] Rujhan Singla, Saamarth Gupta, Anirudh Gupta, Dinesh Kumar Vishwakarma, "FLEX: A Content-Based Movie Recommender", 2020 International Conference for Emerging Technology (INCET) Belgaum, India. Jun 5-7, 2020.

[3] Noor Ifada, Triyani Fatchur Rahman, Mochammad Kautsar Sophan, "Comparing Collaborative Filtering and Hybrid based Approaches for Movie Recommendation", 2020 Information Technology International Seminar (ITIS) Surabaya, Indonesia, October 14-16, 2020.

[4] Ashrita Kashyap, Sunita. B, Sneh Srivastava, Aishwarya. PH, Anup Jung Shah, "A Movie Recommender System: MOVREC using Machine Learning Techniques", IJESC, June 2020.

[5] Anmol chauhan, Deepak Nagar, Prashant Chaudary, "Movie Recommendation Using Sentiment Analysis" , ICIPTM, 2021.

[6] Yeole Madhavi B, Rokade Monika D , Khatal Sunil S, "Movie Recommendation System using Contentbased Filtering", IJARIIE- ISSN(O)-2395-4396,2021.

[7] Haili Wang, Nana Lou and Zhenlin Chao.A Personalized Movie Recommendation System based on LSTM-CNN,2020 2nd International Conference on Machine Learning, Big Data and Business Intelligence (MLBDBI).

[8] Jamilu Maaruf Musa and XU Zhihong. Item Based Collaborative Filtering Approach in Movie Recommendation System Using Different Similarity Measures.

[9] Ching-Seh (Mike) Wu, Deepti Garg and Unnathi Bhandary. Movie Recommendation System Using Collaborative Filtering.

[10] M. Chenna Keshava, P. Narendra Reddy, S. Srinivasulu and B. Dinesh Naik. Machine Learning Model for Movie Recommendation System, International Journal of Engineering Research & Technology (IJERT),ISSN: 2278-0181, Vol. 9 Issue 04, April-2020.

[11] Shouxian Wei, Xiaolin Zheng, Deren Chen, and Chaochao Chen. A hybrid approach for movie recommendation via tags and ratings. Electronic Commerce Research and Applications, 18:83–94, 2016.

[12] Meenu Gupta,,Aditya Thakkar, Aashish,Vishal Gupta and Dhruv Pratap Singh Rathore.Movie Recommender System Using Collaborative Filtering, Proceedings of the International Conference on Electronics and Sustainable Communication Systems (ICESC 2020) IEEE Xplore Part Number: CFP20V66-ART; ISBN: 978-1-7281- 4108-4.

[13] Suja Cherukullapurath and T.Sasipraba .A Machine Learning Based Implementation of Product and Service Recommendation Models,2021 7th International Conference on Electrical Energy Systems (ICEES) | 978-1-7281-7612-3/20/$31.00 ©2021 IEEE | DOI: 10.1109/ICEES51510.2021.9383732.

[14] C. Basu, H. Hirsh, W. Cohen et al., "Recommendation as classification: Using social and content-based information in recommendation," in AAAI/IAAI, 1998, pp. 714–720.

[15] Subramanyam Kunisetti and B Venkatesh.Content-Based Movie Recommendation System Using Genre Correlation,Conference PaperNovember 2018.

AET 011

Workify – Remote work tracker

Rohit Barve
Dept. Information Technology
Vidyalankar Institute of Technology
Mumbai, India
rohit.barve@vit.edu.in

Sameep Sawant
Dept. Information Technology
Vidyalankar Institute of Technology
Mumbai, India
sameep.sawant@vit.edu.in

Atharva Panvalkar
Dept. Information Technology
Vidyalankar Institute of Technology
Mumbai, India
atharva.panvalkar@vit.edu.in

Riddhi Warale
Dept. Information Technology
Vidyalankar Institute of Technology
Mumbai, India
riddhi.warale@vit.edu.in

***Abstract*—Standups are an integral part of every developer working in a startup company. Standups are a type of developer's meeting where they share their progress on what they were working on yesterday, what they will be working on today, and so on. Standups used to be in the physical form, but after lockdown, they changed to online mode. As most of the startups now have gone W.F.H, they still follow online standups and the main problem with this is that it takes a lot of time to complete, and sometimes it's become boring for others to listen to it. So to overcome this, we are developing a Remote first work tracker to help developers to add their daily tasks on this application where they can drag and drop their work between days as this application follows a calendar format. With this, the application also supports the agile project model, where the developer can line up the tasks to complete the project and track them.**

A. 1. Introduction

Communication is of utmost importance in any team. When it comes to tech teams managing your work as well as having an idea of the tasks you have assigned is crucial. DevOps is the combination of cultural philosophies, practices, and tools that increases an organization's ability to deliver applications and services at high velocity: evolving and improving products at a faster pace than organizations using traditional software development and infrastructure management processes. SCRUM is the most widely used software development methodology in organizations. Scrum is a framework for project management that emphasizes teamwork, accountability and iterative progress toward a well-defined goal. Our system helps solve this problem for both the developer as well as the manager. A developer needs to keep track of all the assignments he has been assigned as well as how much work he/she has already completed. The framework begins with a simple premise: Start with what can be seen or known. After that, track the progress and tweak, as necessary. A Kanban board is an essential tool for tracking development progress. A Kanban board is an agile project management tool designed to help visualize work in progress, and maximize efficiency (or flow). It can help both agile and DevOps teams establish order in their daily work.

I. 2. LITERATURE SURVEY

Existing Systems: The features in this system are already implemented in some other softwares such as Google calendar which has a calendar, Trello application which powers the Kanban system and the Jira software which has scrum and bugs system to integrate in it. User need to use this separate applications in order to use the features of our application. Even though all the features are implemented beforehand they are present on different platforms and if user wants to use all the features at once then the user has to use this all platform at once which will be very hectic to use and also very challenging. Also, the Jira software allows users to either use scrum or bug for a single workflow, if user want to use this both then they have to make 2 new projects. None of the systems have support for the GitHub.

3. Background

With the help of our software, IT firms and Startups can maintain and track their project progress. It helps IT teams to plan, assign, track, report and manage work. Our software also helps individuals/teams to organize events as planning, assigning and tracking work becomes easy and efficient. Open- source contributions trends among new developers are increasing day by day and with this increase in open source, managing becomes a challenge, and with Workify, this challenge becomes easy as GitHub issues can be raised and solved from this same software with project management. A DevOps application helps Managers assign tasks to

developers as well as help developers keep track of assigned tasks. Scrum is one of the agile methodologies designed to guide teams in the iterative and incremental delivery of a product. Often referred to as "an agile project management framework," its focus is on the use of an empirical process that allows teams to respond rapidly, efficiently, and effectively to change. Facilitated key features like SCRUM to maintain the agile process of development. Kanban is a popular Lean workflow management method for defining, managing and improving services that deliver knowledge work. It helps you visualize work, maximize efficiency, and improve continuously. Work is represented on Kanban boards, allowing you to optimize work delivery across multiple teams and handle even the most complex projects in a single environment. Utilized the KANBAN board showing work items at any time.

A. Design And Implementation

This proposed system is going to developed completely based on Typescript. For the frontend and server we are using Next.js, styling - Tailwind css, api - Graphql, database – Supabase. Complete solution is created using Typescript, Thus, there are a bunch of typescript based libraries used in the solution as well. Passport-google-oauth2: This library is used for google authentication of the user, using Google as the gateway. Bcrypt: This library is used to bcrypt and dcrypt the password of the user stored in the database. Nookies: This library is used to store the cookie in the web cookies, based on this cookie is user is given access to the routes. Jsonwebtoken: This library is used to create a 32 bit code which is used to create a token with has a link to the id of the user for authentication. Yup: This library is used for validating the use input for the front end as well as the backend. We will start with a landing page describing the application followed by the login or registration page as per the user selection. After the user is logged in successfully, the user will be directed to the dashboard page where the user can create a project or search project. The user can create a project and keep it private or public based on which it will be accessible to other users. The project page will be having all the main functionality of our project. Here the user can update the work the user is currently working on with the help of a calendar view, or the user can track the task using the Kanban board or can create a scrum sprint to complete the task in a given time, or can track the bugs found. In Kanban the user can create task, update task, assign the task to other user to complete the task, share the task and can delete the task. The user who have created the project will have the authority to add other users to the group. In scrum the user can create task, update task, assign the task to other user to complete the task, share the task and can delete the task. The bug feature will the option to integrate GitHub to it so that all the issues can be raised directly from this single application. In the project settings the user can select with feature to user and can change the theme and status of project from public to private and vice a versa. Modules:

1. Login Module
2. Registration Module
3. User Dashboard Module
4. Project Module
5. Calendar Module
6. Kanban Module
7. Scrum Module
8. Bug Module.

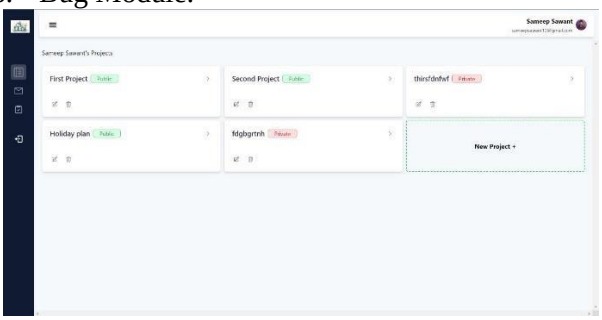


Fig 1. Dashboard

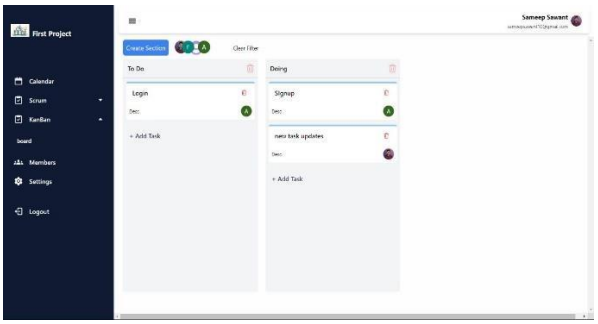


Fig 2. Kanban

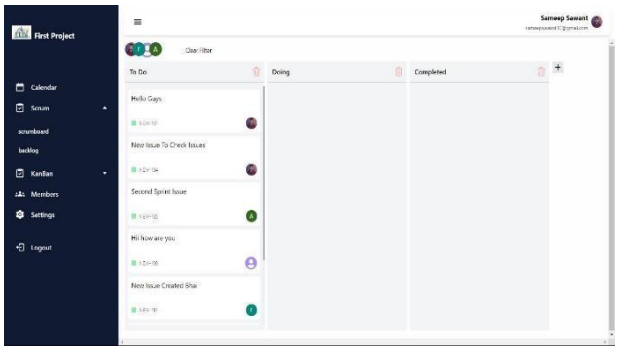


Fig 3. Backlog Scrum

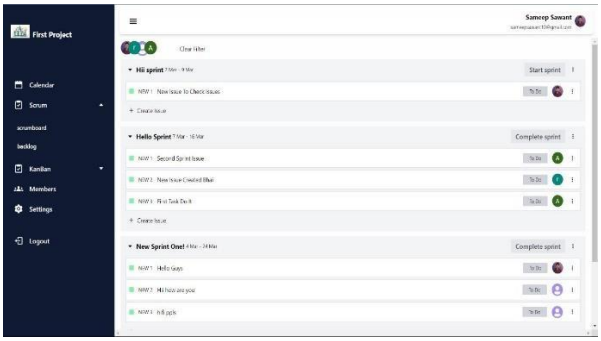


Fig 4. Scrum Board

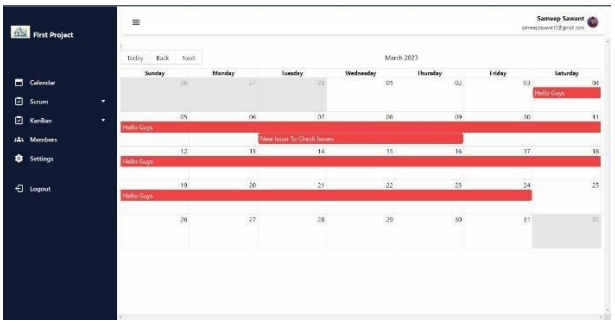


Fig 5. Calendar

B. Future Scope

GitHub is a code hosting platform for version control and collaboration. It lets you and others work together on projects from anywhere. This tutorial teaches you GitHub essentials like repositories, branches, commits, and pull requests. GitHubis a web-based service for version control using Git. Basically, it is a social networking site for developers. You can look at other people's code, identify issues with their code and even propose changes. GitHub is used by developers and companies to build, ship, and maintain software. It makes it possible to collaborate and share code and keep tabs of what's changed along the way. This process can make it easy to track down, say, when or how a bug was introduced. Creating harmony in the work flow and increasing efficiency of teams is the goal of our system.

C. Conclusion

Making a DevOps web app using multiple web development technologies to help both managers and developers. Facilitating most of the major features required by development teams such as Scrum, Kanban, Calendar. Created a strong base for further addition of essential features like GitHub collaboration. Our further future scope is Slack App integration which is a widely used in IT firms, where the user can send the updated of the task directly to the slack thread from the application and Notion Integration which is used by project management with the notion the user can create tasks on the notion and directly import the task in this application.

REFERENCES

[1] "What Makes Agile Software Development Agile?", IEEE Transactions on Software Engineering (Volume: 48, Issue: 9, 01 September 2022).

[2] "Scrum model for agile methodology", 2017 International Conference on Computing, Communication and Automation (ICCCA).

[3] "DevOps", May-June 2016, pp. 94- 100, vol. 33.] "Boris Cherny on TypeScript", IEEE Software (Volume: 37, Issue: 2, March-April 2020).

AET 012

AttendEase – A GPS Based Attendance System for Teachers

Viraj Khot
Department of Information Technology
Vidyalankar Institute of Technology
Mumbai, India
viraj.khot@vit.edu.in

Sankalp Rane
Department of Information Technology
Vidyalankar Institute of Technology
Mumbai, India
sankalp.rane@vit.edu.in

Bhanu Tekwani
Department of Information Technology
Vidyalankar Institute of Technology
Mumbai, India
bhanu.tekwani@vit.edu.in

Anish Padelkar
Department of Information Technology
Vidyalankar Institute of Technology
Mumbai, India
anish.padelkar@vit.edu.in

Abstract— Over the years, practically every educational organization has used manual attendance. Marking and monitoring attendance is an integral part to evaluate the candidate's regularity and sincerity but unfortunately, it is time-consuming due to the large universities. Particularly, in the setting of a manual attendance system, it is exceedingly challenging to identify proxy attendance. This issue was addressed through a number of inventions, and automated attendance eventually became a reality. The automation of the attendance system reduces the use of pen and paper thereby saving human efforts as well as time. In this research, we suggested a geo-location-based, face recognition-capable web prototype for attendance tracking that is both practical and affordable. The core concept is to track attendance based on geolocation by using the virtual boundary of the geographical area and face recognition is used to mobilize as well as increase the authenticity of an individual faculty. The candidate will be tagged as present if they are within the virtual boundaries of a geographic area, else they will be marked as absent. The suggested method eliminates the need for any additional hardware and only requires the end user to install an Android application on their smartphone, which increases efficiency and lowers hardware costs all at once.

Keywords— Automated attendance, Geo-location-based, Geographical area, Face recognition.

I. INTRODUCTION

Attendance is considered one of the easiest processes but on the other hand, it is a mandatory process that is required for every organization. For a long time, two types of attendance systems are available i.e. manual and automated. A manual attendance system relies on the use of pen, paper, and time sheets. However, this system introduces erroneous results most of the time. In this study, Attend Ease - a secure attendance management system that shares the individual member's location and uses facial recognition technology to confirm their presence on campus is built. A digital image is used in facial recognition technology. The developed technology compares a person's pixels to identify them, opening the door to creating a sophisticated attendance tracking system. Based on facial patterns, face textures, and face shapes, a member's face can be recognized using a variety of algorithms. Deep Learning is employed in this work to compare the extracted image to the images contained in the database. Also, the usage of a GPS location tracking device to locate the candidate is a key component of this endeavor. The combined approach of face recognition and location tracking looks more suitable approach for maintaining an attendance system in any organization.

Facial Recognition: A computer vision task called face recognition involves recognizing and authenticating a person from a picture of their face. A computer-driven program that uses a digital image to identify or authenticate a person is known as a facial recognition system. Python libraries are imported for image processing and face recognization. Artificial Intelligence concepts are used to recognize the face of the candidate and predict that the same candidate is using the app. Deep Learning is employed in this research to match the extracted photos with the photographs contained in the database and to extract images from video frames. D-Lib, a Machine Learning Python Library has been employed for this. D-Lib is a deep neural network that is used to identify features in a face image [6].

Geo-Location: We used the Google Maps API for real-time tracking and live GPS positioning to record attendance. You can incorporate the Google Maps service with your app using the Google Maps API. An application can be tailored to you by using geolocation to discover your precise location. The information about cell towers and WiFi nodes that the mobile client can

identify is used by the Geolocation API to deliver a location and accuracy radius. The protocol used to transmit this data to the server and deliver a reply to the client is described in this paper. POST is used for HTTPS communication. The content type of both the request and the response is application/JSON, and they are both formatted as JSON [7].

II. PROBLEM STATEMENT

The effective operation of any university or college depends on the registration and maintenance of attendance. The manual attendance system is quite hectic and prone to mistakes. Particularly, in the setting of a manual attendance system, it is exceedingly challenging to identify proxy attendance. A person's attendance can be tracked via their fingerprints, voice, iris, digital signature, and a variety of other digital techniques. But each of these approaches is either expensive or needs periodic upkeep. The automation of the attendance system also reduces the use of pen and paper thereby saving human efforts as well as time. This System is proposed in order to reduce manual work and reduce hardware cost and makes a robust attendance system. This system replaces the traditional method with a mobile application that captures attendance based on geolocation and face recognition.

III. LITERATURE REVIEW

Attendance systems based on geolocation and facial recognition are two popular technologies that are gaining traction in a variety of industries. The following is a review of the relevant studies and research papers on these topics:

1. E.S. Garba, A. Salihu, and Y. Abubakar (2019): "An Efficient Automatic Attendance System Based on Geolocation and Bluetooth Low Energy Technology." This study proposes an automatic attendance system that tracks and monitors student or employee attendance using geolocation and Bluetooth Low Energy (BLE) technology. A smartphone app is used to scan and detect BLE beacons placed in various locations [1].
2. N.A. Al-Dulaimi, A.A. Al-Rabayah, and A.S. Al-"A Jumaily's Facial Recognition-Based Attendance System Using Raspberry Pi" (2019): This study describes a facial recognition-based attendance system that makes use of a Raspberry Pi as the primary processing unit. A camera is used to capture images of individuals, and a facial recognition algorithm is used to identify and track their attendance [2].
3. P. S. Pasha, R. Gopinath, and A. Raja (2018): "Implementation of an Attendance System Using GPS and Facial Recognition": This study proposes a hybrid attendance system that combines GPS and facial recognition technologies to track students or employees' attendance. The system employs a smartphone app to capture individuals' facial images and GPS coordinates, which are then sent to a server for processing [3].
4. S. Singh, R. Singh, and A. Gupta (2019): "A Hybrid Facial Recognition and Geolocation-Based Attendance System for Universities." This study presents a hybrid attendance system using both facial recognition and geolocation technologies. The system uses a mobile app to collect students' facial images and GPS coordinates, which are then processed and analyzed on a central server [4].
5. A. Tariq, M.A. Qureshi, and A. Sher (2019): "An Automatic Attendance System Using Face Recognition and Geolocation Tracking." This study proposes an automatic attendance system that tracks and monitors employee attendance in the workplace by combining facial recognition and geolocation tracking technologies. Employees' facial images and GPS coordinates are captured using a smartphone app and sent to a central server for processing.[5]

In conclusion, the literature indicates that geolocation-based and facial recognition-based attendance systems have significant potential for improving attendance management in a variety of settings, including educational institutions and workplaces. These systems can improve accuracy, save time and resources, and make life easier for both students and employees.

IV. PROPOSED SYSTEM

The following is the functional block diagram of the proposed system:

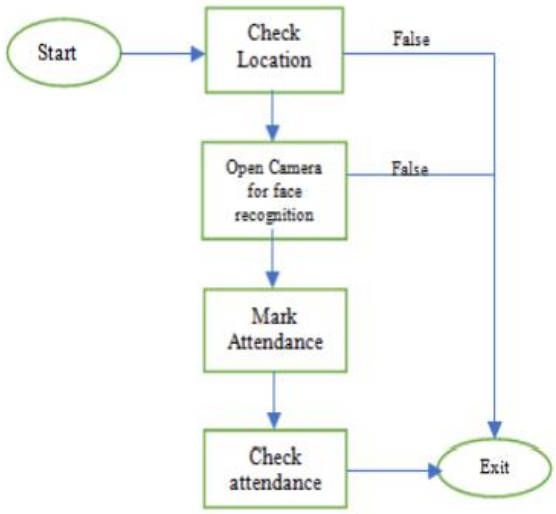


Figure 1: Block Diagram

The proposed system “AttendEase” is a web application which is comprehensive attendance management

solution that makes use of React Native, geo-location, and facial recognition technology. The software is intended to provide users with an easy-to-use attendance marking experience, removing the need for manual attendance monitoring. The software uses GPS technology to ensure that users may only mark their attendance from the approved area. The programme authenticates the user's identity using facial recognition technologies, ensuring that only the intended user can register their attendance.

Flask, a lightweight and versatile Python-based web framework, has been used to power the app's backend. The D-lib library, a high-performance open-source library capable of recognizing faces with high accuracy, is used for facial recognition. The backend of the software is designed to ensure smooth performance and scalability, meeting the needs of large organizations with several users indicating their presence at the same time.

The app's data is stored in a Mongo-DB No-SQL database, which is scalable and versatile for document-oriented data storage and retrieval. The programme makes use of Mongo DB's features to store data in a structured fashion that the app can simply access and change. With the help of Mongo-DB's flexible schema, the app can easily adapt to any changes in the data structure.

Organizations and users will benefit from the proposed system in a variety of ways, including precise attendance monitoring, easier attendance management, and decreased administrative burden. Organizations may use this software to ensure that their attendance monitoring system is transparent and efficient, while users can easily and quickly mark their attendance. The system offers a complete attendance management solution, ensuring that attendance data is gathered, stored, and available to authorized personnel.

V. RESULT

Attend Ease is a web application which requires a GPS-enabled mobile device with a camera and an internet connection is used by a person. To verify the teacher's identity, the camera captures an image of the teacher's face, which is then analyzed and compared to a database of known faces. The system tracks the teacher's attendance as well as their GPS location, which is tracked using a GPS receiver or mobile device. The attendance data is stored in a database and is accessible to authorized personnel for monitoring, reporting, and analysis.

Screenshots:

Main Page: The main page consists of two buttons "Enter" and "Exit" and one section for entering new teacher details labelled as "Admin":



Figure 2: Main Page

Admin Page: This page is used to add new teacher data in the system. The unique ID and face of the teacher is used to create new user:

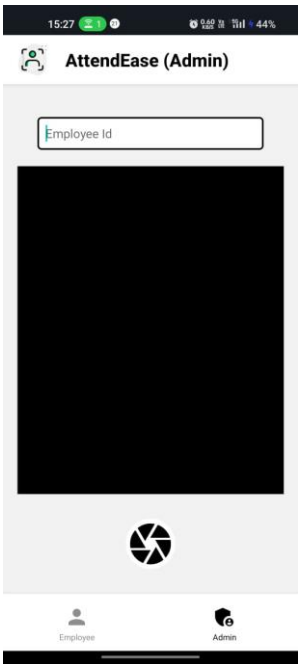


Figure 3: Admin Page

Tracking Geo-Location: The live location of the user is getting tracked while marking attendance:

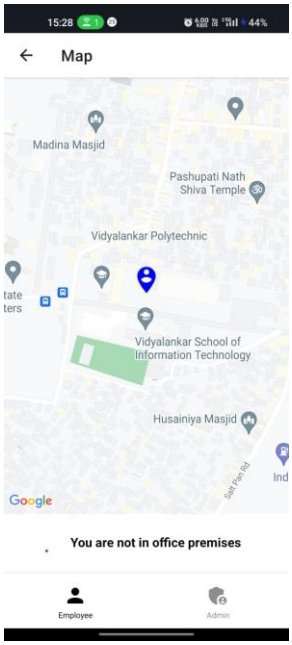


Figure 4: GPS tracking

VI. DISCUSSION

BENEFITS

Face recognition and GPS tracking and positioning attendance systems can provide several benefits to colleges, including:

1. Increased accuracy: These systems can track teacher's attendance accurately, reducing the possibility of errors, omissions, or fraud in attendance records.

2. Less paperwork: Automated attendance systems can eliminate the need for manual attendance records, reducing paperwork and administrative tasks.

3. Contactless attendance: The use of face recognition technology, as well as GPS tracking and positioning, can reduce the need for physical contact, which is important for reducing the risk of disease spread on campus.

4. Increased efficiency: Automated attendance systems can help professors and administrators focus on teaching and other important tasks by streamlining attendance tracking.

5. Time savings: These systems can automate the attendance tracking process, saving professors and administrators time that would otherwise be spent manually taking attendance.

6. Real-time monitoring: GPS tracking and positioning can provide real-time monitoring of student attendance, allowing professors and administrators to identify attendance patterns and address any issues that arise.

Overall, attendance systems based on face recognition and GPS tracking and positioning can assist colleges in improving attendance tracking, saving time, reducing paperwork, improving security, and increasing overall efficiency.

VII. LIMITATIONS

While attendance systems based on face recognition and GPS tracking and positioning have many advantages, there are some limitations that should be considered in college settings:

1. Internet connection required: In order to operate, end users must have a good internet connection.

2. Concerns about privacy: The use of facial recognition and GPS tracking and positioning involves the collection and processing of personal data, which can raise privacy concerns if not handled properly. Teachers may be concerned about such intrusive technologies, especially if they believe their privacy is being violated.

3. Technical issues: Because these systems rely on technology, they can become ineffective if there is a technical issue, such as a network or power outage.

4. Change aversion: Faculty members may be resistant to adopting new attendance tracking methods, particularly if they are accustomed to traditional attendance-taking methods.

5. Biasing: These systems can be biased against specific groups or individuals, resulting in discriminatory outcomes.

6. Reliance on participation: For the system to function properly, teachers must be present and engaged. This requires teachers to be willing and capable of participating in the system, which is not always the case.

Overall, before implementing attendance systems based on face recognition and GPS tracking and positioning, colleges should carefully weigh the pros and cons. Concerns about privacy, technology, and accuracy should be addressed, and efforts should be made to ensure that teachers are comfortable and willing to participate in the system.

FUTURE SCOPE

Geolocation-based and facial recognition-based attendance systems have a bright future. Here are a few areas where these technologies could be developed and applied further:

1. Other technologies integration: Attendance systems based on geolocation and facial recognition can be combined with other technologies such as artificial intelligence (AI) and machine learning (ML) to improve accuracy and efficiency. Facial recognition algorithms, for example, can be trained using ML techniques to improve their ability to recognize faces accurately.

2. Intelligent classrooms and offices: Attendance systems based on geolocation and facial recognition can be integrated into smart classrooms and offices to improve overall productivity and efficiency of the learning and working environments. These attendance systems, for example, can be linked with smart lighting, heating, and cooling systems to create a more comfortable and efficient environment.

3. Real-time data analytics: Attendance systems based on geolocation and facial recognition can provide real-time data analytics that can be used to analyze attendance patterns and identify trends. This data can be used to improve educational and working conditions by identifying areas for improvement.

4. Contactless attendance: As the COVID-19 pandemic continues, contactless attendance systems are becoming more popular. Attendance systems based on geolocation and facial recognition can be further developed to allow for contactless attendance tracking, reducing the risk of infection transmission in educational institutions and workplaces.

5. Integration with payroll and human resources management systems: Attendance systems based on geolocation and facial recognition can be integrated with payroll and HR management systems to automate administrative tasks such as payroll processing and employee record-keeping.

Finally, the future potential for geolocation-based and facial recognition-based attendance systems is vast, as are the applications for these technologies. As technology advances, we can expect more advancements in these areas, resulting in more efficient and accurate attendance management systems.

CONCLUSION

Finally, geolocation-based and facial recognition-based teacher attendance systems have the potential to revolutionize attendance tracking in educational institutions. These technologies provide a variety of advantages, including increased accuracy, decreased administrative workload, increased security, and improved communication.

Attendance systems based on facial recognition provide accurate identification and prevent unauthorized attendance, ensuring that only registered students are permitted in the classroom.

Institution administration can track the attendance of faculty fluently. Ultimately, it becomes easy to make their payroll, track attendance, keep leave records, etc.

By automating the attendance tracking process, these technologies save time and reduce errors, allowing teachers to focus more on teaching and less on administrative tasks, also it decreases the administrative workload for admin. Additionally, the enhanced security provided by these technologies can create a safer and more secure learning environment for teachers.

Overall, geolocation-based and facial recognition-based attendance systems for teachers offer a more efficient, accurate, and secure way of tracking attendance. As technology continues to advance, we can expect to see further developments in these areas, leading to even more innovative solutions for attendance tracking in educational institutions.

ACKNOWLEDGMENT

We, Viraj Khot, Sankalp Rane and Anish Padelkar would like to thank Department of Information Technology and Vidyalankar Institute of Technology for their support during this research. We would also like to express our appreciation to Prof. Bhanu Tekwani for her guidance and support. Finally, we acknowledge the valuable feedback received from our colleagues during the peer review process.

REFERENCE

[1] E.S. Garba, A. Salihu, and Y. Abubakar: "An Efficient Automatic Attendance System Based on Geolocation and Bluetooth Low Energy Technology." (2019)

[2] N.A. Al-Dulaimi, A.A. Al-Rabayah, and A.S. Al: "A Jumaily's Facial Recognition-Based Attendance System Using Raspberry Pi." (2019)

[3] P. S. Pasha, R. Gopinath, and A. Raja: "Implementation of an Attendance System Using GPS and Facial Recognition" (2018)

[4] S. Singh, R. Singh, and A. Gupta: "A Hybrid Facial Recognition and Geolocation-Based Attendance System for Universities." (2019)

[5] A. Tariq, M.A. Qureshi, and A. Sher: "An Automatic Attendance System Using Face Recognition and Geolocation Tracking." (2019)

[6] Facial Recognition: Python | Multiple Face Recognition using dlib - GeeksforGeeks

[7] Geo-location: https://developers.google.com/maps/documentation/geolocation/overview

[8] Cui Zhao; Xiaodan Huang: "Attendance System Based on Face Recognition and GPS Tracking and Positioning." (2020): Attendance System Based on Face Recognition and GPS Tracking and Positioning | IEEE Conference Publication | IEEE Xplore

[9] Maulana Dimas, Iffandi,Nata, Rangga, Jeremia Rizki, Adiningrat Jihad, Fahri Pandapota: "Attendance System with Face Recognition" (November,2020): Attendance System with Face Recognition (researchgate.net)

[10] Amrutha H. B, Anitha C, Channanjamurthy K. N, Raghu R: "Attendance Monitoring System Using Face Recognition" (April,2018): Attendance Monitoring System Using Face Recognition – IJERT

[11] DLib Reference: Dlib - Wikipedia

[12] React Native Reference: React Native · Learn once, write anywhere

[13] Flask Reference: Welcome to Flask — Flask Documentation (2.3.x) (palletsprojects.com)

[14] MongoDB Reference: What Is MongoDB? | MongoDB

AET 013

Vikalp App – an Android Application for Student Career Choices

Manali Surve
BE (8th Semester)
Department of Information Technology,
Vidyalankar Institute of Technology,
University of Mumbai, Maharashtra, India.

Vaishnavi La
BE (8th Semester)
Department of Information Technology,
Vidyalankar Institute of Technology,
University of Mumbai, Maharashtra, India.

Pranali Darekar
BE (8th Semester)
Department of Information Technology,
Vidyalankar Institute of Technology,
University of Mumbai, Maharashtra, India.

Prof. Neha Kudu
Associate Professor,
Department of Information Technology,
Vidyalankar Institute of Technology,
University of Mumbai, Maharashtra, India.

Abstract - In today's rapidly changing job market, choosing the right career path can be a daunting task for many students. This is because the decision-making process is not only influenced by individual preferences but also depends on various external factors such as market demand, job security, and salary expectations. As such, it is essential to have a comprehensive and personalized career planning platform that can guide students in making informed decisions about their future. The proposed platform aims to help students identify their personality traits, strengths, and values, and suggest potential career fields that align with their interests and skills. To achieve this, the platform will use the big five personality test and other relevant data to provide personalized recommendations for each student. This approach will help students gain a better understanding of themselves and identify the careers that best match their personality type. Furthermore, the platform will provide comprehensive information about different career fields, including the necessary education, skills, and experience required to succeed in those fields. This information will help students make informed decisions about the careers they wish to pursue and the steps they need to take to achieve success. To ensure a seamless user experience, the platform will also feature a chatbot that can instantly assist students in answering their questions related to career planning and decision-making. The chatbot will provide quick and relevant responses to users, ensuring that they receive accurate information in real-time. Moreover, the platform will offer a university search function that allows students to search and explore different universities and their programs related to the suggested career fields. This feature will enable students to find the educational institutions that best suit their needs and career goals.

Keywords: Career paths, Personality traits, Career fields, Chatbot feature, University

I. INTRODUCTION

Career planning and decision-making is a crucial aspect of an individual's life that can determine their future success and happiness. However, choosing the right career path can be a daunting task for many students, as it requires a deep understanding of oneself, knowledge about the job market, and awareness of the skills required for different career fields. To address this challenge, a comprehensive and personalized career planning platform is needed that can guide students in making informed decisions about their future.

The proposed career planning platform aims to help students identify their personality traits, strengths, and values and suggest potential career fields that align with their interests and skills. This platform is designed to provide a personalized experience for each student, offering customized recommendations based on their responses to the big five personality test and other information provided by the student. By using this approach, the platform can offer relevant suggestions that match each student's unique profile, ensuring that they have a better understanding of themselves and the careers that best match their personality type.

The platform also offers comprehensive information about different career fields, including the necessary education, skills, and experience required to succeed in those fields. This information will help students make informed decisions about the careers they wish to pursue and the steps they need to take to achieve success. By providing this information, the platform can help students gain a deeper understanding of the job market and make informed decisions about their future.

To ensure a seamless user experience, the platform will also feature a chatbot that can instantly assist students in answering their questions related to career planning and decision-making. This chatbot will provide quick and relevant responses to users, ensuring that they receive accurate information in real-time.

Moreover, the platform will offer a university search function that allows students to search and explore different universities and their programs related to the suggested career fields. This feature will enable students to find the educational institutions that best suit their needs and career goals.

II. LITERATURE SURVEY

Three Apps with similar kind of objective were selected, they are as follows:

Career Guide [9] The Career Guide App is an invaluable resource for young people who are in the process of deciding their career path. With the app, users have access to a wealth of information about various colleges, career guidance, different courses, entrance exams, and top tutors for ITI courses. The app serves as a reliable career counsellor and has an overall rating of 4.3, indicating its usefulness.

One of the app's standout features is the easy access to information about various colleges. Instead of scouring different sources for information, users can find all the necessary details in one place. The app also provides career guidance, which can help users make informed decisions about their future. The app's information about different courses and entrance exams can help users understand the requirements for different careers and prepare for them accordingly.

However, some users have expressed limitations in the app. For instance, there is no direct search option, which can make it challenging to find specific information quickly. Additionally, some users have found the app to be overwhelming due to the sheer amount of content available.

In summary, the Career Guide App is an excellent resource for anyone seeking guidance in choosing the right career path. While there are limitations to the app, the wealth of information it provides more than makes up for them.

The app is available for download athttps://play.google.com/store/apps/developer?id=CareerGuide.Com.

Career Knowledge [10] The Career guidance app is a useful resource for students looking for information about different career options and planning their careers. The app provides knowledge-based career information and career guidance to help students make informed decisions about their future. Its features include a list of different institutions, information on various career topics such as engineering, commerce, and others, a quiz section, and an exam list. Its overall rating of 4.0 suggests that the app is beneficial for its users.

One of the app's notable features is its comprehensive list of different institutions, which can provide useful information to students looking for colleges and universities to pursue their career goals. Moreover, the app's career guidance information on different topics such as engineering, commerce, and more can help students get a better understanding of the career options available to them.

However, some limitations of the app have been reported by users. For instance, the user interface of the app is outdated and not very user-friendly, making it challenging to navigate. Additionally, the quiz section does not work, which is a significant drawback as it could have been a valuable tool for students to test their knowledge. Finally, the exam list is not visible and shows an error message stating that there is no network, even when there is a network connection.

In summary, the Career guidance app is a useful resource for students looking for information about different career options and planning their careers. While the app's features are beneficial, the limitations mentioned above need to be addressed for it to be more effective.

The app is available for download at https://play.google.com/store/apps/detailsid=com.cognitivefiber.CareerKnowledge.

Test Vocacional [11] The Career guidance app is an essential resource for students looking for knowledge-based career information and career guidance. It provides comprehensive information on course information, career planning, and helps select career options to choose career goals. The app offers a range of features, including various tests, games, and exercises for memory retention, personality tests to identify the temperament type, and the analysis of important aspects of current careers available in the market. Its overall rating of 4.2 suggests that the app is useful for its users.

One of the app's standout features is the variety of tests available. The tests can help students gain a better understanding of their strengths, weaknesses, and interests, which can be useful in making informed decisions about their careers. The app also includes various games and exercises for memory retention, which can help students retain the information they learn better. The personality tests can help students identify their temperament type, which can also aid in career planning. Moreover, the app's analysis of important aspects of current careers available in the market can provide valuable insights to students.

However, the app has some limitations that users have reported. For instance, while there are many features, most of them are only available to premium users, which can be a disadvantage for those who cannot afford to pay. Additionally, to access the test, users have to watch an advertisement every time, which can be annoying and time-consuming.

In summary, the Career guidance app is an excellent resource for students looking for career guidance and knowledge-based information. While there are some limitations, the app's features are useful for those who want to make informed decisions about their careers.

The app is available for download at https://play.google.com/store/apps/details?id=com.softF.Vocacional.

III. PROPOSED SYSTEM

The proposed career planning platform will provide a comprehensive and personalized approach to career planning and decision-making for students. The platform will be designed to identify students' unique personality traits, interests, and skills and provide personalized career recommendations based on this information. The big five personality test will be integrated into the platform, and its results will be used to suggest potential career fields that align with the student's personality traits. The platform will also provide comprehensive information about different career fields, including the necessary education, skills, and experience required to succeed in those fields.

To ensure a seamless user experience, the platform will include a chatbot feature that will be available 24/7 to answer students' questions related to career planning and decision-making. Moreover, the platform will allow students to search and explore different universities and their programs related to the suggested career fields, making it easier for them to identify the best universities to pursue their careers.

Overall, the proposed career planning platform will provide a personalized and comprehensive approach to career planning and decision-making, empowering students to make informed decisions about their future and achieve their career goals.

IV. METHODOLOGY

The methodology for developing the Flutter career guidance app will involve the following steps:

A. Needs Assessment
Conduct a thorough needs assessment to identify the requirements and expectations of the target audience. This will involve reviewing literature on career guidance, interviewing students, parents, educators, and career experts to determine the challenges they face in career decision-making.

B. Define Objectives and Scope
Based on the needs assessment, define the project objectives and scope, taking into account the app's features and functions, the target audience, and the available resources.

C. Develop a Prototype
Create a prototype of the app's user interface design, including the chatbot feature, the personality test, and the university search function, to enable testing and validation of the app's usability and functionality.

D. Develop Content
Develop the content of the app, which will include comprehensive information on various career fields, including necessary education, skills, and experience, and the roadmaps for each career field.

E. Develop Algorithm
Develop an algorithm for the big five personality test that will suggest potential career fields based on students' personality traits.

F. Develop Chatbot Feature
Develop the chatbot feature that can answer student's questions on career planning and decision-making, providing personalized feedback.

G. Develop University Search
Develop the university search function that will allow students to search and explore different universities and their programs related to suggested career fields.

H. Integrate Features
Integrate all the features of the app to create a seamless user experience that allows for a personalized career guidance experience for each student.

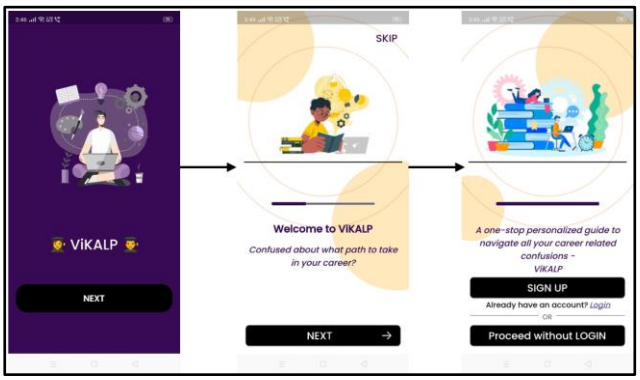
I. Test and Refine
Test the app with the target audience to identify and address any usability and functionality issues. Refine the app based on feedback from users and experts.

J. Launch and Evaluate
Launch the app and evaluate its impact on users' career decision-making, including its effectiveness in helping students identify their personality traits and make informed career choices.

K. Update and Improve
Continuously update and improve the app based on user feedback and emerging trends in career guidance to ensure that it remains relevant and effective in empowering students with the knowledge and resources necessary to make informed decisions about their career paths.

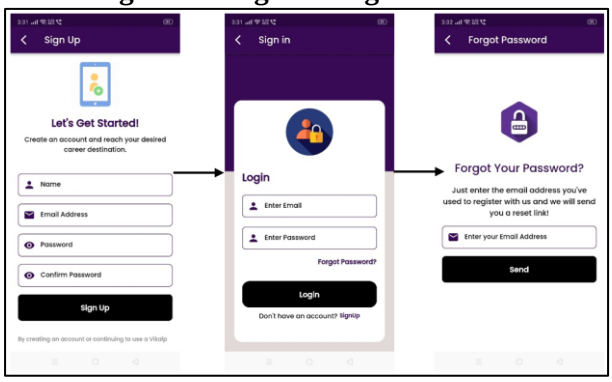
V. RESULTS

STEP-1: **Welcome Page**



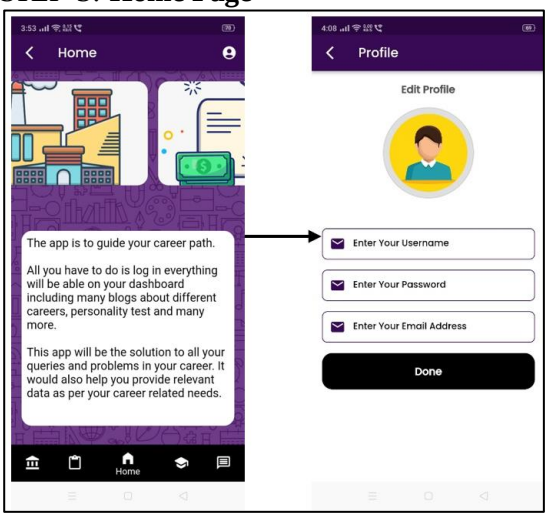
You will land on 'Welcome Page' where you get introduction to the app you can skip these pages to the page for login and signup.

STEP-2: **Login and Register Page**



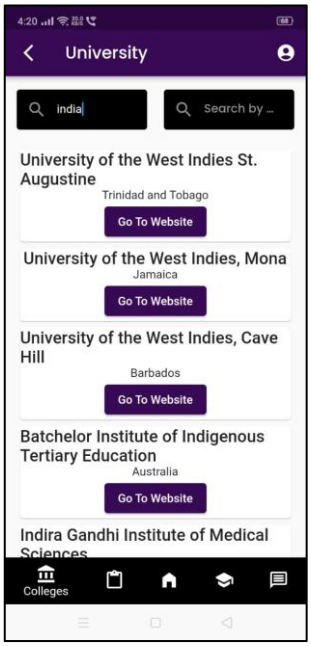
Users will log into the system using email and password or register if they do not have an account.

STEP-3: **Home Page**



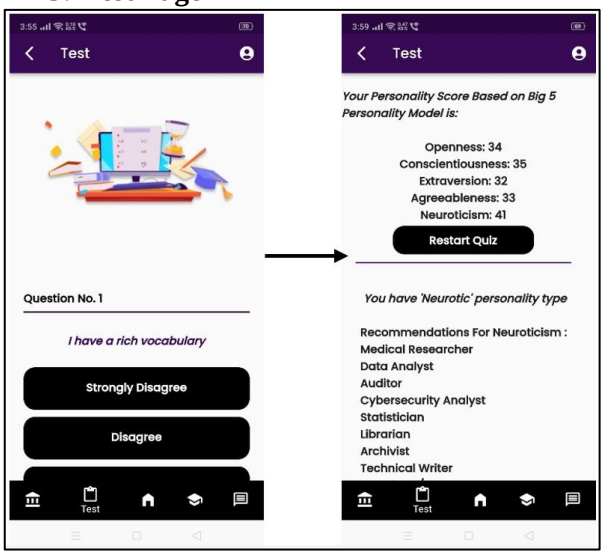
After login you will be directed to the 'Home page' which has different feature options and account option.

STEP- 4: **University Page**



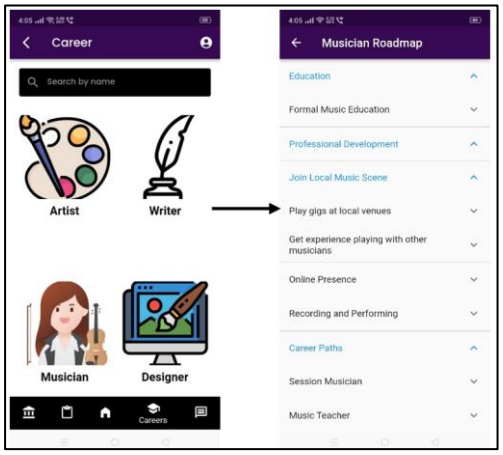
Search Universities page you can search universities by either its name or by its country.

STEP-5: **Test Page**



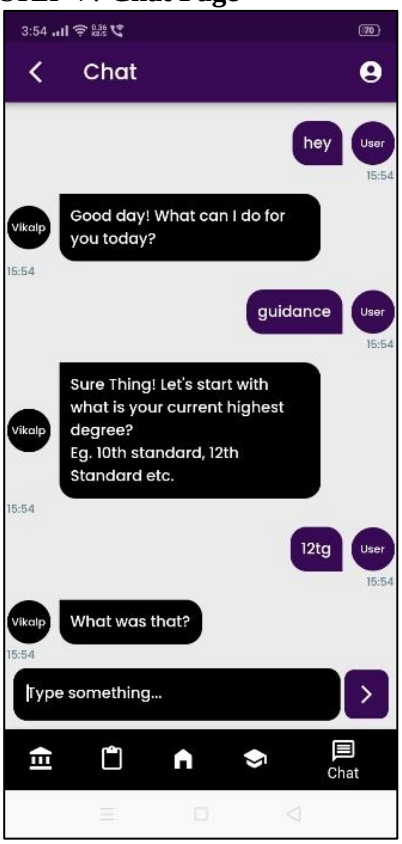
The test option leads to the take test page which has 50 questions overall it has 5 options to choose from which finally appears the result page which shows the personality type and the recommended ten career options list.

STEP-6: **Career Page**



The career page has an option to explore the different careers and after clicking on one page user can explore that career field.

STEP-7: **Chat Page**



Users can chat about career options based on prior education on the application using the chatbot feature.

VI. CONCLUSON

In conclusion, developing a career guidance app involves a systematic process that aims to provide personalized guidance to students, helping them make informed decisions about their career paths. The app's features, such as the chatbot, personality test, and university search function, provide comprehensive information on various career fields, education requirements, skills, and experience. The algorithm used in the big five personality test suggests potential career fields based on the student's personality traits. The app's usability and functionality are tested and refined based on feedback from users and experts, ensuring its relevance and effectiveness. The continuous improvement of the app based on user feedback and emerging trends in career guidance is crucial in ensuring it remains an essential resource for students.

REFERENCES

[1] Harsh Jain, Misha Kakkar, "Job Recommendation System based on Machine Learning and Data Mining Techniques using RESTful API and Android IDE", IEEE 9th International Conference on Cloud Computing, Data Science & Engineering, 2019

[2] Shaha T. Al-Otaibi, Mourad Ykhlef, "An Artificial Immune System for Job Recommendation", IEEE International Work Conference on Bio-inspired Intelligence (IWOBI), 2014

[3] Rucha Rangnekar, Khyati Suratwala, Sanjana Krishna, Dr. Sudhir Dhage, "Career Prediction Model Using Data Mining And Linear Classification", IEEE Fourth International Conference on Computing Communication Control and Automation (ICCUBEA), 2018

[4] M.Fatih Akay, Ebru Cetin, Imdat Yarim, Ozge Bozkurt, M.Mikail Ozciloglu, "Using Machine Learning Techniques to Earlier Predict Student's Performance", IEEE 2018

[5] S.K.Pushpa, T.N.Manjunath, T.V.Mrunal, Amartya Singh, C Suhas, "Career Prediction Model Using Data Mining And Linear Classification", IEEE 2018

[6] Anupam Varshney, Shalini Puri," A Survey on human personality identification on the basis of Handwriting using ANN", IEEE 2017

[7] https://towardsdatascience.com/recommendersystems-in-practice-cef9033bb23a.

[8] https://www.technoarete.org/common_abstract/pdf/IJERCSE/v8/i8/Ext_17459.pdf

[9] **Career Guide App:** https://play.google.com/store/apps/developer?id=CareerGuide.Com

[10] **Career Knowledge App:** https://play.google.com/store/apps/detailsid=com.cognitivefiber.CareerKnowledge

[11] **Test Vocational:** https://play.google.com/store/apps/details?id=com.softF.Vocacional

AET 014

Real-Time Sign Language Detection

Riya Jadhav
Department of Information Technology
Vidyalankar Institute of Technology,
Wadala, Mumbai, India
riyagirishjadhav@gmail.com

Hardik Bandekar
Department of Information Technology
Vidyalankar Institute of Technology,
Wadala, Mumbai, India
hardikbandekar@gmail.com

Atharvaa Rane
DepartmentofInformationTechnology
VidyalankarInstituteofTechnology,
Wadala, Mumbai,India
atharvaa2014@gmail.com

Abstract— Language has been important to humans since ages, without language expression of emotions, ideas, etc everything would not be and would have led to miscommunication and hence a real time sign language detection model is necessary for the people who are hard to hear and speak. It can be the voice for the voiceless who are facing issues to communicate with the people who lack the understanding of sign language. Over the years many models of sign language have been built in variety of languages for a smoother communication with deaf and dumb.

Keywords—Sign Language, deaf and dumb,

I. INTRODUCTION

Information can be exchanged between two or more people via communication. It is a crucial component of our life since it enables us to communicate with one another, comprehend others, and establish bonds with them. There are different ways to communicate, including spoken language, written language, body language, and sign language. Language is a form of communication that conveys meaning through sounds, symbols, and body language. It is one of the most crucial tools available to us as humans since it enables us to communicate our thoughts, feelings, and ideas to others. It is impossible to exaggerate the value of language. The ability to generate and pass on information, tales, and traditions from one generation to the next forms the basis of human civilization and culture. Language is essential for social interaction because it makes cooperation, negotiation, and dispute resolution possible. As a tool of expressing and thinking through feelings and experiences, language is crucial for learning and personal growth. As it lets individuals from various cultures and backgrounds to understand one another, it is also crucial for education, business, and international communication. As a visual language, sign language conveys meaning through hand movements, facial expressions, and body language. It is acknowledged as a full and independent language with its own grammar and syntax that is used by persons who are deaf or hard of hearing. Real-time sign language recognition involves the process of recognizing and interpreting sign language gestures in real time using technologies such as computer vision and machine learning algorithms. This technology can be used to create tools that enable deaf and hard of hearing people to communicate more effectively by virtual interpretation or automatic captioning. Real-time sign language recognition is important because it helps bridge the communication gap between deaf or hard of hearing people and those who are not. It can also make everyday tasks like attending meetings or watching videos more accessible and inclusive for people who use sign language as their primary means of communication. By improving communication, real-time sign language recognition can help promote understanding, empathy, and social inclusion for people with hearing impairments. Real-time sign language recognition is a challenging problem due to the complexity and variability of sign languages and the need for rapid and accurate recognition. However, recent advances in computer vision, machine learning, and wearable technology have made significant strides in the field, increasing interest and investment in developing practical applications of real-time sign language recognition.

II. RELATED WORK

Real- time sign language discovery has been a content of interest for numerous experimenters in the field of computer vision and machine literacy. In this literature check, we will give an overview of some of the most influential and recent exploration papers on real- time sign language discovery.

This paper titled Real- "Time American subscribe Language Recognition using Deep Learning Models" by Lacuna et al.(2016) The paper proposed a real-time American subscribe Language recognition system that uses convolution neural networks(CNNs) and intermittent neural networks(RNNs) to classify signs. The system achieved a delicacy of96.6 on a test set. [1]

This paper titled real – Time subscribe Language Recognition Using a Leap Motion Controller by Perez- Ortiz et al (2017). This paper proposed a real time sign language recognition system that uses the Leap Motion Controller to capture hand gestures and movements. The system achieved a delicacy of 96.6 on a test scale. [2]

This paper titled " Real- Time subscribe Language Recognition Grounded on Skeleton Tracking and LSTM" by Li et al.(2018) This paper proposed a real-time sign language recognition system that uses shell

shadowing and LSTM networks to classify signs. The system achieved a delicacy of 95.5 on a test set. [3]

"Real-time Sign Language Recognition using Convolution Neural Networks and Depth Sensor" by J. Mao, Y. Shan, and X. Liu. This paper proposes a real-time sign language recognition system based on convolution neural networks (CNNs) and depth sensor data. The system achieves high accuracy and robustness to lighting changes and occlusions. [4]

This paper titled " Real- Time subscribe Language Recognition Using a Wearable Camera and LSTM" by Li et al.(2020) This paper proposed a real- time sign language recognition system that uses a wearable camera and LSTM networks to classify signs. The system achieved a delicacy of96.2 on a test set. [5]

This paper titled "Real- Time Hand Gesture Recognition Using Convolution Neural Networks" by Shrivastava et al. (2021) this paper proposed a real-time hand gesture recognition system that uses CNNs to classify gestures. The system achieved a delicacy of96.5 on a test set. [6]

This paper titled "Sign language recognition: State of the Art" by Ashok K Sahoo, Gouri Shankar Mishra and Kiran Ravulakollu. This paper proposed a project based on different sign languages like ASL, CSL and many more. Different classification techniques like Neural Network, HSBN, Tensor flow analysis have been used.[7]

These papers demonstrate that real- time sign language discovery is possible using a variety of approaches, including deep literacy models, shell shadowing, wearable cameras, and hand gesture recognition. The high rigor achieved by these systems show great pledge for real- world operations similar as sign language restatement and communication aids for deaf and hard- of- hail individualities

III. METHODOLOGY

Real-time signal language detection is typically achieved using a combination of computer vision and machine learning techniques. Here is a high-level overview of the methodology typically used:

Data collection: The first step in building a real-time sign language detection system is to collect a dataset of sign language gestures. This dataset should include a variety of gestures performed by different people, with varying lighting conditions, backgrounds, and camera angles.

Image preprocessing: Once the dataset is collected, the next step is to preprocess the images to remove noise and unwanted background. This is done by applying filters and transforming the images to reduce the variability of the data.

Feature extraction: Features that represent important aspects of the sign language gestures are then extracted from the preprocessed images. Examples of features include hand shape, hand position, and hand orientation.

Model training: A machine learning model, such as a deep neural network, is trained on the extracted features to learn the relationship between the visual input and the corresponding sign language gesture. This involves selecting an appropriate architecture, setting hyperparameters, and training the model on the dataset.

Real-time detection: Once the model is trained, it can be used to detect sign language gestures in real-time. This involves capturing live video input from a camera, preprocessing the images, extracting features, and using the trained model to predict the corresponding sign language gesture.

Integration: The real-time sign language detection system can be integrated into various applications, such as video conferencing tools, mobile apps, or wearable technology, to improve accessibility for individuals who are deaf or hard-of-hearing.

Overall, real-time sign language detection is a complex process that requires expertise in computer vision, machine learning, and sign language linguistics. Continuous research and development in this field will lead to more accurate and robust sign language detection systems in the future.

IV. TIMELINE

Real-time sign language recognition has evolved significantly in recent years, thanks to advancements in computer vision, machine learning, and natural language processing. Here are some key milestones in the evolution of real-time sign language recognition:

Early research: In the 1990s and early 2000s, researchers began exploring the use of computer vision techniques to recognize sign language gestures. These early systems were limited in their ability to recognize complex signs and often required extensive training.

Machine learning and deep learning: In the past decade, the use of machine learning and deep learning techniques has led to significant improvements in sign language recognition accuracy,

These techniques allow systems to learn from large datasets of sign language videos and improve their recognition over time. Integration with natural language processing: In recent years, researchers have begun integrating sign language recognition language. These systems typically involve using a combination of computer vision and machine learning techniques to recognize signs, followed by translation algorithms to convert them into spoken or written language.

Wearable devices and mobile apps: With the increasing availability of wearable devices and smart phones, real-time sign language recognition is becoming more accessible to a wider audience. Wearable devices such as smart gloves or wristbands

can capture sign language gestures, while mobile apps can use the smart phone camera to recognize signs.
Commercial applications: Real-time sign language recognition has also been commercialized in various forms, with companies developing products such as sign language translation apps, virtual sign language interpreters, and communication aids for people with hearing and speech impairments systems with natural language processing tools to enable real-time translation of sign language into spoken or written. Overall, real-time sign language recognition has come a long way in recent years, and it is likely to continue to evolve as new technologies and techniques are developed

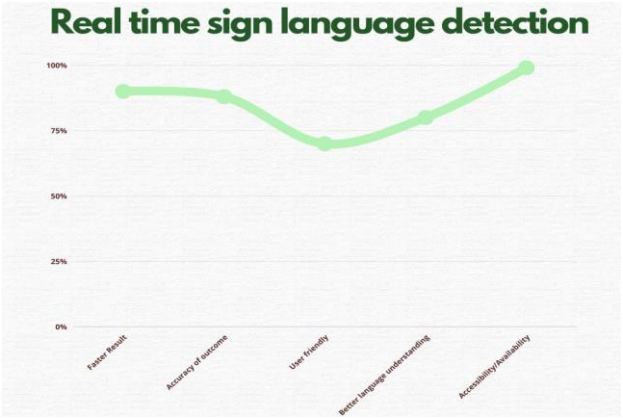
V. COMPARISON OF METRICS

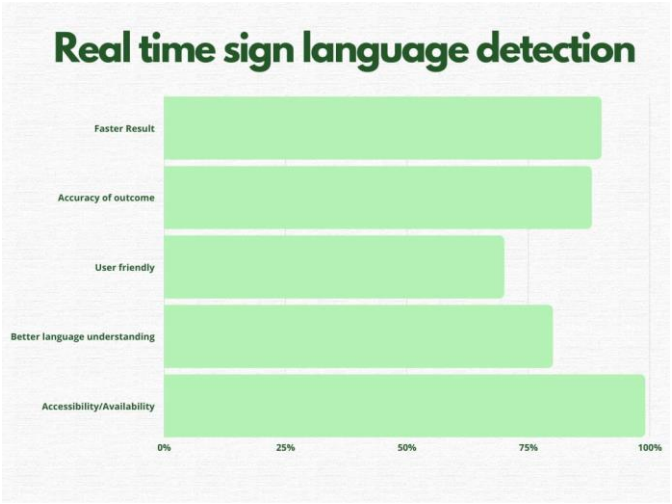
This table distinguishes between human-to-human and human to machine based sign language communication.

Sr. no	Aspects	Machine	Human
	Accuracy		
	Contextual understanding		
	Learning		
	Robustness		
	Cost		
	Availability		
	User friendly		

VI. RESULT

We conducted survey for our Real time Sign Language detection model based on the following parameters: 1. getting faster results 2. Accuracy of the out-come , 3. User friendly , 4. Better language understanding, 5. Accessibility and availability.





Based on the survey we discovered that the real time sign language model has an accuracy of 87% overall. The model was able to give result faster 90%% times when a sign was shown. Also the accuracy of getting the correct result with respect to the sign shown was about 88%. As it is easy to operate and handle it is 70% user friendly.
Also the main motive of the project of understanding the language is also satisfied upto 80% by the model. Since one doesn't need a human to understand the sign the model is available anytime and anywhere and therefore it has an availability of 99%.



.





Figure 2: Accuracy

VII. CONCLUSION

To sum up, sign language recognition technology is crucial for bridging the communication gap between hearing and deaf and hearing impaired. Sign language detection systems can precisely identify and translate sign language movements into spoken or written language using computer vision and machine learning algorithms. These methods can be used to create sign language recognition software that will make hearing impaired people more accessible in a variety of contexts, including social interactions, healthcare, and education. These programmes can also be used to help hearing impaired and hearing people communicate, removing language barriers and encouraging inclusivity. Despite the progress made in sign language detection technology, there is still potential for development, especially in terms of creating more precise and reliable algorithms that can recognise a wider range of sign language gestures and variations

REFERENCES

[1] Lee, K., Jo, J., Kim, J.,

AET 015

Empowering Global E-Learning with EduChain: A Blockchain-based Marketplace for Education and Social Impact

Devendra Chauhan
Dept. of Information technology
Vidyalankar Institute of Technology
Mumbai,India
devendra.chauhan@vit.edu.in

Sayan Khan
Dept. of Information technology
Vidyalankar Institute of Technology
Mumbai,India
sayan.khan@vit.edu.in

Ritik Jain
Dept. of Information technology
Vidyalankar Institute of Technology
Mumbai,India
ritik.jain@vit.edu.in

Harsh Gupta
Dept. of Information technology
Vidyalankar Institute of Technology
Mumbai,India
harsh.gupta@vit.edu.in

Dr.Vidya Chitre
Dept. of Information technology
Vidyalankar Institute of Technology
Mumbai,India
vidya.chitre@vit.edi.in

Abstract—This platform is a blockchain-based e-learning platform that allows course creators to upload courses for purchase by users, using a commission structure that benefits both the platform and associated NGOs. The platform has a unique feature of using blockchain for NFT certificates, which enhances the credibility of courses. The decentralized ecosystem ensures transparency, and the commission structure benefits NGOs, making it a socially responsible platform. The use of blockchain for NFT certificates ensures a secure and reliable platform for learners and course creators, preventing fraud. Overall, this platform leverages the benefits of blockchain technology to create an innovative e-learning platform for learners worldwide.

Keywords — BlockChain, Smart Contract, IPFS, Education, Near Protocol, NFT Certificates.

I. INTRODUCTION

Education is an essential aspect of modern society, and technology has transformed the traditional educational landscape. E-learning platforms have made it possible for individuals to access education from anywhere, at any time, and at their own pace. Despite the convenience offered by these platforms, several challenges still exist, such as the lack of transparency in course material ownership, course quality, and certification. Additionally, the traditional educational system often fails to equip students with the necessary skills and knowledge required in the rapidly evolving job market.

Blockchain technology has emerged as a disruptive force in several industries due to its unique properties. Blockchain is a decentralized, distributed ledger that maintains a tamper- proof record of transactions, making it virtually impossible to alter or manipulate the data. Blockchain can provide a transparent and secure platform for e-learning by ensuring that all course materials are owned by the rightful creators, and any transactions related to course selling are recorded immutably on the blockchain. Furthermore, blockchain can enable the creation of decentralized education systems that offer more flexibility, accessibility, and affordability to learners worldwide. It can also ensure the authenticity and credibility of educational certificates, which is crucial in the job market.

To address the challenges faced by existing e-learning platforms and leverage the benefits of blockchain technology, we propose a blockchain-based e-learning platform that enables users to upload courses and other users to buy courses where a commission of the course price goes to the platform, the course creator, and a small commission to NGOs associated with the platform. The NGOs can buy courses from the commission collected from the course selling, and the NGO students can learn from that course. The platform leverages blockchain technology to offer several benefits, such as transparency, immutability, and security. The platform also provides Non-Fungible Tokens (NFTs) as certificates for successful course completion, which can be verified and shared easily.

This platform can revolutionize the e-learning industry by providing a transparent, secure, and accessible platform for learners and educators alike. It can help bridge the skills gap by offering courses that are designed to meet the demands of the job market and providing learners with the necessary skills and knowledge. Additionally, the platform can enable learners from underprivileged regions to access quality education, as the platform is accessible from anywhere

in the world. The platform can also benefit the creators of educational content by ensuring that they are fairly compensated for their efforts, and the commission earned by NGOs can be used for social causes, thereby promoting a more sustainable and equitable education system.

II. RELATED WORK

Blockchain technology has emerged as a promising solution for various challenges in the education sector, including improving transparency, security, and efficiency. Several papers have explored the potential of blockchain in e- learning assessment and certification, including the use of smart contracts to automate the process and eliminateintermediaries.

In [1], "A Blockchain System for E-Learning Assessment and Certification," which proposes a decentralized blockchain network to provide a tamper-resistant and immutable record of assessment results and certifications. The use of smart contracts reduces administrative overhead and minimizes the risk of errors or fraud. However, the paper does not provide a comprehensive evaluation of the proposed system's performance, scalability, and security properties, which may limit its practical applicability.

In [2], "Blockchain Technology in Peer-to-Peer eLearning: Opportunities and Challenges," highlights the key features of blockchain technology, such as distributed computing, consensus mechanisms, and cryptographic security. The paper identifies one specific use case of blockchain technology in peer-to-peer e-learning and offers recommendations to mitigate challenges and increase the usability and popularity of blockchain technology in peer-to-peer e-learning. However, the paper only focuses on one specific type of e- learning, i.e., peer-to-peer e-learning, and does not consider other forms of e-learning.

In [3], "A blockchain-enabled e-learning platform" proposes a blockchain-based e-learning platform that leverages the benefits of blockchain technology, including increased trustworthiness due to added transparency and provenance, versatile privacy controls for learners, and increased transparency of assessments. The personalization features and user interface are highly praised, and all participants rated the system positively, expressing interest in enrolling in a platform like this in the future

Platform	**Features**	**Commission Structure**	**NFT Certificates**	**Focus**
This platform	Course creation and purchase, NGO support, NFT certificates	Yes, supports NGOs	Yes	Social impact
A Blockchain System for E- Learning Assessment and Certification [1]	Tamper-resistant assessment and certification records, smart contracts	Not mentioned	Not mentioned	Assessment and certification
Blockchain Technologyin Peer-toPeer eLearning: Opportunities and Challenges [2]	Distributed computing, consensus mechanisms, cryptographic security	Not mentioned	Not mentioned	Peer-to-peer elearning
A blockchain enabled elearning platform [3]	Increased transparency and trustworthiness, privacy controls, personalized features	Not mentioned	Not mentioned	General elearning
Noordex	Course purchase across various subjects	No commission structure	Not mentioned	General elearning
Edublock [4]	Verification of academic credentials	No commission structure	Not mentioned	Verification of academic credentials
Plato	Course creation and participation	No commission structure	Not mentioned	General elearning

III. PROBLEM STATEMENT

We have many e-learning platform that provides quality learning resources but none of that have utilised the abilities and benefits of Decentralised technique more specifically Blockchain. This project is a e-learning platform that also supports the free of cost learning to NGO students based on a small commission of the course price. The platform gives a power of buying modules of the courses (that saves their cost) with the regular option of buying complete course with NFT certificates. Also, our application provide support for Fungible Tokens which students can get as a reward after completing the course which is not present in most of the applications available in the market. This fungible token will be beneficial to students to avail discounts and coupons.

IV. PROPOSED SYSTEM

The platform aims to provide a safe and transparent environment for learners, tutors, and NGOs/NPOs to share knowledge and earn rewards.

- Registration Process:

All users (learners, tutors, and NGOs/NPOs) will have to register on the platform by providing necessary information, including Near Wallet address, organization details, and qualifications/experience (for tutors). The registration process is stored on the blockchain ledger using smart contracts, ensuring the authenticity and transparency of the user's identity.Course Purchase:

- Course Purchase:

  Learners can purchase entire courses orindividual modules using their Near Wallet details. The purchase details are recorded on the blockchain, ensuring transparency in the transaction process.
- Course Upload:
  Tutors can upload courses module wise or entire courses using their Near Wallet details. The course details include the course name, information, modules, related video/textual content, final assessments, and learning materials. This information is also stored on the blockchain ledger, providing a transparent record of the course's ownership.
- NFT Certificates:
  Learners will earn Non-Fungible Tokens (NFTs) upon completion of a course. NFTs are unique and non-interchangeable units of data, making them ideal for valuing and authenticating ownership of digitally completed courses. By storing NFT certificates on the blockchain ledger, they are less likely to be lost, ensuring learners' credentials are secure and easily verifiable.
- NGO/NPO Commission:
  A small commission of the course price goes to the platform and the course creator, and a part of the commission goes to NGOs/NPOs associated with the platform. NGOs/NPOs can use the commission to purchase courses, and their students can learn from the purchased courses.

V. METHODOLOGY

1. Education User Registration: The first step is to register on the e-learning platform using blockchain technology. The user can register either as a learner or a tutor. The registration process involves providing basic information such as name, email address, and password.
2. Browse Course: Once registered, the learner can browse through the list of courses available on the platform. Each course has a fixed price, and a portion of that amount will go to an NGO supporting education.
3. Purchase Course: After selecting the course, the learner can make the payment using a cryptocurrency supported by the blockchain network. The payment gateway is secured by smart contracts that ensure the transaction's transparency and security.
4. Course Access: Once the payment is verified, the learner can access the course material. The course content is stored on the blockchain network, ensuring that it is tamper-proof and immutable.
5. NGO Contribution: A portion of the course fee paid by the learner goes to an NGO supporting education. The platform has a built-in mechanism for transferring funds to the NGO's wallet address, ensuring transparency in the process.
6. Course Upload: The platform allows learners to upload their own courses and become tutors. The uploaded courses are verified by the platform's administrators to ensure their quality and relevance to the platform's users.
7. Course Purchase: Other learners can purchase the courses uploaded by tutors using the same payment mechanism described above.
8. Blockchain Network: All transactions on the platform are recorded on the blockchain network, ensuring data security and immutability. The platform uses smart contracts for automating various processes, such as payment, course verification, and fund transfer to NGOs.

VII. TECHNOLOGY USED

A. Blockchain

Blockchain technology is a secure and immutable ledger that stores all reported occurrences and related data. By utilizing blockchain technology, data can be encrypted and protected from tampering or alteration, creating an auditable and verifiable record of all reported incidences. The NEAR Protocol is a decentralized blockchain platform used to build smart contracts and decentralized applications (DApps). Its own cryptocurrency, NEAR, powers smart contracts and transactions on its network. Test net, a network that allows for testing and experimenting with blockchain apps and smart contracts without using actual assets or cash, is used in the NEAR system as a proof-of-stake (PoS) test net for testing smart contracts. PoS is a consensus mechanism used to validate transactions and produce new blocks, where validators are chosen based on the amount of NEAR they own and are willing to stake as collateral to be selected as the next block validator.

B. IPFS

The Inter Planetary File System (IPFS) is a distributed system for storing and distributing data in a peer-to-peer network, intended to provide a long-term, decentralized means of storing and accessing files and information. IPFS identifies and locates files via content-addressing, which means that files are addressed based on their content rather than their location on a specific server or network. IPFS uses

distributed file storage, content-addressed networking, and blockchain technology to store and retrieve files in a peer-to-peer network, enabling decentralized and fault-tolerant data storage. By employing content-based addressing to identify and retrieve material based on its hash, IPFS stores data off- chain, reducing the expense and complexity of storing large volumes of data on the blockchain itself. Additionally, IPFS provides a quick and efficient mechanism to access and transfer data, increasing the speed and scalability of decentralized apps.

C. Agile Testing Model

Informant is a blockchain-based platform that facilitates the secure and transparent delivery of education. To accomplish our project goals, we will break down the project into smaller sections and work on each section separately within a certain time limit. Our team comprises four members, namely Devendra Chauhan, Sayan Khan, Ritik Jain, and Harsh Gupta, working under the mentorship of Dr. Vidya Chitre. Our mentor will guide us, check the status of the project, and serve as the owner of the project, while we are the software engineers working under the mentor, who can also be referred to as the manager and stakeholder of our project.

To achieve our project objectives, the Agile development model is the most suitable. This methodology accommodates changing requirements throughout the development process, focuses on frequent delivery of working software, supports and motivates the people involved, enables face-to-face interactions, and prioritizes working software as the primary measure of progress.

Continuous attention to technical excellence and good design enhances agility, and regular reflections on how to become more effective and adjust accordingly. The Agile methodology encompasses various technologies, and for our project, we will adopt the SCRUM framework, which involves an iterative and incremental approach to development. This framework breaks down developmental phases into sprints, which serve as the basic unit of time in the development process.

VIII. RESULTS AND DISCUSSION

1. Home Page



Fig 1-Home Page

2. Course Page

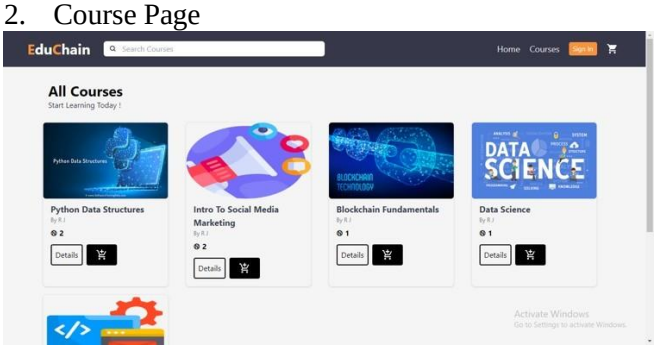


Fig 2- Course Page

3. Sign-in Page

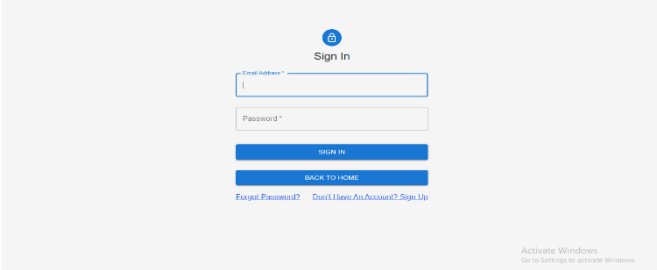


Fig 3- Sign-in Page

4. Sign-up Page

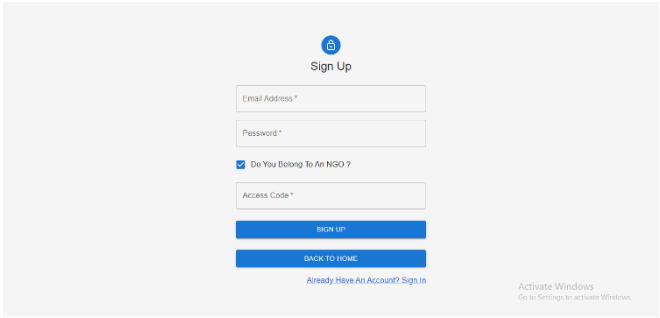


Fig 4- Sign-up Page

5. Profile Page

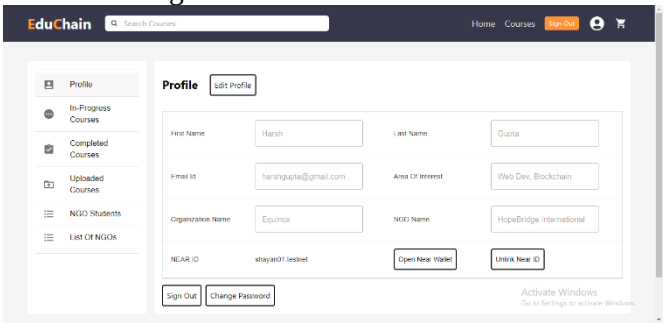


Fig 5- Profile Page

6. Cart Page

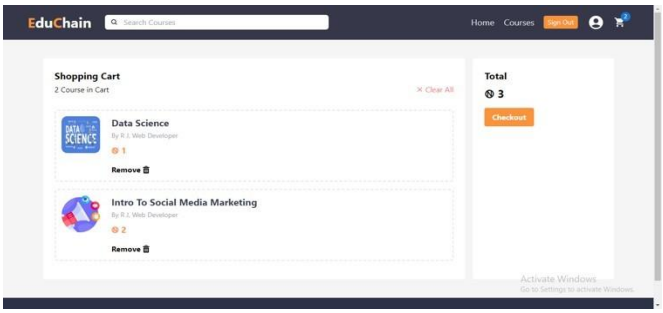


Fig 6- Cart Page

7. In-progress Course

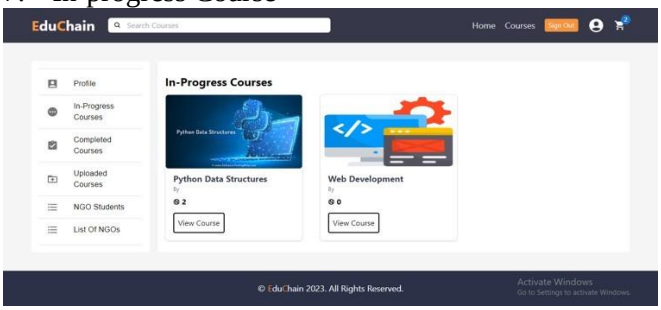


Fig 7- In-progress Course

8. List Of NGO's Page

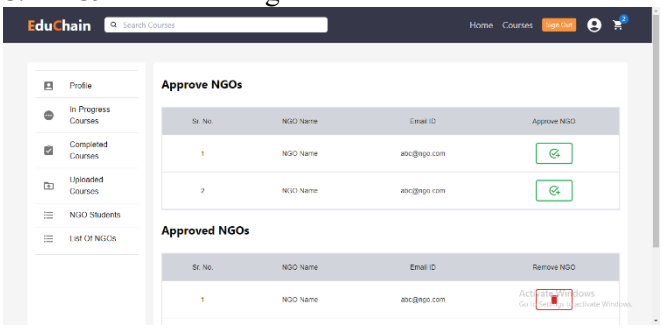


Fig 8- List Of NGO's Page

9. Course Play Page



Fig 9- List Of NGO's Page

10. Assessment Page

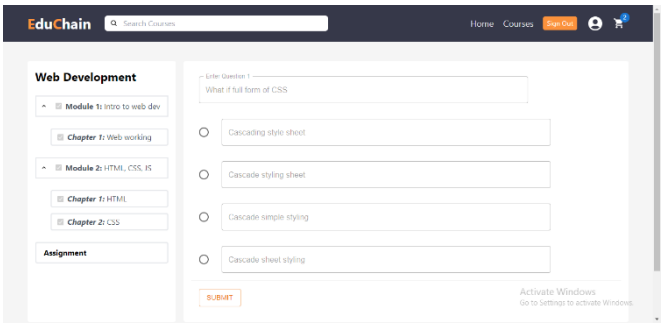


Fig 10- Assessment Page

11. NGO Sign-in Page

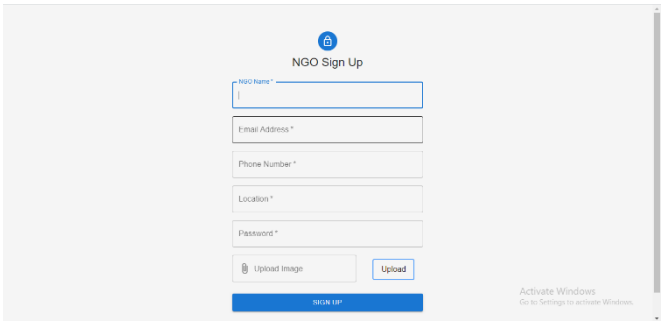


Fig 11- NGO Sign-in Page

12. Course Upload Page

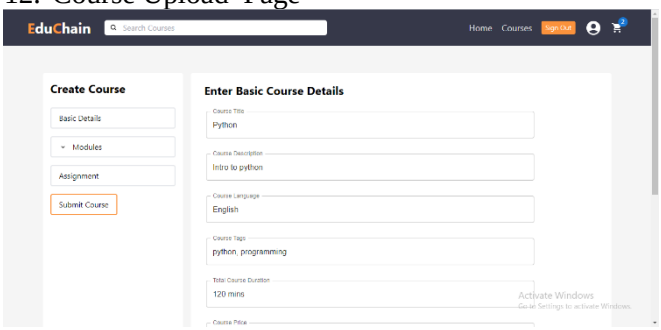


Fig 12- Course Upload Page

13. Wallet Connection

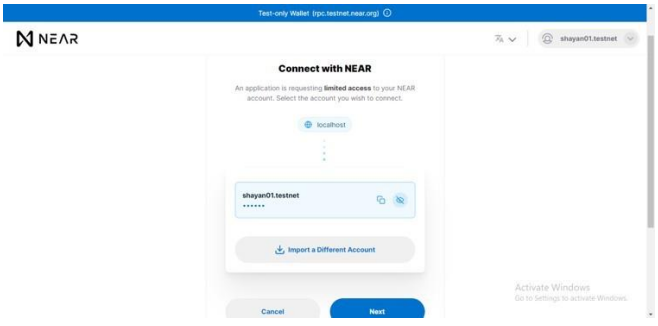


Fig 13- Course Upload Page

14. NFT Certificate Page

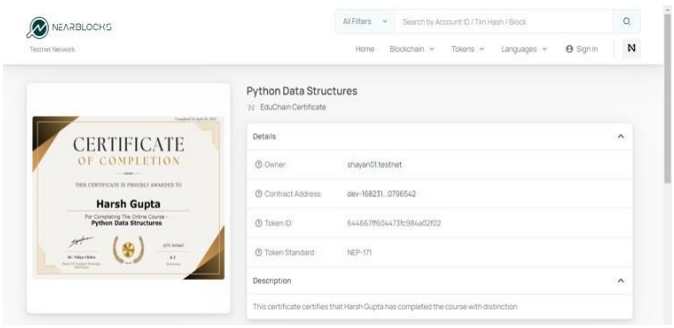


Fig 14- NFT Certificate Page

V. CONCLUSION

In conclusion, the e-learning platform proposed using blockchain technology has the potential to revolutionize the traditional model of e-learning by offering a decentralized, secure, and transparent platform for learners and tutors. With the added feature of supporting NGOs, the platform enables learners to contribute to a noble cause while gaining knowledge themselves. The platform offers a win-win situation for everyone involved, as NGOs can access quality educational material for their students, while learners can avail of a plethora of courses at reasonable prices. Additionally, the platform's peer-to-peer nature allows learners to become tutors, further democratizing the education system. By leveraging blockchain technology, the platform ensures data security and immutability, enhancing the trust and transparency of the system. Overall, the proposed e- learning platform has the potential to address some of the challenges of traditional e-learning platforms, and by supporting NGOs, it can contribute to the goal of democratizing education globally.

REFERENCES

[1] Chuyang Li, Junqi Guo*, Guangzhi Zhang, Yaofei Wang, Rongfang Bie," A Blockchain System for E-Learning Assessment and Certification", 2019 IEEE International Conference on Smart Internet of Things (SmartIoT), DOI: 10.1109/SmartIoT. 2019.00040

[2] Muhammed Miah, "Blockchain Technology in Peer-to-Peer eLearning: Opportunities and Challenges", 2020 Proceedings of the EDSIG Conference Virtual Conference.

[3] Tsz Yiu Lam & Brijesh Dongol, "A blockchain-enabled e-learning platform", 2022 Interactive Learning Environments, DOI: 10.1080/10494820.2020.171602

[4] Pavitra Haveri, Rashmi U B, Narayan D.G.3 , Nagaratna K.4 , Shivaraj K, "EduBlock: Securing Educational Documents using Blockchain Technology", 2020 11th International Conference on Computing, Communication and Networking Technologies (ICCCNT),

DOI: 10.1109/ICCCNT49239.2020.9225265

[5] Shams Tabrez Siddiqui,Mohammed Oqail Ahmad, Mohammad Khamruddin, Ashok Kumar Gupta, Anjani Kumar. Singha, 2022 2nd International Conference on Computing and Information Technology (ICCIT), DOI: 10.1109/ICCIT52419.2022.9711656

[6] Q. Li and X. Zhang, "Blockchain: A Technology to Win Open and Trust in Education," Journal of Distance Education, vol. 35(01), pp. 36- 44, 2017.

[7] A. Grech and A. F. Camilleri, "Blockchain in Education," Inamorato dos Santos A(ed.) EUR 28778 EN, 2017.

[8] X. M. Yang, X. Li, H. Q. Wu and K. Y. Zhao, "The Application Model and Challenges of Blockchain Technology in Education," Modern Distance Education Research, vol. 02, pp. 34-45, 2017

[9] X. Lei, C. Pahl and D. Donnellan, "An evaluation technique for content interaction in Web-based teaching and learning environments," Advanced Learning Technologies Proceedings, The 3rd IEEE International Conference on. IEEE, 2003.

[10] Alammary, A., Alhazmi, S., Almasri, M., & Gillani, S. (2019). Blockchain-Based Applications in Education: A Systematic Review, Applied Sciences, 9, 2400.

[11] Grech, A., & Camilleri, A. F. (2017). Blockchain in education. Publications Office of the European Union 2017, 132 S. - (JRC Science for Policy Report). Luxembourg.

[12] Duan, B., Zhong, Y., & Liu, D. (2017). Education application of blockchain technology: learning outcome & meta-diploma. International Conference on Parallel and Distributed Systems (ICPADS).

[13] Sharples, M., & Domingue, J. (2016). The Blockchain and Kudos: A Distributed System for Educational Record. Reputation and Reward. European Conference on Technology Enhanced Learning.

[14] J. O. Malchow, G. Benjamin and V. Roth, "New Directions for Trustin the Certificate Authority Ecosystem," 2018.

AET 016

Blind Stick using Raspberry Pi

Nilesh Adhal
Dept. of Information technology
Vidyalankar Institute of Technology
Mumbai, India

Sagar Kore
Dept. of Information technology
Vidyalankar Institute of Technology
Mumbai, India

Pooja shejwal
Dept. of Information technology
Vidyalankar Institute of Technology
Mumbai, India

Prof.Shashikant Mahajan
Dept. of Information technology
Vidyalankar Institute of Technology
Mumbai, India

Abstract— People with walking disabilities or external disabilities find it very difficult to function without any help, and this can lead to increased pressure, which can actually cause them to fall. The proposed work is to create and design a stick that will help them live independently and improve their morale. The main task of this work is to help people to recognize obstacles and make the right choice. remove from the side. The stick interacts with an innovation consisting of a camera, voice recorder, speaker and Raspberry Pi to make it smart. This cane can also be very useful for blind people. Lack of confidence and poor health are the results of this problem. Today's era of innovation is the development of smart sticks that empower people without stress and help them perform their daily tasks. Finally, the proposed work serves as a useful crutch for the blind. It can be controlled by voice through a headset and is developed using an ultrasonic sound sensor. Thus helping blind people to navigate safely in public spaces and do daily activities.

Index Terms —Blind Stick, smart Stick, Ultrasonic sensor, obstacle avoider, Raspberry pi.

I. INTRODUCTION

Lack of vision is a major problem running the world today. An online survey found that 246 million people have low vision, 940 million have vision, and nearly 39 million are blind. It is almost impossible to cure complete blindness in any of the above cases. It has an unimaginable effect on human life and mental health [1] [2] [3]. A surprising fact is that 15 million of the 39 million blind people in the world are from India [4]. This makes India the country with the largest number of blind people. One of the largest eye donation centers is in India, where 2.5 million eyes are donated every year, but only 70% are used [5]. The problems faced by the blind are very serious and require urgent action to deal with this rapidly growing problem. The most sought-after procedure is to improve vision for people with vision impairments. Several devices have been developed to detect blind obstacles. With the advancement of technology, many options are created. The most popular is Device Travel Assistance (Estimated Time of Arrival), which usually comes with innovative route and obstacle IDs. However, most of these devices are limited in performance and require precision. Finally, a Raspberry Pi-based smart stick is proposed as a way to address and solve problems with existing devices. The smart stick is integrated with a variety of sensors and devices that empower people to perform various daily movements and exercises.

II. REVIEW OF PREVIOUS WORK

It is always necessary to review the work of previous researchers for problem statement and solution. This led to the development of devices that overcome the problems posed by earlier ones.

The Blind stick proposed for the blind [6]. It uses a variety of sensors to overcome obstacles, but the limitation is that it can only sense up to the range of the stick. This problem is solved by echolocation and image processing as described in the [7]. Where [8] [9] [10] [11] blind sticks are made using ultrasonic sound sensors, buzzers and avoid obstacles.

While on the other side various devices have been developed. Table 1 presents the details of different methodologies used in the literature.

TABLE I. Description of different methodologies in Survey

SL. NO	Device Details	Description
1	C-5 Laser Cane [14]	Developed in 1973, uses optical triangulation technology. Has a rangeof up to 3.5 meters
2	Sonic Torch [15]	Uses ultrasound transmitting and isbattery operated.
3	Mowat Sensor [14][15]	Uses ultrasonic sensors.The distanceis inversely proportional to the frequency ofvibrations.
4	Sonic Path Finder[14][15]	Uses acoustic difference as maintechnology. Not accurate
5	Meldog [16][17]	Uses AI technology which rather different from sonic pathfinder. Has ultrasonic and laser sensor
6	Navbelt [14]	Equipped with ultrasonic sensors andcomputer, has 120° wide view and is converted into series of audioinstructions.

III. SYSTEM DESCRIPTION AND IMPLEMENTATION

The proposed system is as shown in Fig. .1 Consists of two main units:

1. Ultrasonic Sensor unit.
2. Image to Text and Text to Speech unit.

This app is specially designed to help blind people, making it easy to use and maintain. The device is designed with the help of various electronic sensors. It includes an ultrasonic sound sensor and also has a sound function as feedback. Text to Speech (TTS) technology is used for voice commands. The device proposed here first detects an object or obstacle in the vicinity, and once found, sends feedback to the user's headset by making a sound through a speaker or earphone. The aim of the proposed work is to develop a low-cost device with high efficiency and obstacle detection for blind people. Thus, it provides users with artificial vision that provides details such as static and moving objects around them, thereby helping blind people walk independently.

The system includes four ultrasonic sound sensors, Smart Guiding Stick. This is an electronic sensor. The Smart Stick has three sensors on both sides of the stick to improve its functionality compared to the previous version. Pothole detection is one of the important features of the proposed work, so the sensor is placed at the bottom of the smart stick. The range of this sensor varies between 2-250 cm. Objects and text are recognized by the camera. Switches are provided to toggle and change various features of the smart stick. Finally, the text is converted into spoken commands and fed through the headset for the user to hear.

A. Ultrasonic Sensor

An ultrasound sensor is a device that produces sound waves at very high frequencies. The distance is calculated based on the received sound waves. The distance calculation is based on the time interval between sending and receiving the sensor signal.

B. Camera Module

Object recognition and text reading are captured by Logitech High Resolution C series cameras. Digital image processing is used for conversion of captured images. This particular camera is used as it is ideal for capturing high definition images with 1080 pixels HD quality and premium glass lens.

C. Ear Phones

It is used as an output of TTS, as it enables one to detect objects, text and potholes.

D. Raspberry Pi Protocol Architecture

Raspberry is basically a low cost and high performance computer. It can be connected to TV and PC monitor which helps it to usecomputer. Fig.2 below shows the Raspberry Pi architecture.

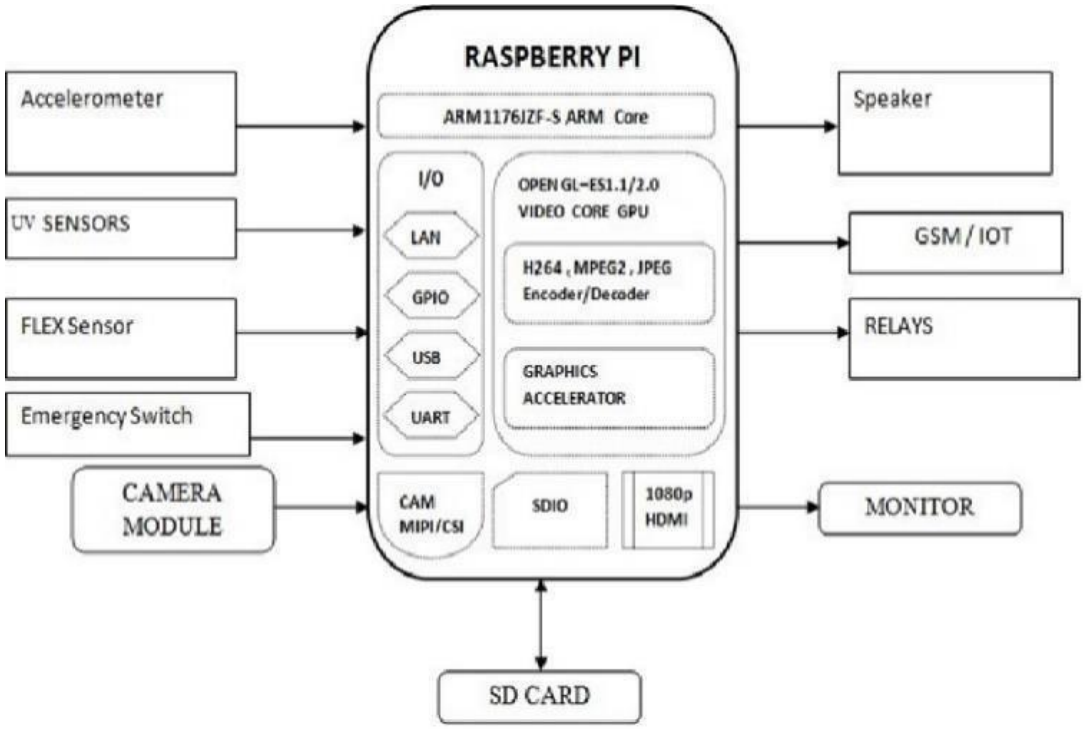


Figure 1 Block Diagram

1. The has a 600Mhz single core CPU
2. There are 4 USB ports
3. It is built with dual core video IV multimedia processor
4. It has a RAM of 512 mb
5. For storage of data, a micro SD slot is provided
6. It a 3-watt device.

In the proposed work, Raspberry Pi is a smart stick computer. This is a cheap computer with a credit card. The input is taken from the GPIO pin, so it can be connected to LED lights, switches, analog signals, and other devices. Here the GPIO pin is connected to the ultrasonic sensor. The Raspberry Pi runs on a 5V supply and uses a micro SD card to store data. A Raspberry Pi 1 Model B+ is used here. It consists of four USB ports, an HDMI port, an audio jack and an Ethernet port. The Ethernet port is used to connect to the Internet to install the required driver APIs. Built with a 700MHz single-core processor, the device supports Python, Java, C and C++ etc. can support programming languages. So the proposed algorithm can be used on Raspberry Pi. Algorithms help calculate distance from obstacles using sensors. After the range is calculated, the text-to-speech (TTS) driver API is used, which converts the message into text, meaning it is sent to the user via speakerphone and speakerphone..

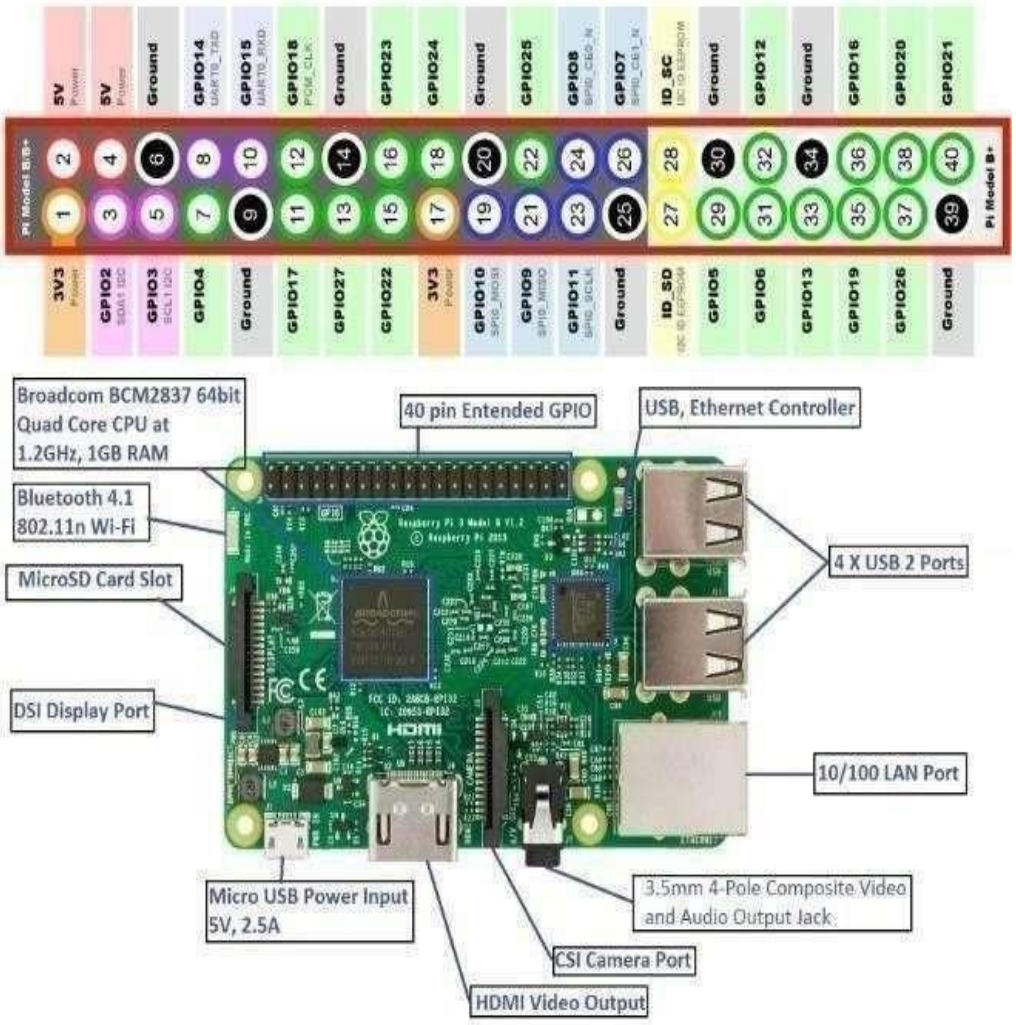


Figure 2 Architecture of Raspberry Pi

E. Flow Chart of proposed architecture anticipation:

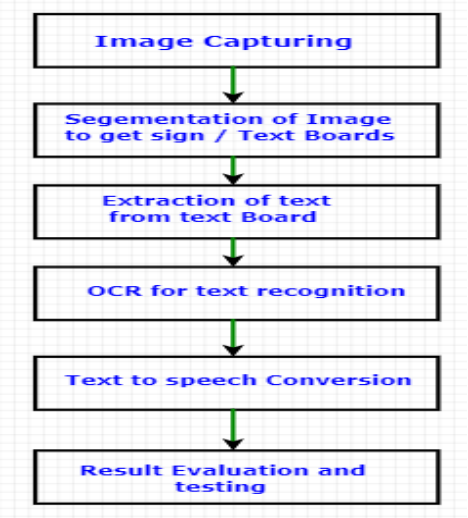


Figure 3 Flow chart the Smart Stick

Basically, it describes the sequence of activities that take place in the context of the project, as shown in Figure 3. An interesting feature of our project is taking pictures to read the text accurately. The flow chart starts with getting the picture that a blind person wants to read. Image segmentation is done to extract the text from the image, then use the marker board to recognize the text.

Extracting text from a text board turns images

into text that blind people want to read. We use OCR to recognize text. This text is then converted into speech or audio to help blind people read what they want. This feature makes it aware of the surrounding context.

F. Activity Diagram

Figure 4 below illustrates all the features of our project. Our project mainly focuses on the blind and their protection. We use Raspberry Pi to achieve all the features mentioned. The use case highlights on text on image and text to voice conversion, this feature is used to read anything a blind person wants as the text will be converted into voice that the blind

can hear.

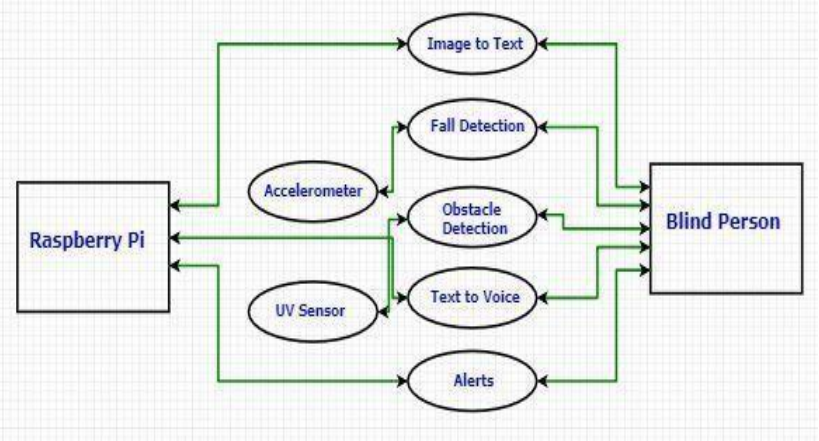


Figure. 4 Activity Diagram

It also explains features like obstacle detection with the help of UV sensor. An important and last feature will be the fall detection where the care taker will be alerted via message or email using the accelerometer. We will use all methods involved to maintain safety with blind mobility. The data flow diagram is as shown in Figure 5 below.

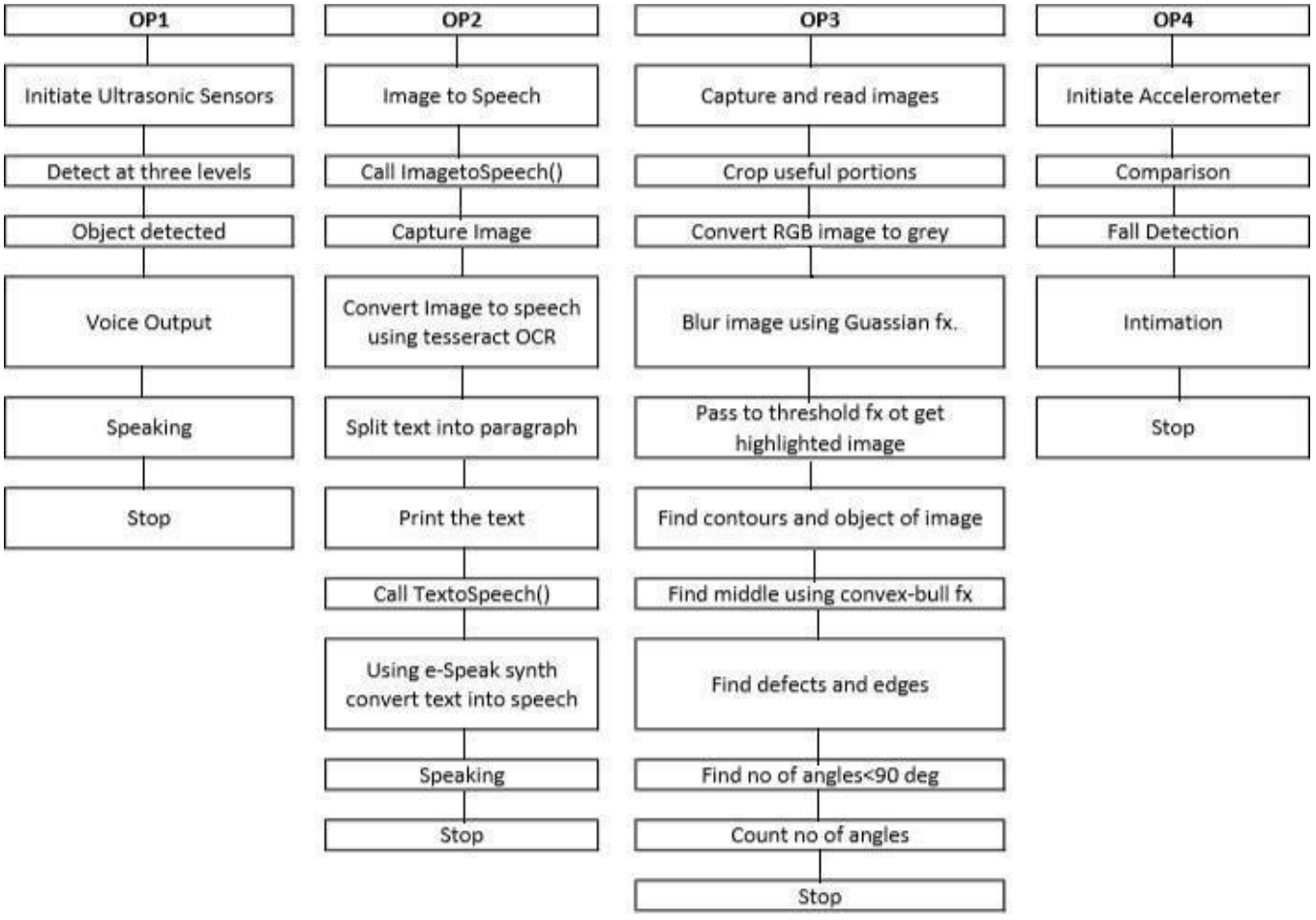


Figure. 5 Data flow Diagram

IV. RESULTS AND DISCUSSION

Testing and validation of the developed prototype is very important, as it helps to cement the results of the proposed work. This section presents the hardware test results of the Smart Stick. It is done using two methods:

1. Unit Testing
2. System Testing.

This type of software testing usually tests individual components and units of software. One of the main reasons for performing the above tests is to verify that each software component performs as designed. In the proposed work, Raspberry Pi is checked for compatibility with ARM processors as shown in Figure 6 below. Output is indicated by an active LED. Table 2 shows the unit results of the various tested components.



Figure. 6 Testing the connection with Raspberry Pi

TABLE II – UNIT TESTING OF COMPONENTS

Module No	Module Name	Observation	Expected Result	Actual Result
1	Obstacle detection	If the obstacle is within 20cm	Obstacle detected	PASS
2	Obstacle detection	If the obstacle is beyond 20cm i.e 50cm	Obstacle not detected	FAIL
3	Fan automation	The flex sensor bent at 180 degree ,the fan will switched on	fan will switched on	PASS
4	Fan automation	The flex sensor not bent properly i.e 45 degree	fan will not switched on	FAIL
5	Image processing	Image need to be captured at a clarity	Image captured	PASS
6	Image processing	Image is not captured at a clarity	Image not captured	FAIL

System testing is usually done to ensure that the operating system of the device being tested is capable of operating in different environments. This is usually done after the system has been fully integrated. System testing falls under the category of black box testing. After all the modules are connected, the login starts. This is done to detect any inconsistencies in software or performance. Sometimes there is a glitch in the device integration that causes the device to crash. Thus, system testing helps in troubleshooting installations and systems. The results of the system test determine the actual performance of the device. System testing is performed on all systems to check not only software limitations but also hardware requirements. Table 3 below shows the hardware tested on the device, the test results are displayed.

TABLE III .Blind stick Functionality Test Results.

Module No	Module Name	Observation	Expected Result	Actual Result
1	Blind stick functionalities	All things are working	Image should be captured, fan automation should work, Obstacles are detected	PASS

The device prototype, as shown in Figure 7, is tested for each module compatibility after system integration. As you can see in the image below, the Raspberry Pi is being tested for speech recognition using an ultrasound sensor and a headset.

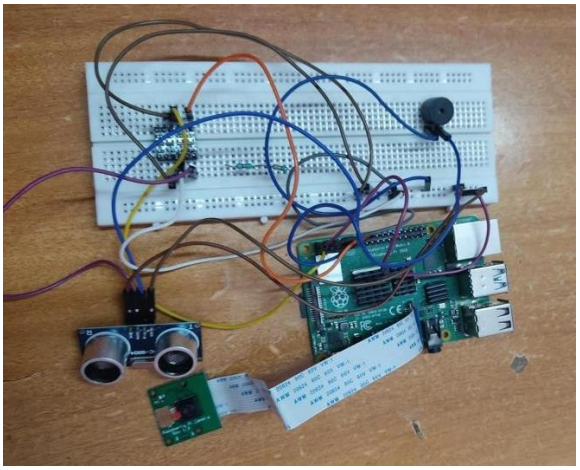


Figure. 7 Hardware prototype being tested

Image to speech conversion is one of the highlights of the proposed work, image 8 was taken with a high resolution camera and speech converter as shown in the image below. This is heard by the user using ear pieces. Distance is the most important factor to consider in devices for the blind. The accuracy of the device depends on the distance range that can be estimated by the sensor and the sensor is tested for 360 ° accuracy as shown in Fig- 8 below.

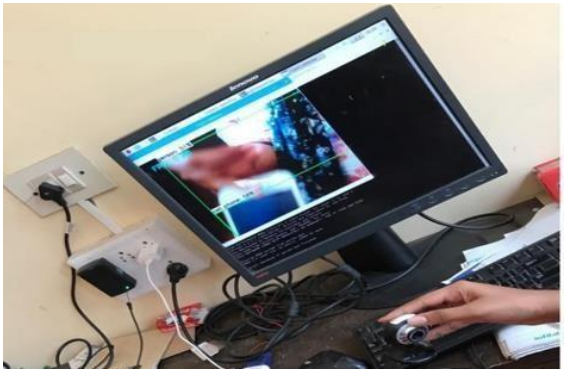


Figure 8 Image to text conversion

CONCLUSION

Here we present a proposal called "Blind Stick Using Raspberry Pi", a system built with the help of various electronic sensors to improve the performance of the device, which is one of the main concerns of the previous work presented in the review section. Disadvantages in the previous system. The device uses an ultrasonic sound sensor, built with a high-resolution camera, which in turn is converted into speech through TTS technology, so that the user is given voice commands sent to the blind through the headset. Thus helping a blind person to walk independently anywhere. This system is a combination of electronic sensors such as ultrasound. In short, the proposed system is efficient and cost-effective and will help the blind to be independent in their daily activities.

REFERENCES

[1] http://www.who.int/mediacentre/factsheets/fs282/en/
[2] http://www.who.int/mediacentre/factsheets/fs282/en/
[3] https://www.iapb.org/vision-2020/who-facts/
[4] https://timesofindia.indiatimes.com/india/India-has-largestblindpopulation/articleshow/ 2447603.cms
[5] http://www.myeyeworld.com/files/eyebanks.htm

AET 017

Digimart – A Blockchain based E-commerce

Roshan Mhatre
Student, BE (8th Semester),
Department of Information Technology,
Vidyalankar Institute of Technology,
University of Mumbai, Maharashtra, India.

Yash Mistry
Student, BE (8th Semester),
Department of Information Technology,
Vidyalankar Institute of Technology,
University of Mumbai, Maharashtra, India.

Ajay Ajmera
Student, BE (8th Semester),
Department of Information Technology,
Vidyalankar Institute of Technology,
University of Mumbai, Maharashtra, India.

Dr. Dilip Motwani
Associate Professor,
Department of Information Technology,
Vidyalankar Institute of Technology,
University of Mumbai, Maharashtra, India.

Abstract - The blockchain is a revolutionary technology that offers new solutions for solving problems in distributed environments. In this project, we have designed an ecommerce website called "DigiMart" that is built on the Ethereum blockchain. Our goal is to provide a decentralized platform for buying and selling digital products, which removes the need for a centralized intermediary. To achieve this, we have leveraged the features of the Ethereum blockchain, including smart contracts and decentralized storage. The smart contracts enable us to automate the process of buying and selling digital products, while the decentralized storage using IPFS(Interplanetary File System) ensures that the products are securely stored on- chain, but can be accessed and downloaded by buyers whenever they want. Our proposed framework provides a secure, transparent, and immutable system for buying and selling digital products. By leveraging the Ethereum blockchain's features, we are able to minimize the risks associated with traditional ecommerce platforms, such as fraud, data breaches, and unauthorized access. The design and implementation of the system are discussed in detail, and we have evaluated its potential advantages and limitations. Our results show that the proposed blockchain- based ecommerce website can significantly enhance data security, integrity, and accessibility, while minimizing the risks associated with traditional ecommerce platforms. In summary, DigiMart is a novel approach to ecommerce that leverages blockchain technology to provide a secure and decentralized platform for buying and selling digital products.

Keywords: blockchain, ecommerce, digital products, decentralized storage, Ethereum, security, transparency.

I. INTRODUCTION

Digimart is a blockchain-based e-commerce platform that specializes in the buying and selling of digital products. This includes items such as music, software, eBooks, online courses, and more. The platform utilizes the Ethereum blockchain to ensure secure and transparent transactions for both buyers and sellers. By using a decentralized ledger, transactions are recorded immutably, making it nearly impossible for fraudulent activity to occur. Additionally, all transactions are conducted using cryptocurrencies, making it easier for users to make purchases from anywhere in the world without worrying about currency conversion rates. One of the unique features of Digimart is its use of IPFS for file storage. This allows sellers to upload their digital products onto the platform in a way that is decentralized and secure. Unlike traditional e-commerce platforms, which often rely on centralized servers to store files, Digimart ensures that files are stored on a distributed network of computers, making it nearly impossible for data loss to occur. The platform also includes a seller management dashboard that allows vendors to manage their products, sales, and transactions. Additionally, Digimart provides an integrated digital wallet that enables users to store and transact with cryptocurrencies such as Ether. This also means that files can be easily accessed from anywhere in the world, without any delays or interruptions. Another important aspect of Digimart is its use of Firebase for metadata management. One of the main advantages of using Digimart is its security features. The platform utilizes blockchain technology to secure all transactions and maintain a tamper- proof record of every purchase and sale. This provides a level of

security that is not available in traditional e-commerce platforms. In addition, Digimart eliminates the need for intermediaries, such as banks and payment processors, thereby reducing costs and increasing efficiency. This information is stored securely on Firebase servers, ensuring that it is easily accessible and can be updated in real-time. Digimart also makes use of Metamask, a browser extension that allows users to interact with the Ethereum blockchain. This means that all transactions conducted on the platform are conducted using cryptocurrencies, which are transferred directly from the buyer to the seller. Digimart also offers a user-friendly interface that makes it easy for buyers and sellers to navigate the platform. The platform offers features such as product search, filtering, and sorting, as well as a shopping cart and checkout process that is simple and straightforward. In addition, sellers can easily list their products for sale on the platform and manage their inventory through the seller dashboard This eliminates the need for third-party payment processors, reducing the risk of fraudulent activity. Overall, Digimart is an innovative platform that leverages the power of blockchain technology to create a secure and efficient marketplace for digital products. By using Ethereum blockchain, IPFS, Firebase, and Metamask, Digimart provides a user-friendly interface that allows buyers and sellers to interact with each other in a safe and secure way. With its emphasis on digital products, Digimart is well-positioned to become a leader in the fast-growing e-commerce industry, and is an exciting example of how blockchain technology can be used to create new opportunities for online transactions. Overall, Digimart provides a secure, decentralized, and user- friendly platform for buying and selling digital products. Its use of blockchain technology ensures that all transactions are secure and transparent, while its intuitive interface makes it easy for users to conduct transactions on the platform.

II. LITERATURE SURVEY

- Gumroad:-

1) Lack of Transparency: Traditional e-commerce platforms often lack transparency in terms of tracking the origin of products and verifying the authenticity of products. This can lead to a lack of trust among customers, as they are unable to verify the legitimacy of the product.
2) Security Concerns: Traditional e-commerce platforms are often vulnerable to data breaches and cyber-attacks, which can result in the loss of sensitive customer information, such as credit card numbers and personal data. This can damage the reputation of the e-commerce platform and lead to financial losses.

- Shopify:

1) Centralized control: Shopify is a centralized platform, which means that it is controlled by a single company. This can make it easier for the platform to be hacked or for users to lose control of their data.
2) Limited privacy: Shopify requires users to provide personal information, such as their name and address, to create an account. This information is stored on Shopify's servers, which can make it vulnerable to hacking or data breaches.

- Amazon:

1) Lack of Privacy: Amazon/Flipkart may collect and use customer data for various purposes, such as targeted advertising or product recommendations.
2) Centralized Payment Options: Amazon has country-based payment options, which can be a barrier for customers who prefer to pay using cryptocurrencies or other alternative payment methods.

III. PROBLEM STATEMENT

The traditional ecommerce platforms for buying and selling digital products have several issues that affect both buyers and sellers. Firstly, the centralized nature of these platforms makes them vulnerable to data breaches, fraud, and unauthorized access. Secondly, the intermediaries involved in these platforms charge high transaction fees, which can significantly reduce the profits of the sellers. Lastly, the lack of transparency in the process can lead to disputes between the buyers and sellers. To address these issues, we propose a blockchain-based ecommerce platform called "DigiMart" that leverages the features of the Ethereum blockchain to provide a decentralized and transparent platform for buying and selling digital products. By using smart contracts and decentralized storage, we aim to eliminate intermediaries and provide a secure and cost-effective solution to buyers and sellers. The proposed platform will also provide transparency in the buying and selling process, thereby reducing the likelihood of disputes between the parties.

IV. PROPOSED SYSTEM

The main purpose of Digimart is to provide a secure and trustworthy platform for buying and selling digital products. To ensure data authenticity and quality, a blockchain-based system will be implemented. The Ethereum blockchain will be used to store all the transaction data and maintain a secure record of all transactions. The use of blockchain technology provides transparency and immutability, which enhances the trustworthiness of the platform. In addition to the blockchain technology, Digimart will use IPFS for distributed file storage. IPFS will allow the platform to store files securely and efficiently, reducing the risk of data loss or tampering. By using IPFS, Digimart can provide a reliable and secure platform for selling digital products. Digimart will also use a smart contract- based system to handle

transactions. Smart contracts will automate the transaction process and ensure that all transactions are executed in a secure and transparent manner. The use of smart contracts will eliminate the need for intermediaries and provide a more cost-effective and efficient platform for buying and selling digital products. To ensure the authenticity and quality of the digital products, Digimart will implement a review-based system where users can post comments and ratings on the products. This system will enable new customers to assess the quality of the products and help to build trust in the platform. Overall, the proposed solution for Digimart involves the use of blockchain technology, IPFS, smart contracts, and a review- based system to provide a secure, transparent, and trustworthy platform for buying and selling digital products. This solution will help to ensure that customers receive high-quality products, while also providing a stable business environment for the owners of the platform.

V. METHODOLOGY

The methodology for developing the Digimart website involve the following steps:

- User Registration/Login Process:

The system will allow users to register themselves and create account. When signing/login users will require their passwords for authentication Users shall be able to login and log out. The user after successful registration is redirected to the user dashboard where it is required to login via MetaMask account. The very first MetaMask wallet address is captured and mapped along with logged in user and stored in the user database.

- Add Product Process:

Once the user has logged in with email and is verified, then he will be able to add new product via the user dashboard. The product could be in any format but must be in accordance with the list provided by the digimart. The user has to add the product then enter a description for the product and click on addproduct. This triggers a blockchain transaction and then the user is accepted to pay the required amount of gas fee and complete the transaction. Storing documents directly is a gas intensive process in blockchain. To solve this problem blockchain provides us with Inter Planetary File System (IPFS) which stores documents securely as hashes and returns a CID (Content Identifier) which is stored in the blockchain as string.

- Product Management:

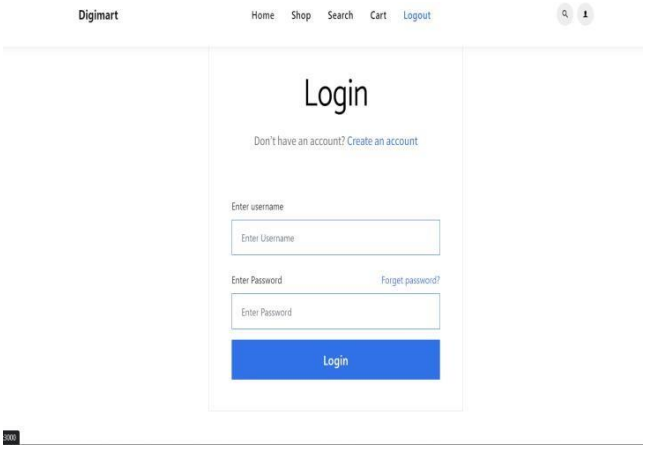
When a user adds a new product to the DigiMart platform, the product data is stored on firebase and original product file is stored on IPFS. When a transaction is initiated on the DigiMart platform for adding product, MetaMask calculates the gas fees required for the transaction and prompts the user to confirm the payment. Once the payment is confirmed, the smart contract is executed, and the product is successfully added to the Ethereum blockchain. The user can edit the metadata of the product like name, cost of the product, preview images, tags, description etc. The user can activate or deactivate his product based on his choice the product will be displayed or hidden from the shopping page.

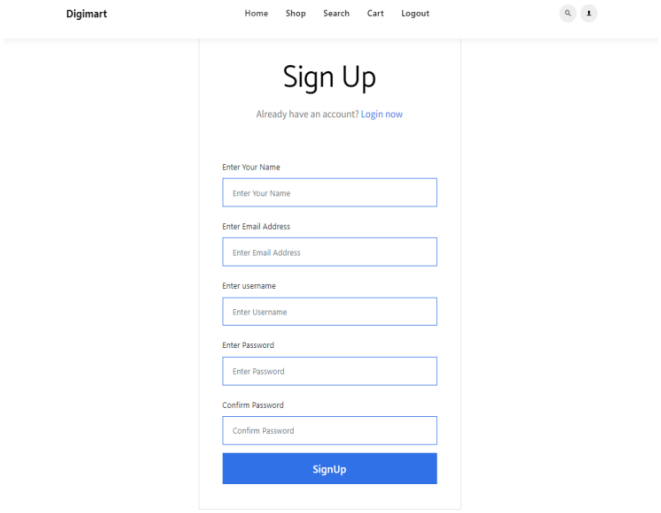
- Buy Product:

The user after successfully logging in via email can view the products listed by others. The user can add the desire product to the cart and after making successful transaction of ethers, user can see the bought products in the Orders section of the profile page, where user can download the bought products.

VI. RESULTS

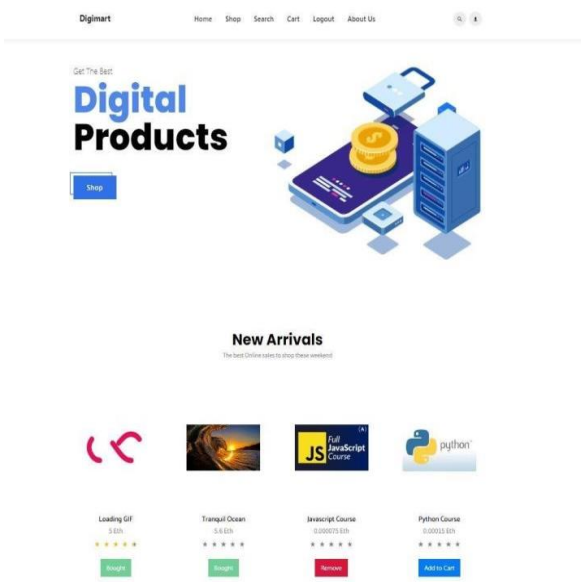
Login and Register Page





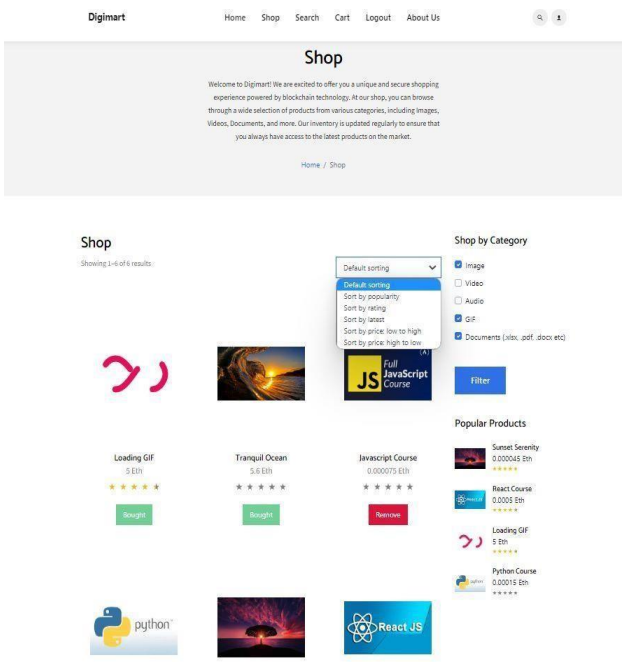
Users will log into the system using email and password or register if they do not have an account.

Home Page



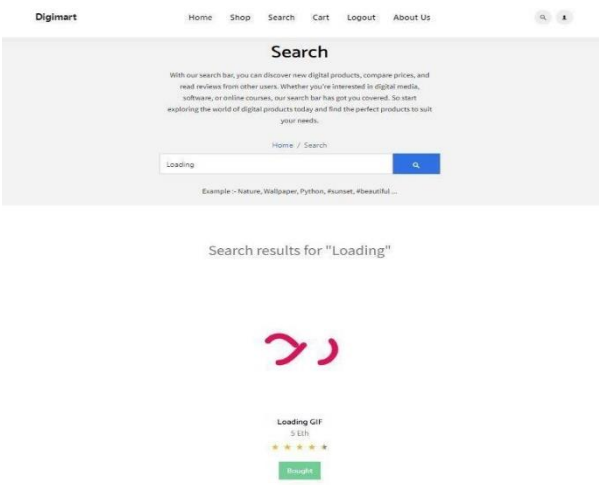
The Home page features a 'Shop' button and 'New Arrivals' section showcasing the latest products with ratings, built using React.js and Bootstrap.

Shop Page



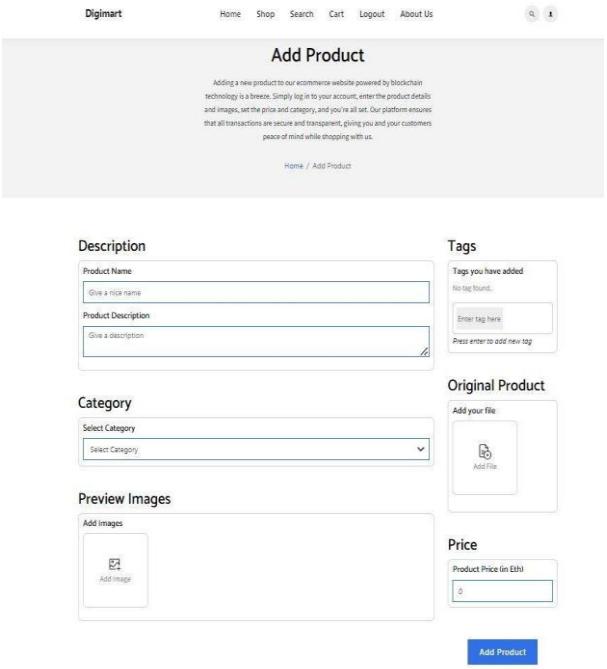
Our 'Shop' page offers sorting and filtering options with a convenient display of previous purchases and cart items for a seamless shopping experience.

Search Page



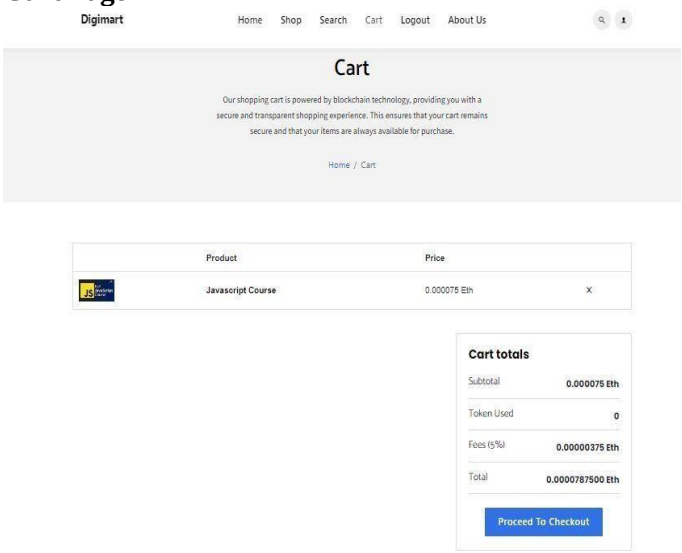
Digimart's search page enables quick and efficient product searches based on name and tags, with relevant results sorted for enhanced user experience.

Add Product Page



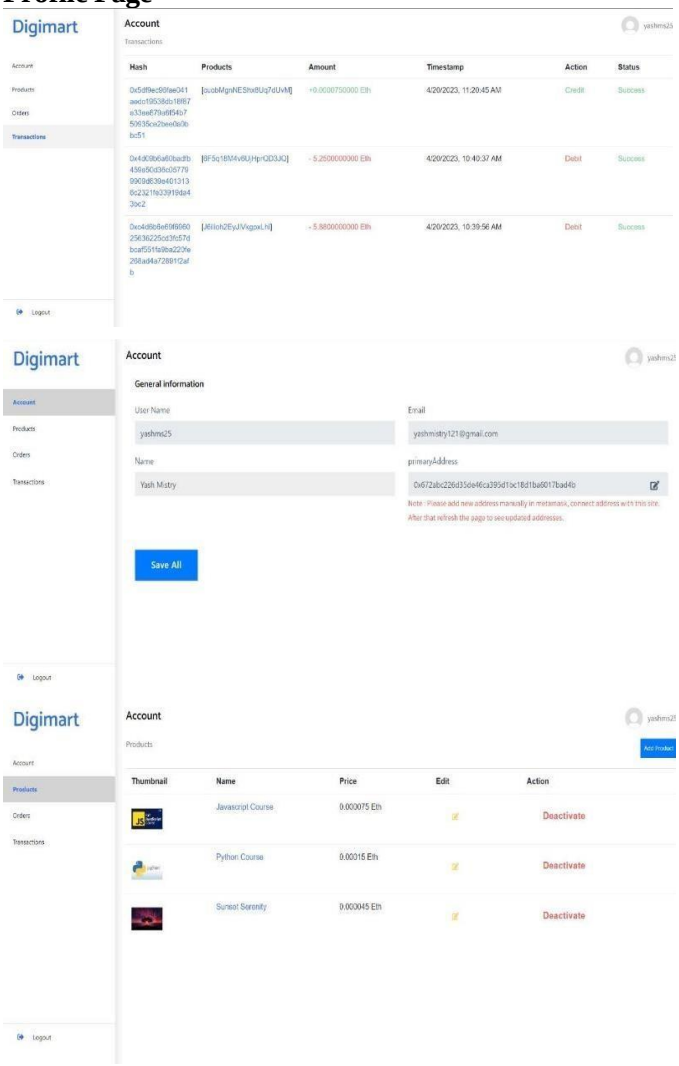
The 'Add Product' page enables sellers to easily add new products to our platform by filling in the required fields, including name, description, tags, category, original product, preview images, and price.

Cart Page



The cart page in Digimart displays all the products added by the user for purchase. Users can remove items or proceed to checkout with just a few clicks, making the shopping experience fast and easy.

Profile Page





Digimart offers various features to manage user profiles, products, orders, and transactions. Users can view and edit their profiles, manage their product listings, view and download their purchased products, and access their transaction history. These features provide users with greater control over their activities on the platform and make their overall experience seamless and enjoyable.

IV. CONCLUSON

In conclusion, Digimart is a blockchain-based ecommerce platform that provides a decentralized, transparent, and secure solution for buying and selling digital products. By leveraging Ethereum blockchain and IPFS protocol, Digimart eliminates intermediaries and provides secure and cost-effective solutions to buyers and sellers. The platform offers features such as smart contracts, decentralized storage, Metamask integration, and transparent transaction tracking. Overall, Digimart has the potential to revolutionize the ecommerce industry by addressing the issues faced by traditional ecommerce platforms and providing a secure and efficient solution for digital product transactions.

REFERENCES

[1] Yan Zhu, Chunli Lv, Zichuan Zeng, Jingfu Wang, and Bei Pei. Blockchain-based decentralized storage scheme. In Journal of Physics: Conference Series, volume 1237, page 042008. IOP Publishing, 2019.

[2] Muqaddas Naz, Fahad A Al-zahrani, Rabiya Khalid, Nadeem Javaid,Ali Mustafa Qamar, Muhammad Khalil Afzal, and Muhammad Shafiq. A secure data sharing platform using blockchain and interplanetary file system. Sustainability, 11(24):7054, 2019.

[3] Soham Toraskar and Dr. A. Rengarajan. Research paper on Storing Documents on Blockchain 2021-2022, April 2022.

[4] Xiuping Lin, “Semi-centralized Blockchain Smart Contracts: Central-ized Verification and Smart Computing under Chains in the Ethereum Blockchain”, Department of Information Engineering, National Taiwan University, Taiwan, R.O.C., 2017.

[5] **Gumroad:** https://gumroad.com/

[6] **Shopify:** https://shopify.com/
Amazon: https://amazon.com/

AET 018

Agriculture Robotic Machine

Kirti Dhotre
Department of Information Technology,
Vidyalankar Institute of Technology,
Mumbai, India

Shraddha Patil
Department of Information Technology,
Vidyalankar Institute of Technology,
Mumbai, India

Sukanya Kokani
Department of Information Technology,
Vidyalankar Institute of Technology,
Mumbai, India

Prof. Rohit Barve
Department of Information Technology,
Vidyalankar Institute of Technology,
Mumbai, India

Abstract - This project is based on a agriculture system for monitoring agricultural activities more efficiently. Currently the agricultural robots are becoming more and more popular among farmers and workers. This system is responsible for seeding, water spraying, harvesting and fertilization. "Agricultural Robotic Machines" are designed to reduce the problems that farmers face. A growing world population requires farmers to increase food production, manage and maintain natural resources and to help workers improved crops production to provide food in all sectors. However, supply and demand do not match during certain periods. Managing and maintaining capital and labor remains a constant challenge to improve agricultural production. Smart farming by using our "Agriculture Robotic Machine" is the very good option to the farmers to increase food production, manage and maintain natural resources and to help workers.

Keywords - Agriculture, Automatic Irrigation, IoT, Soil moisture sensor,Arduino.

INTRODUCTION

Agriculture is the backbone of the economic system of old procedures such as standard agricultural practices of certain countries, reliance on human power, use of synthetic chemical fertilizers pesticides, herbicides and genetically modified organisms. To efficiently perform similar tasks uses agricultural robots. Agri-bots can detect the presence of diseases, soil erosion, weeds, insect infestations, and other stressful situations. The Agriculture robotic machine is lightweight. Agricultural robot can be controlled by Android Application, is helpful for farmers' livelihood. An android application is used to monitor this Agriculture robot. This indeed supports the farmer's livelihood. Nevertheless, current methodologies that permit highly mechanized group of primary phenotypic data for compact numbers of plants in the greenhouse fall far short of the requirement to look into and distinguish plenty of plants under real world circumstances. Building structures that can gather multi-modal, multi character data in real time in the field needs joining plant biology and crop science with robotic vision and computer engineering. These structures should be precise and dependable and should supply exceptional facts than the present routine accessible for automated greenhouse or physical field phenol typing. This will help to link the plant genotypes together with the molecular and eco-physiological responses to the interpretation of the specific phenotypes responding to the flowering vector.

I. LITERATURE SURVEY

1. **Seeding And Fertilization Using An Automated Robot** (Divya C. H., Ramakrishna, H. and Praveena Gowda Department of Industrial Engineering and Management, DSCE, Bangalore) The proposed project aims to create a preliminary model of an independent agricultural robot with an automated guidance system. This robot is intended to be useful in various phases of horticulture, specifically for harvesting selective crops or facilitating weed removal. In the long term, it is important to pursue advancements in robotic technology to expand their applicability in agricultural practices, such as ploughing, planting seeds, cultivating crops, irrigating plants, and administering insecticides andpesticides.[1]

2. **Internet-of-things (IoT) Based Agricultural Robot** (Toushia Parveez, Wafa Maheen Sherrief, Prakruthi J , Ramya M B,Sahana MS)
The present study presents a novel device that simplifies complicated tasks through software programs, providing more efficient alternatives to conventional techniques. The integration of automation technology in agriculture has led to numerous advancements in the industry, resulting in significant time and cost savings for farmers. Additionally, the agricultural robot can be monitored through an android smartphone by utilizing Bluetooth technology.[2]

3. **IoT Based Agricultural Robot for Monitoring Plant Health and Environment** (Manjunath P M, Gurucharan, Shwetha, Prof. Melwin DSouza)
   The current research aims to create and implement a crop monitoring robot that can monitor both the crop and the surrounding environment. This system incorporates machine learning techniques to detect and prevent crop damage caused by diseases and insects. Various sensors are employed to analyze the environmental conditions, while a camera is used to identify the plant species and detect potential diseases. Although several prototype guidance systems have been developed, they have yet to be commercialized. [3]

4. **IoT Based Ploughing and Seeding Robot for Agricultural Applications** (Prasada Rao Bobbili, Sesha Sai Sajan Tamiri, Jhansi Rani Naddimpalli, Jyothi Swaroop Manchu,Dinesh Yempadapu)
   The purpose of this robotic system is to assist farmers with ploughing, seeding, and crop maintenance, resulting in reduced stress and increased productivity. Node MCU is used to establish a connection between the internet and the robot, allowing for remote control from a distance. A 4- channel relay is utilized to switch the robot on and off, enabling it to perform actions on the field. The model incorporates a variety of components and materials tailored to specific tasks. Specifically, this model drills the land and sequentially drops seeds at adjustable intervals, controlled by a solenoid lock. Additionally, the system is equipped to water the land asnecessary. [4]

5. **Robotic Agriculture Machine** (Gholap Dipak Dattatraya, More Vaibhav Mhatardev, Lokhande Manojkumar Shrihari, Prof. JoshiS.G)
   This study proposes a high-speed robotic system designed for advanced agriculture processes, specifically cultivation. The robotic system is an electromechanical and artificial agent, controlled by a DC motor with four wheels, which cultivates the farm in accordance with specific crop rows and columns. The machine is equipped with an infrared sensor to detect obstacles and turning points, while a water pressure system is employed to detect and resolve seed blocks. The robot can be remotely controlled and features a DC battery charged by a solar panel. [5]

II. METHODOLOGY

Robot works in manual as well as in automated mode. In automated mode all processes are done one by one. Digging is the first process that occurs. When we first start the robot, wooden arms come out and start digging the soil. After that seeding process takes place. We need to add the seeds in round shape bottle, then the seeds get added to thedigging hole one by one.
Water gets added to the sowed seed and the robot moves forward for the next crop. In manual mode, we need to control the robot as per our needs.
The remote control contains various buttons for moving forward, backward, left, and right as well as for digging, seeding, watering, and spraying pesticides.
We just need to set the mode by using a switch. This is how the whole system works.
This is how we can help the farmers to automate their farming process and releasetheir pressure.

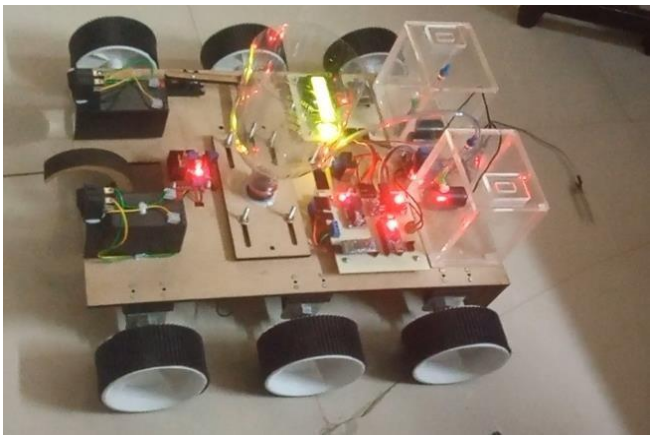


Figure 1 : Automated Mode

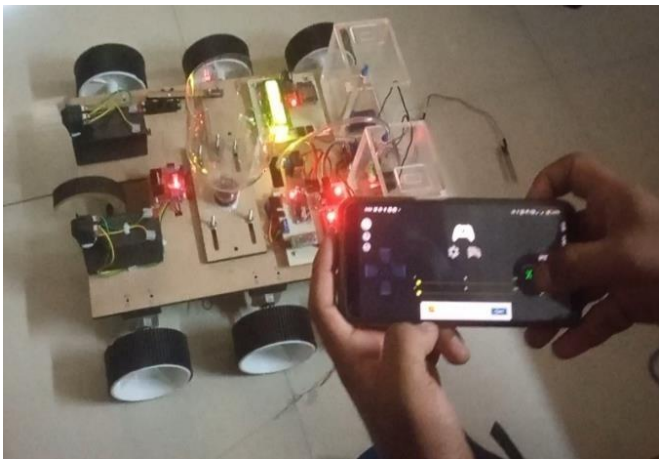




Figure 2 : Manual Mode



Figure 3 : Soil moisture reading in ThingSpeak

III. PROPOSED SYSTEM

In this project, we propose an advanced agriculture system that can be controlled using Arduino and Bluetooth controllers. The system is capable of performing various functions such as digging, seeding, watering, and spraying pesticides. The hardware structure used to control the agricultural robot is depicted inthe figure.

One of the key features of the system is the soil moisture sensor, which enables us to monitor the soil moisture level and determine the specific plant's water requirements. The soil moisture level is uploaded in the form of graphs to Thing Speak.

The hardware structure includes 3 servo motors, 6 DC motors, Arduino Nano, ESP8266 Wi-Fi module, 2 12V batteries, L298 motor driver, HC05 Bluetooth module, and other components.

IV. COMPONENTS USED

1) **L298 Motor Driver -**
The L298N board is a dual motor driver that can help you interface motors that draw up to 2 Amperes of current, such as BO motors and basic gear motors.

2) **ATMega328P arduino Nano -**
The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3.x). It has more or less the same functionality as the Arduino Duemilanove but in a different package. It lacks only a DC power jack and works with a Mini-B USB cable instead of a standard one.

3) **HC-05 Bluetooth -**
The HC-05 Bluetooth Module can be used in two modes of operation: Command Mode and Data Mode. In Command Mode, AT commands are used to change the settings of HC-05. To send these commands to the module, a serial (USART) port is used. In Data Mode, exchange of data between devices is possible.

4) **DC Motor 100 RPM -**
These motors have a 3mm threaded drill hole in the middle of the shaft, making it simple to connect to wheels or any other mechanical assembly. These motors are simple DC motors featuring gears for the shaft for obtaining the optimal performance characteristics. They are known as center shaft DC geared motors because their shaft extends through the center of their gearbox assembly.

5) **Servo Motor -**
A servo motor is a rotary actuator, also called a linear actuator, that allows for precise control of angular or linear position and speed. It consists of a suitable coupling with a sensor module for feedback position. Servo motors are often used in a closed-loop control system. Modern-day servo motors are designed and supplied around a dedicated controller module from different manufacturers.

6) **Esp 8266 wifi module -**
The ESP8266 Wi-Fi module is a SOC microchip mainly used for the development of end-point IoT (Internet of Things) applications. It is referred to as a standalone wireless transceiver, available at a very low price. It is used to enable the internet connection to various applications of embedded systems.

7) **Soil Moisture –**
A soil moisture sensor is used to measure the amount of moisture (water content) present in the soil. Water monitoring is very important for a few crops. A soil moisture sensor is used to automate the process of monitoring moisture levels in the soil.

8) **Tyre 100 X 40 mm**

9) **Connecting cable**

10) **Zero PCB -**
A Zero PCB is basically a general- purpose printed circuit board (PCB), also known as a perfboard or dot PCB. It is a thin rigid copper sheet with holes pre-drilled at standard intervals across a grid with 2.54mm (0.1-inch) spacing between holes.

V. Block Diagram

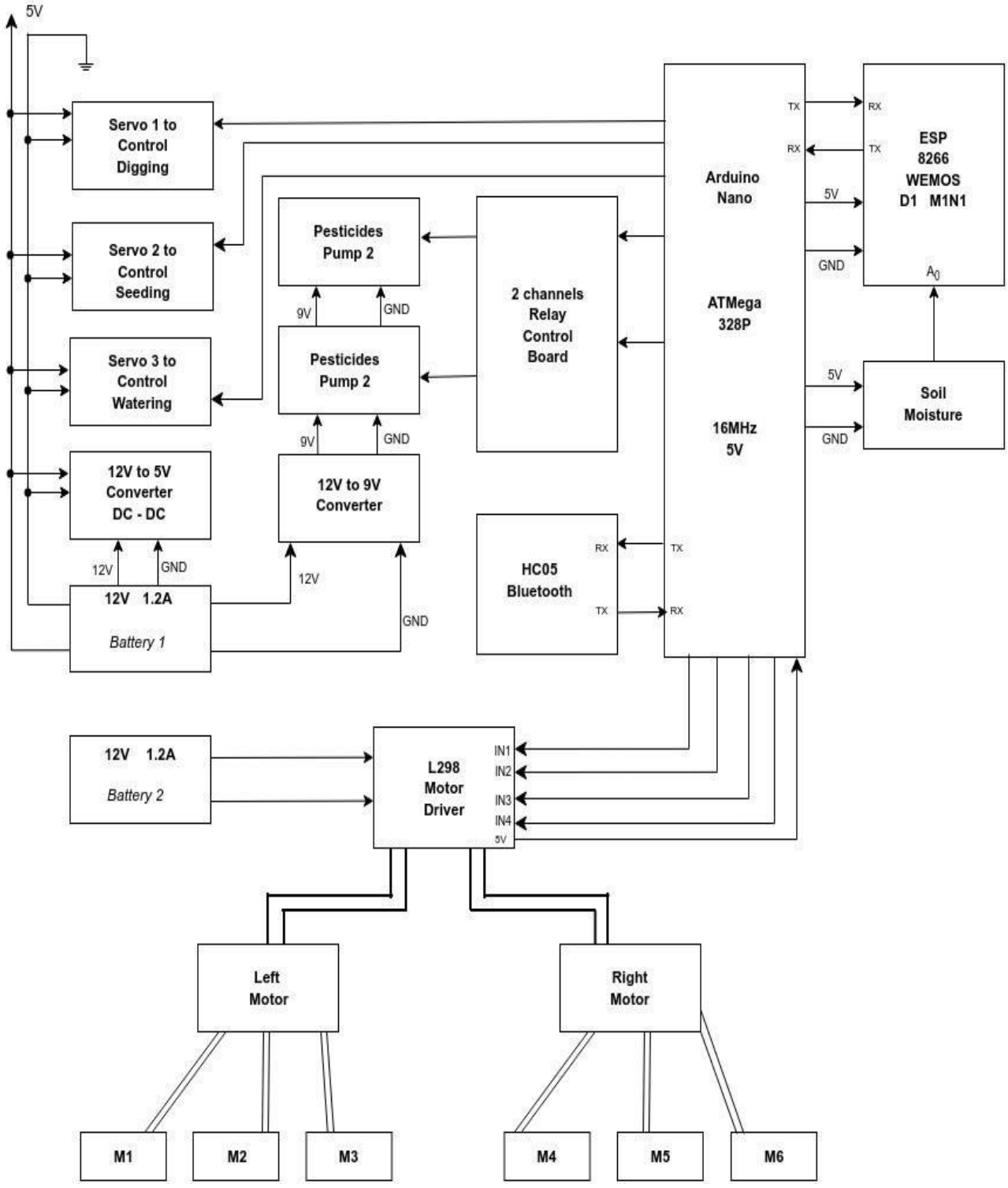


Fig. 1: Block Diagram

From the above block diagram, it can be understood that the model is automated and also controlled using a mobile device that can control the Ardiuno Nano through an application. The device is supported by the bluetooth and can control the model wirelessly. The Ardiuno Nano is interconnected with different sensors which serves an individual purpose.

VI. CONCLUSION

The model currently works for functions like digging, seeding, spraying water and pesticides. The seeds have been sowed in proper sequence which results in proper seed germination process. Wastage of seeds and water also reduced to a greater extent. This robot will help the famers to do farming most effectively and in an efficient way.

VII. REFERENCES

[1] Seeding And Fertilization Using An Automated Robot *Divya C. H., Ramakrishna, H. and Praveena Gowda Department of Industrial Engineering and Management, DSCE, Bangalore.

[2] Internet-of-things (IoT) Based Agricultural Robot(Toushia Parveez, Wafa Maheen Sherrief, Prakruthi J , Ramya M B, Sahana MS)

[3] IoT Based Agricultural Robot for Monitoring Plant Health and Environment (Manjunath P M, Gurucharan, Shwetha, Prof. Melwin D Souza).

[4] IoT Based Ploughing and Seeding Robot for Agricultural Applications(Prasada Rao Bobbili, SeshaSaiSajanTamiri, Jhansi Rani Naddimpalli, JyothiSwaroop Manchu, Dinesh Yempadapu)

[5] Robotic Agriculture Machine(Gholap Dipak Dattatraya, More Vaibhav Mhatardev, Lokhande Manojkumar Shrihari, Prof. Joshi S.G)

AET 019

Collab Pro –A Project Repository

Tanish Mohanty
Information Technology Engineering (B.E.)
Vidyalankar Institute of Technology Maharashtra, India
tanish.mohanty@vit.edu.in

Nilabh Waingankar Information Technology Engineering (B.E.) Vidyalankar Institute of Technology Maharashtra, India
nilabh.waingankar59@g mail.com

Omkar Karle Information Technology Engineering (B.E.) Vidyalankar Institute of Technology Maharashtra, India omkar.karle@edu.in

Prof Deepali Shirkhande Department of Information Technology Vidyalankar Institute of Technology Maharashtra, India
deepali.shirkhande@edu.in

Abstract-

In today's digital world, many college students learn new technology through digital medium and use this technology innovatively to create new projects/outcomes during their college curriculum. Unfortunately, these projects are not used effectively, or they don't get any recognition. Many students dedicatedly learn new technology and use them very innovatively, many of such ideas have caliber of forming a successful startup. Many of the current startups have been have succeeded which were started by youths. We studied the existing collaboration software and have proposed an android platform for university student to showcase their projects and get recognition. The application will also help other students to study the uploaded projects and suggest any reviews. The referee will have control to approve the projects uploaded by students to avoid plagiarism. The application will also help the company recruiters to find innovative projects and consider the author for further recruitment processes. The android application was developed using Java. The data of the application is stored/managed on Google Firebase. Android Studio served as IDE at the development stage. The project is dedicated for providing a dedicated platform for students to showcase their projects and get national recognition and provide a platform to recruiters for hiring talented authors.

Keywords: Collaboration software, Android, Collab-pro android app.

I. INTRODUCTION

Software development has evolved tremendously over the past decade. Millions of developers around the world are working to add something new or better to the products they've already created. Every software evolves in the form of versions. Software repositories serve the general purpose of promoting collaborative use by providing remote access to code modules and software packages and allowing version management. They play an essential role in managing Open-Source Projects and commercial software development. Build a platform where in all the universities/colleges provide information about the projects done by the students. The information on this platform will help in the peer learning and this will also help functional research between various universities and colleges. An Android based platform for college university projects. Collabpro is a android based application which will help students to share their own project on university level platform. The app will help students to view projects of other students and suggest any reviews and report bugs in the project. The system will allow the student to login using his credentials. After his login user will be allowed to view all the projects uploaded by pervious contributors. The user can also upload their own projects on the application which will go through a verification process by the referee. The referees will be verified teachers/professors from the universities/college from which the student belong. The third category of user will be admins (verified professors from different universities). Referee will verify the project uploaded by students. The Projects uploaded by students will go through approval process. The referee of the App will check the project for piracy issues and approve the project. The companies or their recruiters can also login using their cred and view the projects uploaded by students and sort-list the contributors for recruitment process. The approved project will be visible to students as well as visitors (Recruiter, Company HR, etc:.). Recruiter's can view Projects and accordingly sort students for recruiting process. Database firebase and design me xml and

Json. 2 The android based platform will be build using the Java programming language. The database will be from Google firebase. The objects from the backend that is the firebase will be integrated with the java application. Firebase is a set of hosting services for any type of application. It offers NoSQL and real-time hosting of databases, content, social authentication, and notifications, or services, such as a real-time communication server. The first version will also include main feature of our application that is the student user uploading the projects on the repository. The second version of the application will include commenting and reviews section for the specific projects and the final version will include the searching and ranking features.

II. LITERATURE REVIEW

N. Bleiel, "Collaborating in GitHub," 2016 IEEE International Professional Communication Conference (IPCC), 2016, pp. 1-3, doi: 10.1109/IPCC.2016. 7740497 'Collaborating in GitHub'. GitHub (https://sithub.com/) is a web-based repository for software projects and is reportedly the world's largest open-source community, hosting over 31 million repositories that include both code and the documentation for that code. Gap Analyzed - GitHub doesn't have any verification tunnel to verify projects, so the projects can be easily plagiarized.[1]

Bernstein, Philip A., and Umeshwar Dayal. "An overview of repository technology." VLDB. Vol. 94. 1994. Details about how a repository system should function and the features required in Repository system.[3]

Jones, Richard E., Theo Andrew, and John MacColl. The institutional repository. Elsevier, 2006. 'Digital libraries' can mean many things, but we consider them to be libraries first and foremost and built upon the enduring principles of information management which have lain at the heart of the practice of librarianship for hundreds of years. Management repository only related to books.[4]

Dabbish, Laura, et al. "Social coding in GitHub: transparency and collaboration in an open software repository." Proceedings of the ACM 2012 conference on computer supported cooperative work. 2012. Social applications on the web let users track and follow the activities of many others regardless of location or affiliation. There is a potential for this transparency to radically improve collaboration and learning in complex knowledge-based activities.[15]

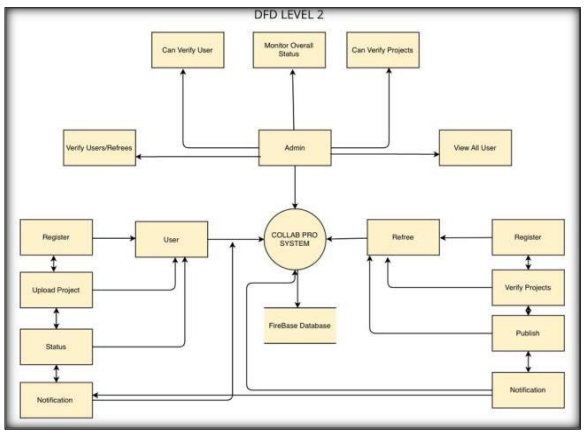
III. PROBLEM STATEMENT

Innovation is the key to improving education, and students in Indian universities and colleges spend a lot of time and energy working on projects as part of their coursework. If a platform for sharing knowledge is developed, with the ability to detect plagiarism, to compile all of the project work undertaken at various levels by students in Technical / Higher Educational Institutes and Universities across the nation, it will be an excellent source of information and also encourage the student community to engage in original/innovative project work. Summary: It is necessary to create an integrated platform where all colleges and universities may share information about the projects that their students have completed. Peer learning will benefit from the material on this platform, which will also help in cross functional research between various universities/college.

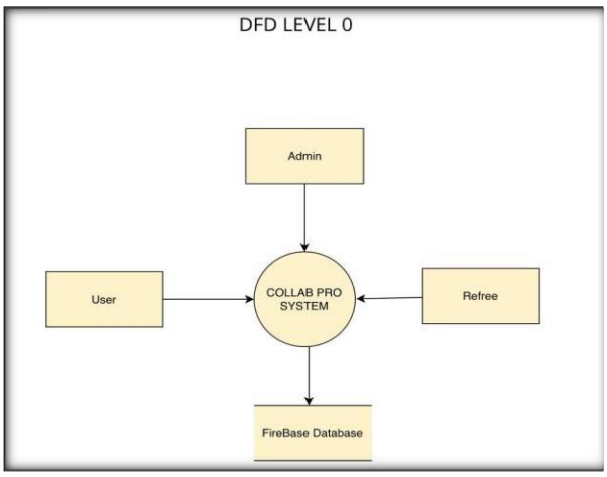
IV. PROPOSED SYSTEM

The proposed system will be Android application developed in Java using Firebase database at the back end. The system will allow the student to login using his credentials. After his login user will be allowed to view all the projects uploaded by pervious contributors. The user can also upload their own projects on the application which will go through a verification process by the admins. The companies or their recruiters can also login using their cred and view the projects uploaded by students and sort-list the contributors for recruitment process. The third category of user will be admins (verified professors from different universities). Admins will verify the project uploaded by students.

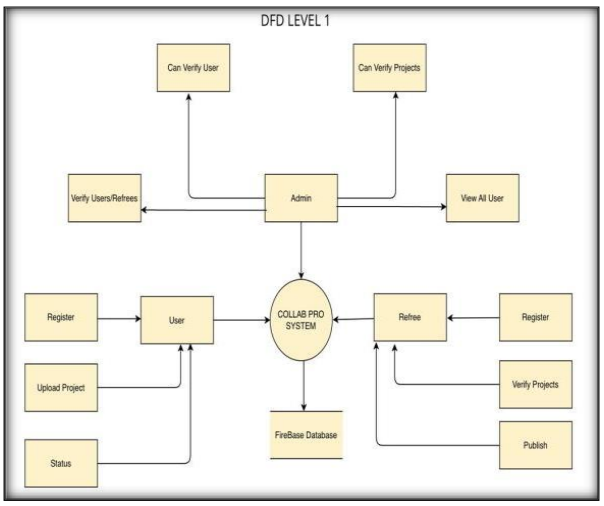
V. DESIGN



1.12.1. DFD Level 0



1.12.2. DFD Level 1



3.12.3 DFD Level 2

VI. IMPLIMENTATION

A. Welcome Screen:



3.5.1 Welcome Screen 1



3.5.2 Welcome Screen 1



3.5.3 Welcome Screen 3

B. User Account Management:

a) User Registration: The application will allow users to register themselves and create profiles.

b) User Authentication: When signing/login users will require their passwords for authentication

c) User Login: Users shall be able to login, log out or deactivate their accounts.

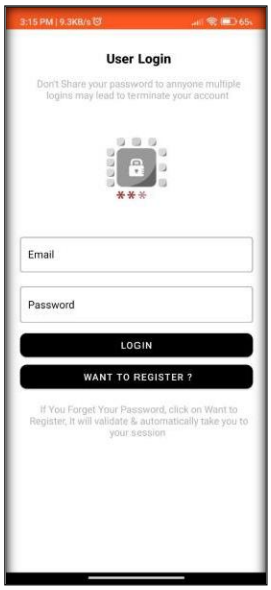
Student user Entity:

1.2.1. Creating New User Profile:

The user can register himself using his email and phone number. The user has to enter his name, address, email-ID, password and phone number. The email address will be users username and the password will be of users choice.



3.6.1 Login Screen



3.6.2 User Login





3.6.3 Referee Login **3.6.4 Admin Login**

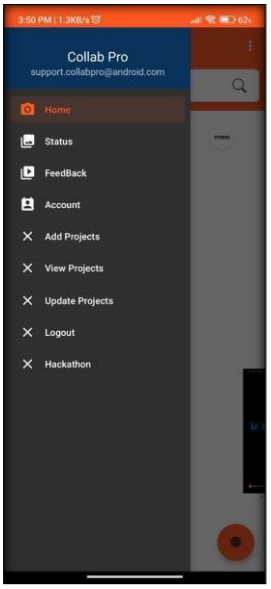


3.7 User Registration

1.2.1. User Dashboard:

From the home screen user view previously uploaded projects by other users. He can filter the projects based on the domain and also search using the search tab. User can also slide a drawer from top left corner for more features like uploading his own project. Checking status of already uploaded project, logout and open hackathon tab.

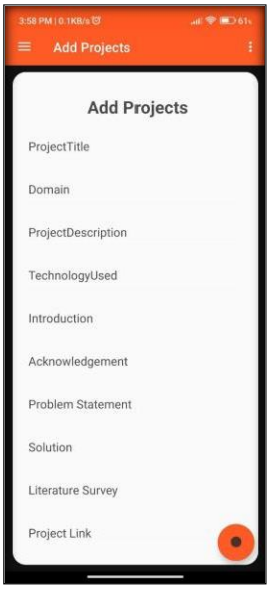


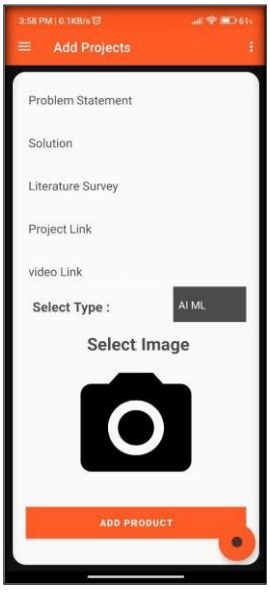


3.8.1 User Dashboard **3.8.2 User Drawer**

1.2.1. Uploading Project:

User can upload new project using the Add Projects tab from the Home page drawer. To upload a new project user has fill up the details and image of the project. The specified in details section is used for filtering the project. After this the project will be visible to admin.



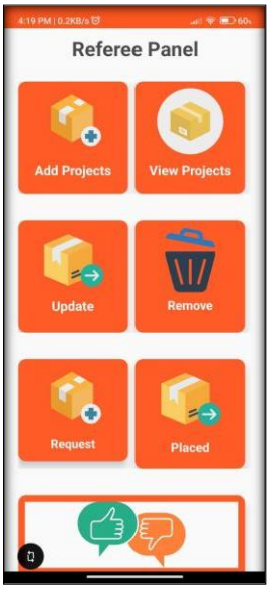


3.9.1 Add Project 1 **3.8.2 Add Project 2**

Referee user Entity

1.2.2. Referee dashboard:

The referee can view projects allocated to him by the admin and after checking the plagiarism he will approved the project.



1.10 Referee Dashboard

Admin User Entity

1.2.1. Admin Dashboard:

Admin can view projects uploaded by the students and allocate a guide for each project for checking plagiarism. The admin will also manage the user of the application.



3.11 Admin Dashboard

VII. CONCLUSION

In conclusion we developed an Android application which will help students to get national recognition for their college/university level projects. The junior students can refer the projects uploaded by other peers which will help them to understand the projects working and the technologies used the building the project. The authors can get reviews and rating from the peers as well as company recruiters. The company recruiters will also get chance to hiring talented Students and their innovative ideas as start- ups. The referee verification will help for checking plagiarism. The most important feature of our application is avoiding plagiarism activities. The repository will include only brief description of the projects.

VIII. FUTURE SCOPE

In future the android based application can be featured on Web Platform for user convenience. The projects which are added by the authors can have a review system, where the peer as well as domain specialist can add their reviews and ratings. The reviews section will help the author to identify and remove bugs (if present). The process of plagiarism check can also be automated using various algorithms, which make the process smooth without referees intervention. In future the application can be made open to all developers (currently restricted to university students) nation or worldwide which will help any developer to showcase their domain wise projects and indirectly their skills.

IX. REFERENCE

[1] N. Bleiel, "Collaborating in GitHub," 2016 IEEE International Professional Communication Conference (IPCC), 2016, pp. 1-3, doi: 10.1109/IPCC.2016.7740497.

[2] L. Augustin, D. Bressler and G. Smith, "Accelerating software development through collaboration," Proceedings of the 24th International Conference on Software Engineering. ICSE 2002, 2002, pp. 559-563, doi: 10.1145/581407.581409

[3] Bernstein, Philip A., and Umeshwar Dayal. "An overview of repository technology." VLDB. Vol. 94. 1994.

[4] Jones, Richard E., Theo Andrew, and John MacColl. The institutional repository. Elsevier, 2006.

[5] J. Ossher, S. Bajracharya, E. Linstead, P. Baldi and C. Lopes, "SourcererDB: An aggregated repository of statically analyzed and cross-linked open-source Java projects," 2009 6th IEEE International Working Conference on Mining Software Repositories, 2009, pp. 183-186, doi: 10.1109/MSR.2009.5069501.

[6] Burrows, Steven, Seyed MM Tahaghoghi, and Justin Zobel. "Efficient plagiarism detection for large code repositories." Software: Practice and Experience 37.2 (2007): 151-175.

[7] Cosma, Georgina, and Mike Joy. "An approach to source-code plagiarism detection and investigation using latent semantic analysis." IEEE transactions on computers 61.3 (2011): 379-394.

[8] Meirelles, Paulo, et al. "Brazilian Public Software Portal: an integrated platform for collaborative development." Proceedings of the 13th International Symposium on Open Collaboration. 2017.

[9] Greene, Joseph. "Project management and institutional repositories: A case study at University College Dublin Library." New Review of Academic Librarianship 16.S1 (2010): 98-115.

[10] Y. Zhang, D. Lo, P. S. Kochhar, X. Xia, Q. Li, and J. Sun, "Detecting similar repositories on GitHub," 2017 IEEE 24th International Conference on Software Analysis, Evolution and Reengineering (SANER), 2017, pp. 13-23, doi:10.1109/SANER.2017.7884605. 29

[11] T. F. Bissyandé, D. Lo, L. Jiang, L. Réveillère, J. Klein and Y. L. Traon, "Got issues? Who cares about it? A large-scale investigation of issue trackers from GitHub," 2013 IEEE 24th International Symposium on Software Reliability Engineering (ISSRE), 2013, pp. 188-197, doi: 10.1109/ISSRE.2013.6698918.

[12] Castelluccio, Michael. "Opening the crowdfunding release valves." Strategic Finance 93.2 (2012): 59-61.

[13] Tan, Xin, Minghui Zhou, and Zeyu Sun. "A first look at good first issues on GitHub." Proceedings of the 28th ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering. 2020.

[14] Dhasade, Akash Balasaheb, Akhila Sri Manasa Venigalla, and Sridhar Chimalakonda. "Towards prioritizing github issues." Proceedings of the 13th innovations in software engineering conference on formerly known as India software engineering conference. 2020.

[15] Dabbish, Laura, et al. "Social coding in GitHub: transparency and collaboration in an open software repository." Proceedings of the ACM 2012 conference on computer supported cooperative work. 2012.

[16] F-Droid project was founded in 2010 by Ciaran Gultnieks

[17] Software Engineer in a Multi-National Company at Pune. Wildbit, a distributed software company founded in 1999 in Philadelphia.

AET 020

Auto Categorization of reels (Quick Learn)

Akshaj Salvi,
Dept. of Information Technology,
Vidyalankar Institute of Technology,
Mumbai, India

Rahul Chavan,
Dept. of Information Technology,
Vidyalankar Institute of Technology,
Mumbai, India

Syed Mohammad
Dept. of Information Technology,
Vidyalankar Institute of Technology,
Mumbai, India

Abstract
'Quick Learn is a web-based application that performs the task of creating the user's query's response. In order to handle user material, the programme also functions as a kind of information management system. A brief movie that has gained popularity is employed in the suggested system, Fast Learn, to supplement the shortness of other online platforms that would cover the domain criteria. Quick Learn can assist pupils in finding explanations for the subjects they find challenging. Teachers and content creators can quickly connect with students and assist them in clearing up their doubts.

Keywords
The software has been designed with simplicity in mind, aiming to minimize the risk of data entry mistakes. Additionally, it includes an error notification feature to alert users when they input incorrect data. Its user-friendly interface does not require any formal training to operate, making it accessible to anyone. Fast Learn has the potential to streamline organizational management by providing an error-free, secure, customizable, and efficient system. By reducing the time spent sifting through data, users can focus on what is essential, ultimately leading to improved resource allocation. To understand the context of the information given to the software and put it together, the solution uses web-based models and concepts. It is here to respond to the queries put forth by the user. The system makes an effort to take data as input and derive context from the data. By giving the consumer a way to search for the content they need, this aids in their academic endeavors. The user interface of the app will look like that. Managing data can be a challenging task for any software, regardless of its size. Each implementation has specific branch requirements, which is why we've developed a Tailored solution based on your specifications. Our solution aims to simplify content ER – Entity Relationship

I. INTRODUCTION

Quick Learn is a web-based application that implements the process of producing answers to the user's queries. In order to control user material, the software also functions as a semi-information management system. The software has been designed with simplicity in mind, aiming to minimize the risk of data entry mistakes. Additionally, it includes an error notification feature to alert users when they input incorrect data. Its user-friendly interface does not require any formal training to operate, making it accessible to anyone. Fast Learn has the potential to streamline organizational management by providing an error-free, secure, customizable, and efficient system. By reducing the time spent sifting through data, users can focus on what is essential, ultimately leading to improved resource allocation. To understand the context of the information given to the software and put it together, the solution uses web-based models and concepts. It is here to respond to the queries put forth by the user. The system makes an effort to take data as input and derive context from the data. By giving the consumer a way to search for the content they need, this aids in their academic endeavors. The user interface of the app will look like that.

II. LITERATURE SURVEY

[1] "A hybrid method to news video categorization multimodal features," P. Wang, R. Cai, and S.-Q. Yang, Proc. Joint Conf. 4th Int. Conf. Inf. Commun. Signal Process. 4th Pacific Rim Conf. Multimedia, pp. 787-791, 2003. This study describes a novel method for categorising news videos. Other methods use both sound and visuals, although they are less reliable than written words. As a result, the writers devised a style that relies heavily on the words in the news article while also relying on sounds and visuals. They segregated the words, sounds, and visuals for computer analysis before merging the results to establish the category of the news item. They discovered that their strategy beat alternatives that relied purely on words or a combination of words and sounds or visuals in TV news pieces.

[2] "Content-based video indexing and retrieval," S. W. Smoliar and H. Zhang, IEEE Multimedia, vol. 1, no. 2, pp. 62-72, Summer 1994. The tools and methods for managing and editing movies are focused on the

small dots, or pixels, that make up the image, rather than an understanding of what the image is about. This implies that, while video editing software is capable of changing factors such as time and pixel appearance, it does not completely "understand" the film's content, such as the existence of a basketball in the scene.

[3] J. Nam, M. Alghoniemy and A. H. Tewfik, "Audio-visual content-based violent scene characterization", Proc. Int. Conf. Image Process. (ICIP 1998), pp. 353-They have devised a novel method for locating and cataloguing violent scenes in television programmes and motion pictures. They wanted to identify the violent sections and mark them so that they could be quickly recognised and indexed.To help the audience better grasp what is happening in each scene, they combine music and images. This can be helpful in a number of ways, including keeping kids from watching violent movies, applying special effects to hide violent parts, and categorising digital video libraries according to genre.

[4] "Semantic video classification and feature subset selection under context and concept ambiguity," J. Fan, H. Luo, J. Xiao, and L. Wu, Proc. 4th ACM/IEEE CS Joint Conf. Digit. Libr. (JCDL 2004), pp. 192-201. As more movies are uploaded to digital libraries, it is vital to be able to categorise them based on their subject matter so that users may search and retrieve them fast. Nevertheless, most approaches for teaching computers to classify films require a large number of examples, and they may fail to understand the context and concepts of a video if just a few examples are supplied. To overcome this issue, they created a new technique that can learn from both labelled and unlabeled examples and focuses on the main parts of a video to better understand its meaning.

They can also change when new movies are uploaded and deal with instances in which a video's themes expand over time. They tested their method with a series of medical education DVDs and determined that it was successful.

[6] Short videos gained popularity during the 2010s. Snapchat began allowing users to send 10-second films in 2012. Snap Inc., formerly known as Snapchat Inc., is a multi-media instant messaging service and software company based in the United States. One of Snapchat's distinguishing features is that photographs and messages are typically only available for a limited time before they are no longer seen by their receivers.

[7] Instagram is a photo and video-sharing social networking platform owned and operated by the American company Meta Platforms. The app allows users to upload media that can be edited using filters, organized using hashtags, and categorized by content type, such as photos. Users can also follow other users to see their content in their personal feed and search for content from other users based on categories and location.

[8] TikTok and Douyin are short-form video hosting platfors owned by ByteDance, a Chinese company. Users can upload videos to the platform that range in length from three seconds to ten minutes.The mobile app allows users to create short videos that can be speed up, slowed down, or edited using filters. Music is often included in the background of this video’s, but users can also add their own audio background music can be selected from a variety of genres, and videos upto 15 seconds long can be recorded and shared on TikTok amd other social networking sites. Using the mobile app, TikTok and Douyin users can create short videos that can be edited with various effects, including speed changes and filters. Background music is commonly used in these videos, but users can also include their own audio. A wide selection of music genres is available for users to choose from. After selecting their desired music and applying any desired edits or filters, users can record a video up to 15 seconds in length and share it on TikTok or other social networking sites.

III. EXISTING SYSTEM

In the current system, the concept of short videos, this has been embraced by numerous social media platforms such as YouTube and Instagram. The primary purpose of short videos is to provide viewers with an effective way to understand an idea without having to watch a full video. It also allows content creators to promote their work and grow their audience. The problem of these systems is that they provide a wide range of material, including entertainment-related content, which might induce users to lose focus on their goals. These systems are geared at organisational applications and are designed to manage data on a larger scale. This suggests that there aren't enough tools available that can be personalised to certain customers. The use of the reels

idea for teaching purposes inspired the problem statement. By automating the production of unique questions for each data set, the idea is to make the software more effective and engaging. Individual users will find the suggested solution easier to use if it controls all content-related information in addition to generating replies.

While the concept of fast videos has been successful on social media platforms, there are certain drawbacks. One of these systems' significant drawbacks is the availability of a diverse variety of material, particularly entertainment-related content that may distract users from their goals. Social media systems are designed for organisational applications and to handle information on a large scale. This suggests that there aren't enough tools available that can be personalised to certain customers.

Several social media companies, like Instagram and YouTube [3], have adopted the notion of short video. The idea behind how such software works is that it allows users to learn concepts in a short amount of time rather than viewing extended films [1]. The platform's emphasis on short-form video content is designed to help content creators promote their material and reach as many users as possible. By encouraging brief video content, the app enables creators to engage their audience with concise and engaging videos that can be easily shared on social media.

IV. PROPOSED MODEL

The suggested system is web-based and was created with web-based languages. The logic is written in typescript, and the system processes the queries using a collection of web-based libraries. The imported libraries are listed below:

- Vercel's Next.js is an open-source web development framework that allows React-based web apps to have server-side rendering and generate static webpages.
- Zustand is a simple, quick, and scalable state-management system that employs simplified flux principles. It features a pleasant hook-based A4PI and is not strict or opinionated.
- OAuth (Open Authentication) is an open standard for access delegation that is extensively used by internet users to provide websites or applications access to their information on other websites without providing passwords.

The system consists of the following modules:

- Welcome Module:
- Login Module:
- User Dashboard View
- Upload Data Page
- Home Page
- Result Page

V. SYSTEM DESIGN

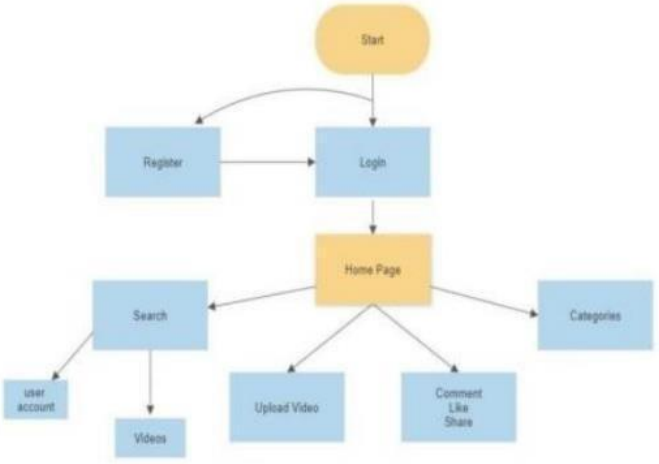


Fig. 1 - Flow of the Solution

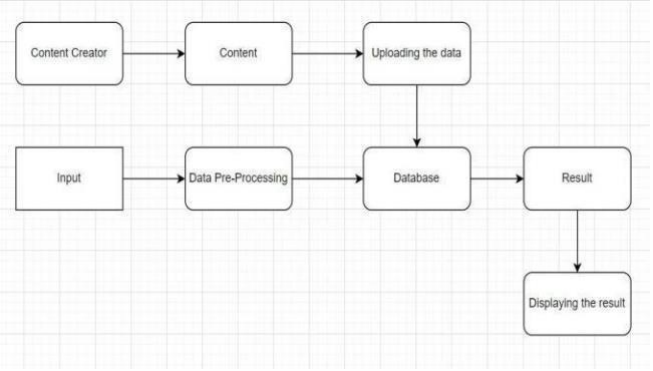


Fig. 2 - Data Flow Diagram for proposed system

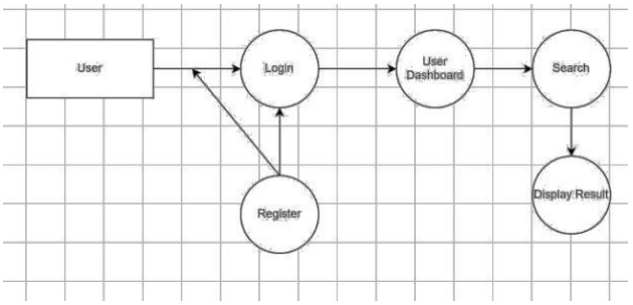


Fig. 3 - Data Flow Diagram for User Data

VI. RESULTS

With this, we successfully implemented our project ‘Quick Learn’ which includes the following output

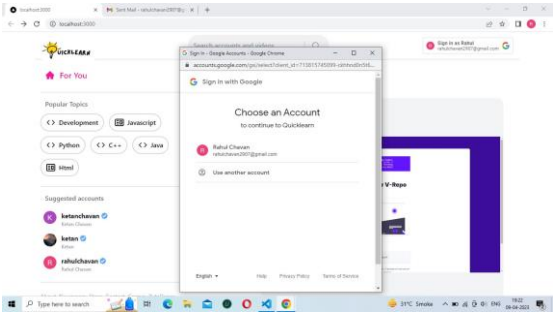


Figure 1: Login Page

The above image shows the login page which was created using google auth and user can login into the system using google account

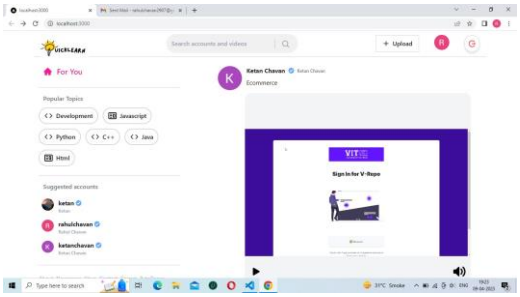


Figure 2: Home Page

As shown in fig 2,we can see the home page after the user is successfully logged into the system. The user can see videos and search videos according this requirement and need

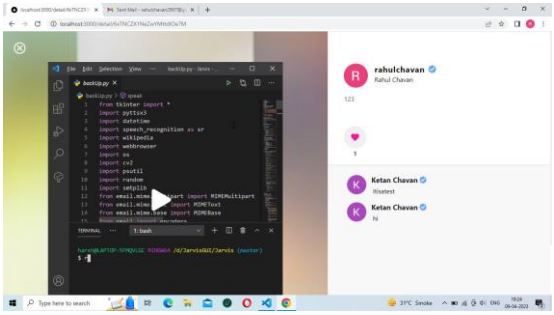


Figure 3: Video Page

As shown in fig 3, user can watch video which he/she opt to see. This page also includes the like and comment button

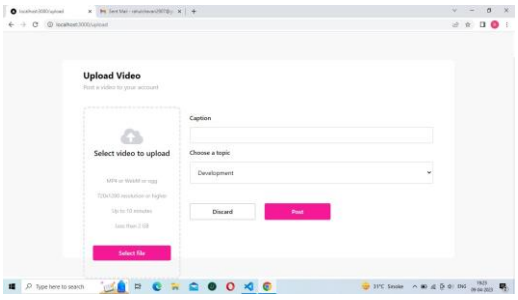


Figure 5.4: Upload Page

As shown in fig 4 , user can upload video. In this, user as to select the topic of the video which he/she uploaded. The limit is set to 10 min and size is upto 2gb

References

[1] P. Wang, R. Cai and S.-Q. Yang, "A hybrid approach to news video classification multimodal features", Proc. Joint Conf. 4th Int. Conf. Inf. Commun. Signal Process. 4th Pacific Rim Conf. Multimedia, pp. 787-791, 2003.

[2] S. W. Smoliar and H. Zhang, "Content based video indexing and retrieval", IEEE Multimedia, vol. 1, no. 2, pp. 62-72, Summer. 1994.

[3] J. Nam, M. Alghoniemy and A. H. Tewfik, "Audio visual content-based violent scene characterization", Proc. Int. Conf. Image Process. (ICIP 1998), pp. 353-357.

[4] J. Fan, H. Luo, J. Xiao and L. Wu, "Semantic video classification and feature subset selection under context and concept uncertainty", Proc. 4th ACM/IEEE-CS Joint Conf. Digit. Libr. (JCDL 2004), pp. 192-201.

[5] In 2005, Chad Hurley, Jawed Karim, and Steve Chen started YouTube. It was built on video transcoding technology, which allowed user-generated content to be streamed in video format from anywhere on the Internet.

[6] In 2012, Snapchat began enabling users to share 10-second videos. Snapchat is a multi-media instant messaging service and software created in the United States by Snap Inc., formerly known as Snapchat Inc.

[7] Instagram is a social media platform owned and operated by Meta Platforms, an American company. The platform allows users to share pictures and videos, which can be edited using filters and organized by hashtags. In addition, content can also be categorized by location to help users find relevant posts. Users can upload their own media to the app and easily share it with their followers.

[8] The Chinese corporation ByteDance is the owner of the short-form video hosting services TikTok and Douyin. Videos uploaded by users are hosted there, and they can be anything from three seconds to ten minutes long. The mobile software enables users to make quick films that may be sped up, slowed down, or altered with a filter. These videos frequently include music playing in the background.

AET 021

Density based Traffic Signal using Image Processing

Prof. Amey Revandkar
Assistant Professor
Department of Electronics and Telecommunication Engineering,
Vidyalankar Institute of Technology
Wadala(E), Mumbai.

Sonawane Yash Laxman
Department of Electronics and Telecommunication Engineering
Vidyalankar Institute of Technology
Wadala(E), Mumbai- 400437
yash.sonawane@vit.edu.in

Ballal Swaraj Rajesh
Department of Electronics and Telecommunication Engineering .
Vidyalankar Institute of Technology
Wadala(E), Mumbai-400437
swaraj.ballal@vitedu.in

Padekar Atharva Harish
Department of Electronics and Telecommunication Engineering
Vidyalankar Institute of Technology
Wadala(E), Mumbai- 400437
atharva.padekar@vitedu.in

Raghunath Abhiraj
Department of Electronics and Telecommunication Engineering
Vidyalankar Institute of Technology
Wadala(E), Mumbai- 400437
abhiraj.raghunath@vitedu.in

Abstract – The exponential growth in urbanization and population has led to a massive surge in traffic volume worldwide, resulting in traffic congestion, high fuel consumption, and air pollution. Thus, it has become essential to develop a traffic management system that utilizes advanced technologies to enhance traffic flow efficiency while ensuring safe and sustainable transportation. In this context, we propose a traffic management system that leverages the power of computer vision and IoT technologies to manage traffic flow in smart cities based on the density of vehicles. Our proposed system comprises two critical components: a video camera and a Raspberry Pi for object detection and tracking, and an ESP32 module for controlling the traffic signals. To detect and track vehicles in real-time, we use OpenCV, an advanced computer vision library that extracts the Region of Interest (ROI) and applies a background subtraction algorithm. The vehicles' coordinates are tracked using the Euclidean Distance Tracker algorithm, which calculates the distance between the centroid of the detected vehicles in consecutive frames. The tracked information is then wirelessly transmitted to the ESP32 module using the Firebase Realtime Database. The ESP32 module controls the traffic signals based on the number of tracked vehicles in the ROI. When the vehicle density surpasses a certain threshold, the system adjusts the traffic signals to allow more time for the vehicles to pass. Conversely, when the vehicle density is low, the system minimizes the waiting time at red lights by adjusting the traffic signals accordingly. Our proposed traffic management system is a novel solution that leverages computer vision and IoT technologies to enhance traffic flow efficiency in smart cities, contributing to a sustainable future.

Keywords—Image Processing, Internet of things(IoT) Computer Vision, Raspberry PI, ESP32 module , OpenCV .

I. INTRODUCTION

The rise in urbanization and population growth has led to an increase in vehicular traffic, resulting in problems such as traffic congestion, accidents, and bottlenecks. To overcome this challenge, researchers have turned their attention to Intelligent Transportation Systems (ITS) that use traffic monitoring to forecast traffic flow and identify congestion. However, traditional techniques for vehicle detection on roads are cumbersome and require significant hardware[1]. In this context, object recognition technology in computer vision has contributed to the development of effective methods for detecting objects in images and videos, including partially obscured or differently scaled ones. The proposed method uses image processing techniques to count vehicles on the road and estimate density, which can be used for traffic management. This approach to traffic control eliminates the need for human intervention and organizes traffic in an efficient and smart manner. The proposed method employs a filter to detect and count vehicles without a background, which is critical for calculating traffic congestion on highways.[1] Video or image processing is employed to perform some necessary operations to obtain the final car count. Various techniques have been proposed in the literature for vehicle detection and counting in traffic videos or images. These include edge detection, feature-based approaches, deep learning-based methods, and background subtraction techniques[6]. This paper presents a novel approach to address the challenges of traffic congestion by proposing a system that uses image processing techniques and the Euclidean Distance Tracker algorithm for vehicle detection and counting. The proposed system accurately calculates vehicular density by measuring the distance between

the centroid of detected vehicles in consecutive frames. The use of this modern approach in traffic control eliminates the need for human intervention and enables smart and efficient traffic organization. With the potential to improve traffic flow, the proposed system represents a significant step towards the development of intelligent transportation systems[7].

II. ALGORITHM

A. Euclidean distance tracking algorithm

The Euclidean distance tracking algorithm is a simple algorithm used to track location of an object in space over time. It is based on the Euclidean distance formula, which calculates distance among two points in space.

To use the Euclidean Distance tracking algorithm, first need to establish the initial position of the object you want to track. Then, as the object moves, you calculate its distance from the initial position using the Euclidean distance formula. This provides us with a quantity as how far the object has moved from its starting position.

The formula for Euclidean distance is:

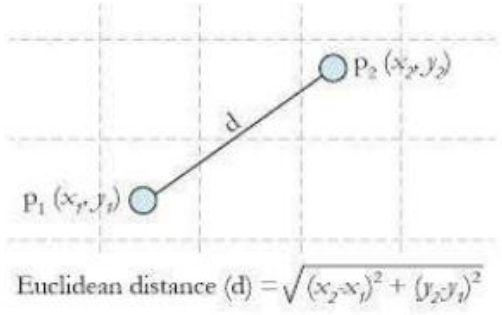


Fig. 1. Euclidean Distance formula

where d => distance midst the two points (x1, y1) and (x2, y2).

You can use this distance measurement to estimate the object's current position by assuming that it has moved in a straight line from its starting position. To do this, you calculate the direction and distance of the object's movement using the difference between its current position and its initial position. You can then use this information to predict where the object is likely to be at a future time.

Overall, the Euclidean distance tracking algorithm is a simple and effective way to track the position of an object in space over time, particularly when the object's movement is relatively straightforward.

B. Limitations Euclidean Distance Tracking Algorithm

Although the Euclidean Distance Tracker algorithm is a reliable approach for object tracking, it has certain limitations. One of the most significant drawbacks is its assumption that objects move in a straight line at a constant speed. However, real-world scenarios are often more complex, and objects may move in non-linear paths or change direction abruptly, making it difficult for the algorithm to track them accurately. Additionally, the algorithm does not consider the size or shape of the objects, which can lead to errors in tracking when multiple objects have similar shapes or sizes.

Despite these limitations, the Euclidean Distance Tracker algorithm remains a popular choice for object tracking due to its simplicity, efficiency, and ease of implementation. Its widespread use in various real-world applications highlights its reliability and effectiveness. Furthermore, with the recent advancements in deep learning and computer vision, several techniques have been developed to overcome the algorithm's limitations and improve its overall performance.

Overall, while the Euclidean Distance Tracker algorithm has its limitations, it still holds great promise for object tracking in a wide range of applications. By combining this algorithm with other advanced techniques, researchers can continue to develop more effective and accurate methods for object tracking in the future.

III. HARDWARE COMPONENTS

A. Raspberry Pi

RaspberryPi is a single-board computer and it uses ARM architecture and runs on a Linux-based operating system, such as Raspbian. It consists of Broadcom system-on-a-chip (SoC) with an ARM Cortex-A processor that ranges from the single-core Raspberry Pi 1 Model B to the quad-core RaspberryPi4 Model_B. The RaspberryPi has various peripherals, including HDMI and composite video o/p, USB ports, Ethernet, Wi-Fi, Bluetooth connectivity, and a 40-pin GPIO (General-Purpose Input/Output) header for interfacing with various sensors, actuators, and other devices.



Fig. 2. RaspberryPi version 3

It supports multiple programming languages, including Python, C/C++, and Scratch, and can run different types of software, such as web servers, media centres, and machine learning frameworks. As a result, the Raspberry Pi has become a popular choice for various projects, including IoT devices, robotics, home automation, and educational projects. It has also been utilized in research, such as in the field of computer vision and machine learning.

For our project, we are using the RaspberryPi3 Model_B, which satisfies our needs. The RaspberryPi3 Model_B has a quadiCorei1.2GHz 64--bit CPU BCM2837 64bit CPU, 1GB RAM, BCM43438 wireless LAN and Bluetooth Low Energy (BLE)

Specification of raspberry Pi are as follows:

1. QuadiCorei1.2GHz 64--bit CPU
2. 1GB RAM
3. 40-pin extended GPIO
4. Two USB ports
5. Full size HDMI.

B. Pi Camera

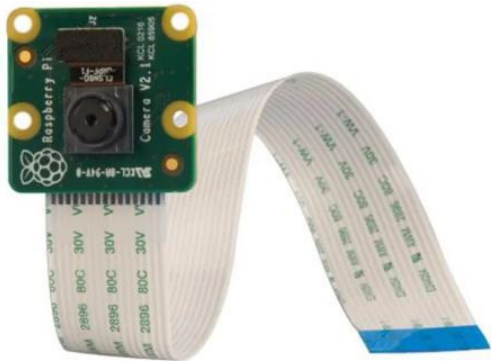


Fig. 3. Raspberry Pi HD Camera Board V2

The Raspberry Pi HD Camera Board V2 is a compact and cost-effective camera module that is highly suitable for various computer vision and image processing projects. With its high-quality image and video capture capabilities, it offers resolutions of up to 8 megapixels and 1080p at 30 frames per second. One of its key advantages is that it is a plug-and-play device that can be easily connected to the Raspberry Pi board via a dedicated ribbon cable, without the need for any additional setup or configuration. Moreover, the Pi Camera is equipped with a range of features and functionalities that can be easily controlled and adjusted through software libraries and APIs. These include auto-exposure, white balance, and focus, making it a versatile and customizable camera module.

C. ESP32

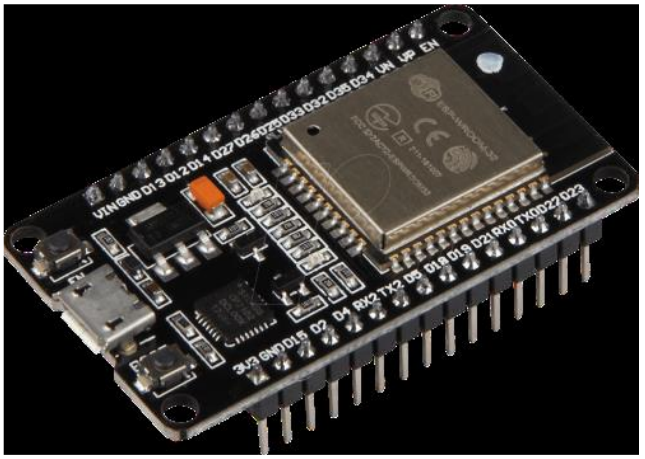


Fig. 4. ESP32 module

The ESP32 is a low-cost, low-power microcontroller with built-in Wi-Fi and Bluetooth connectivity. It features two Tensilica CPUs, 520 KB SRAM, and 4MB flash memory, with peripheral interfaces including SPI, I2C, UART, ADC, DAC, PWM, and GPIO. It is popular in IoT applications, such as home automation, industrial automation, and smart agriculture due to its affordability, low power consumption, and built-in connectivity. The ESP32 has a large community of developers who share code, provide support, and create new projects and applications. It can be programmed using C++, Python, and MicroPython, making it a versatile option for IoT projects.

Key features of ESP32 module:

1. Low-cost and low-power microcontroller
2. Built-in Wi-Fi and Bluetooth connectivity
3. Two Tensilica CPUs, 520 KB SRAM, and 4MB flash memory
4. Peripheral interfaces, including SPI, I2C, UART, ADC, DAC, PWM, and GPIO
5. Provision for multiple programming languages and development environments.

IV. METHODOLOGY

A. Block diagram



Fig. 5. Block diagram

B. Flowchart

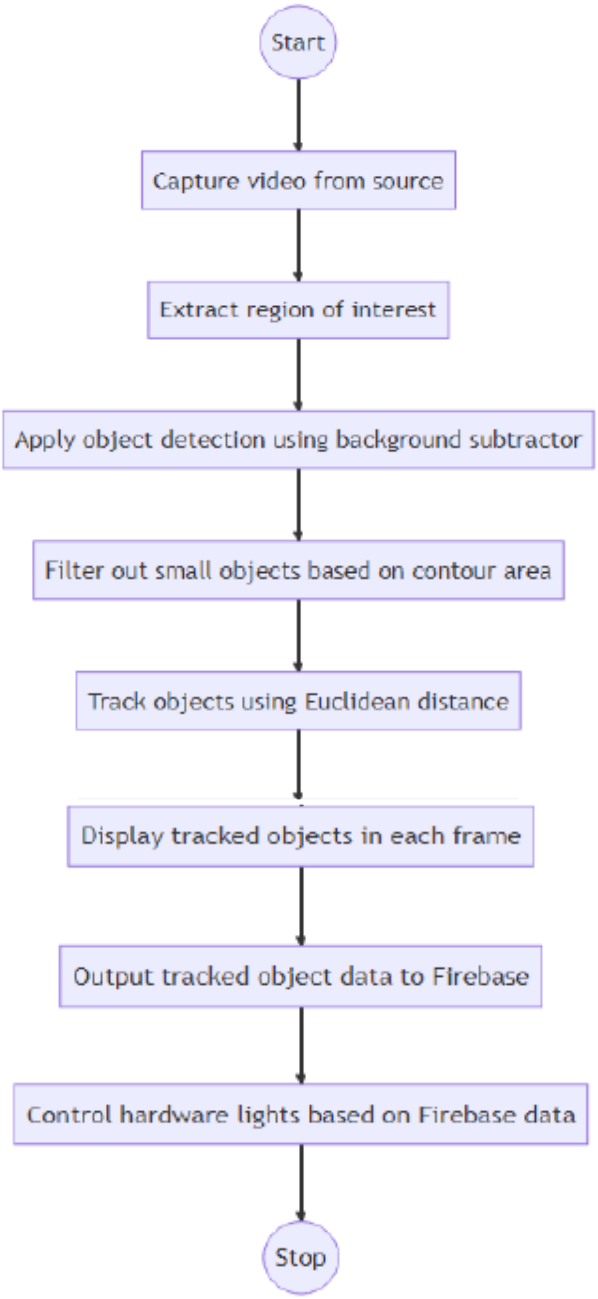


Fig. 6. Flowchart

Here is the explanation for the flowchart Figure 6:

- Establish a connection with the Firebase server to store and transmit vehicle count to the ESP32 board.
- Connect to the live camera for vehicle detection using image processing
- Use the Euclidean Distance Tracking Algorithm for vehicle detection by tracking movement and distance.
- Count the number of vehicles and store the count in a variable.
- Transmit the vehicle count to the ESP32 board through the Firebase server and Wi-Fi connection.
- Control the traffic light based on the number of vehicles on the road using the ESP32 board.
- Increase or decrease the red-light time based on the count of vehicles to manage traffic and reduce congestion.
- Monitor traffic conditions and adjust traffic light times accordingly.
- Continuously update the vehicle count and traffic light times in real-time.
- Provide a safe and efficient traffic management system for drivers and pedestrians alike.

V. RESULTS

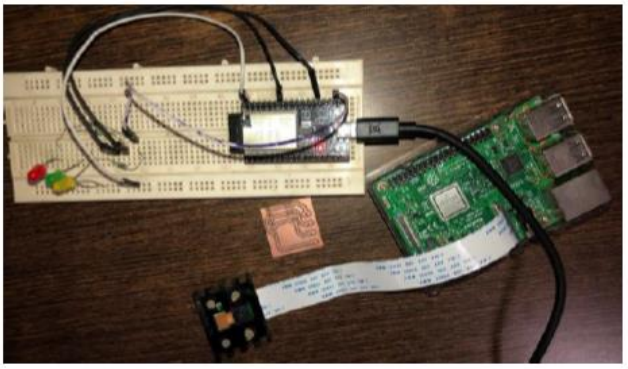


Fig. 7. Hardware setup



Fig. 8. Realtime vehicle count



Fig. 9. Vehicle count with Masking and Region of Interest(ROI) frames

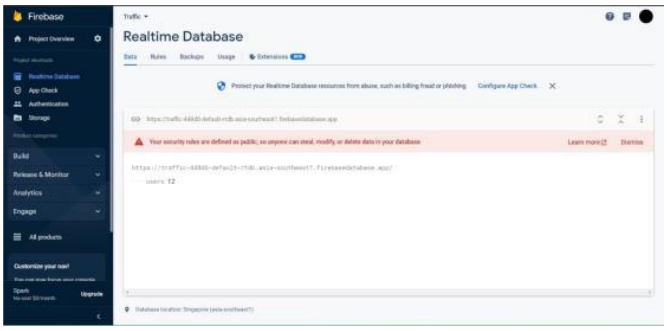


Fig. 10. Realtime count of vehicles in database

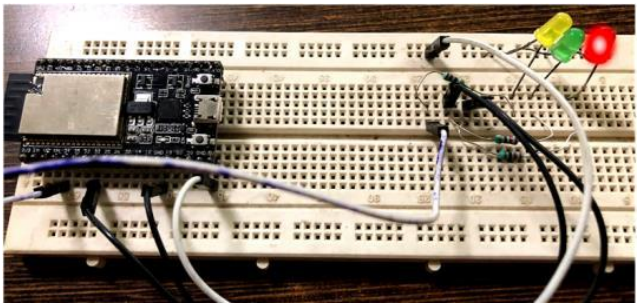


Fig. 12. LED setup (Stop light on)

REFERENCES

[1] U. E. Prakash, K. T. Vishnupriya, A. Thankappan and A. A. Balakrishnan, "Density Based Traffic Control System Using Image Processing," 2018 International Conference on Emerging Trends and Innovations In Engineering And Technological Research (ICETIETR), Ernakulam, India, 2018, pp. 1-4, doi: 10.1109/ICETIETR.2018.8529111.

[2] A. Balakrishnan and S. Ravi, “Real Time Traffic Density Estimation Using Image Processing,” Int. J. Comput. Sci. Mob. Comput., vol. 3, no. 6, pp. 1-7, Jun. 2014.

[3] “Object Counting and Density Calculation Using MATLAB,” V. Prem Kumar, V. Barath and K. Prashanth, 2013.

[4] “A Feature Construction Method for General Object Recognition,” K. Lillywhite, D.J. Lee, B. Tippetts and J. Archibald, Pattern Recognition, vol. 46, pp. 3300, 2013. https://doi.org/10.1016/j.patcog.2013.06.002

[5] “Real-time smart traffic management system for smart cities by using internet of things and big data,” P.R.K.S.M.R.Babu, in Proc.ICETT’16: International Conference on Emerging Technological Trends (ICETT), 2016.

[6] “A smart traffic management system for congestion control and warnings using internet of things (iot),” C.K.K.Chandana and S.Meenakshi Sundaram, Saudi J. Engin.Technol., vol. 2, 2013.

[7] “Smart traffic management system using iot,” P.N.Dave et al., Int.J.Comput.Engin.Appl., vol. 12, 2018.

“Smart Traffic management system using IOT project report,” [Online]. Available: https://cit.ac.in/smart-traffic-management-system-using-internet-of-things-iot

ACKNOWLEDGMENT

- This work would not have been possible without the guidance, support, and contributions of many individuals, and we express our gratitude to all of them.
- We extend our heartfelt thanks to our guide, Prof. Amey Revandkar, and to Prof. Satendra Mane for their valuable insights.
- We also thank Dr. Varsha Turkar and staff members of Vidyalankar Institute of Technology, Wadala for their support and cooperation, and our family and friends for their constant encouragement.

AET 022

IR based Wireless Underwater Communication System

Rugved Kharbade
Department of Electronics & Telecommunication ngineering
Vidyalankar Institute of Technology
Mumbai, India
rugved.kharbade@vit.edu.in

Pranav Khatal
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology Mumbai, India
pranav.khatal@vit.edu.in

Shreyas Padghan
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology Mumbai, India
ansika.jaiswal@vit.edu.in

Parth Bhagdikar
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology
Mumbai, India
parth.bhagdikar@vit.edu.in

Prof. Santosh Jagtap
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology Mumbai, India
santosh.jagtap@vit.edu.in

Abstract – Underwater communication is the process of transmitting messages wirelessly through the water. As a medium, water poses unique challenges to signal transmission due to its high density, viscosity, and absorption of electromagnetic waves. To overcome these challenges, different communication technologies have been developed, including acoustic, optical, and electromagnetic methods. In this context, the infrared (IR) technology has been selected for its practicality, feasibility, and requirement for the problem statement. Despite the advantages of IR technology for underwater communication, several challenges must be addressed. The challenges include the selection of the right medium parameters, such as density, volume, and cohesion, to optimize signal transmission strength. So, with this project, we did analyze the transmission distance to ensure that the medium is suitable for specific applications. Here we propose an IR Based Underwater Wireless Communication system to overcome such challenges.

Keywords – IR Technology, Acoustic, Optical, Underwater Communication, Density

I. INTRODUCTION

The infrared electromagnetic band, with a wavelength of 980 nm and a frequency range of 430 THz to 300GHz, can serve as a means of communication for data transmission and reception between portable and fixed devices. This communication is secure due to the high directionality of infrared radiation, which allows for source identification and eliminates the risk of information diffusion. In addition, it is safe for human beings as infrared radiation is not harmful. The high data rate of approximately 1 Gbps makes it suitable for sending information such as video signals. An underwater wireless communication system comprises two communication modules that use infrared radiation for data transmission and reception. Each module contains a transmitter/receiver that converts the received data. The IR light detecting unit outputs logic zero when it detects a pulsed bursting of infrared radiation for approximately 600 microseconds and a logic one when it fails to detect infrared radiation for the period.

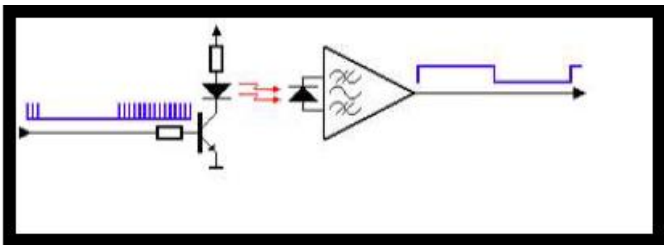


Fig.1 Procedural Diagram of IR Sensor

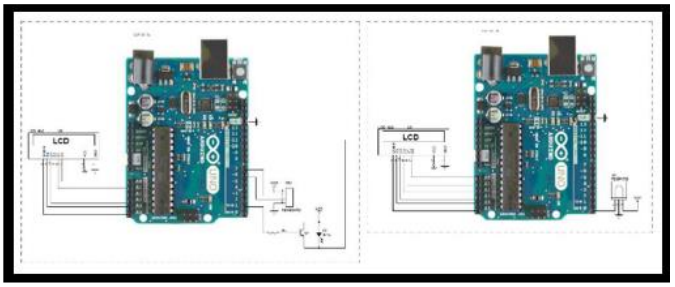


Fig. 2. Circuit Diagram

II. SYSTEM DEVELOPMENT(HARDWARE)

Inside its circuit is an IR LED transmitter that produces an infrared light pulse for each electric pulse applied to the sensor. This pulse is produced in the same way as a remote-control button is pressed, completing the system circuit and biassing the LED.

When biased, the LED produces a series of pulses of light with a wavelength of 940 nm that represents the data. However, since there are numerous other infrared light sources, including us humans, lightbulbs, the sun, etc., in addition to the IR LED, the transmitted information may be interfered with. Modulation can help with this issue. A carrier frequency of 38 KHz (or any other frequency between 36 and 46 KHz) is used to modulate the transmitted signal. For the duration of the pulse, this frequency is made to oscillate in the IR LED. The pulse width modulated information or light signals are carried at the frequency of 38 KHz.

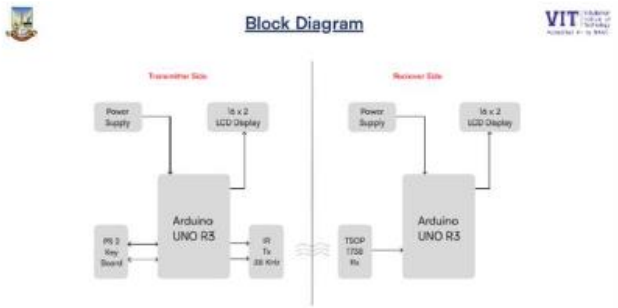


Fig. 3. Block Diagram

III. METHOLOGY(FUNCTIONALITY)

The functionality of IR LED is to transmit data wirelessly in digital form (0 – LED OFF or 1 – LED ON). An IR photodiode or IR phototransistor receives this data. The IR receiver (IR photodiode or IR phototransistor) gives different current values according to the intensity of light. The data transmitted can be modulated and there are special decoder IR receivers like TSOP1738 available that can receive the modulated data. The data from transmitter side is modulated at 38 kHz before transmission. An Arduino MCU, read data from Keyboard and modulated in 38KHZ.



Fig. 4. Underwater Data Tx System

IV. IR RECEIVER

The receiver comprises of a photo detector that, when exposed to light, produces an electrical signal as an output. A narrow band filter is used to filter the detector's output, excluding all frequencies below or above the carrier frequency (in this example, 38 KHz). A suitable device, such as a microcontroller or microprocessor, which manages machines like a computer or a robot, receives the filtered output next. To read the pulses, the output from the filters can alternatively be linked to an oscilloscope. The TSOP1738 is an IR Receiver with the capability to demodulate signals that have been modulated at a frequency of 38 kHz. Any other TSOP17xx receiver like the TSOP1730 can also be used instead of TSOP1738. The only difference is the carrier frequency that it can demodulate.



Fig. 5. Underwater Data Rx System

V. MCU CLOCK

A microcontroller unit (MCU) clock is an electronic component that generates a timing signal that is used to synchronize the operation of the various components within the microcontroller. The clock signal is used to control the sequencing of CPU instructions and to synchronize the operation of the peripherals and interfaces connected to the MCU. In most modern microcontrollers, a crystal oscillator is used as the clock

source. The crystal oscillator generates a highly accurate and stable signal that can be divided down to provide a range of clock frequencies suitable for different applications. For example, a typical MCU might use a 16 MHz crystal oscillator as its clock source. The 16 MHz crystal oscillator provides an accurate timing source that can be divided down to provide a wide range of clock frequencies suitable for different applications. The high frequency clock source is used to control the sequencing of CPU instructions and to synchronize the operation of the various peripherals and interfaces connected to the MCU. This enables the MCU to perform complex operations and communicate with other devices in a reliable and efficient manner. The MCU clock is an important component in the design of any microcontroller-based system. The clock speed directly affects the performance of the MCU and can have a significant impact on the overall system performance. A higher clock speed allows for faster execution of instructions and faster data transfer rates, while a lower clock speed can reduce power consumption and extend battery life.

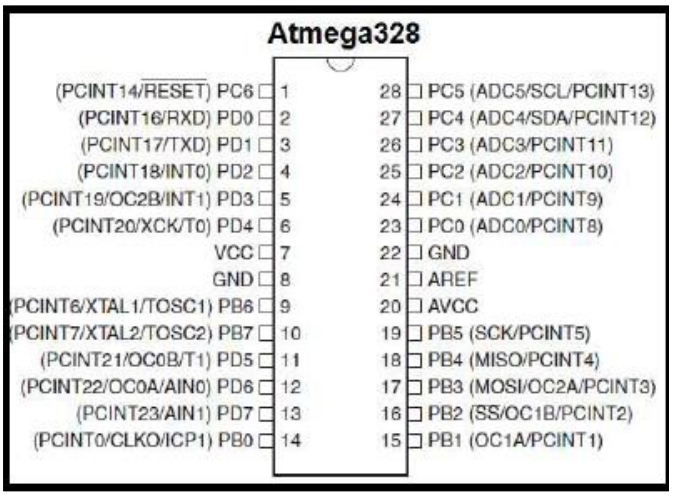


Fig. 5. Atmega328

VI. CONCLUSION

In this experiment, we analyzed the communication system using IR transmission through different mediums at varying distances. The results showed that as the distance between the transmitter and receiver module increased, the error rate of the received information increased. The transmitted signal was still received even at long distances, but with a higher error rate. We found that plain water was the most feasible medium for IR transmission as it provided a clear and stable signal with no errors up to a distance of 134 cm. However, salt water showed errors at a much shorter distance of 63 cm. This can be attributed to the higher conductivity of salt water, which caused scattering of the IR signal. When we used soap water as the transmission medium, the signal was received with errors at an even shorter distance of 25 cm. This is due to the presence of surfactants in the soap water, which reduces its surface tension and causes IR signal scattering. Overall, we can conclude that the medium used for IR transmission plays a critical role in the clarity and stability of the signal. Plain water was found to be the most suitable medium, followed by salt water, and soap water being the least suitable. Therefore, it is essential to choose the appropriate medium for IR transmission depending on the specific requirements and limitations of the communication system.

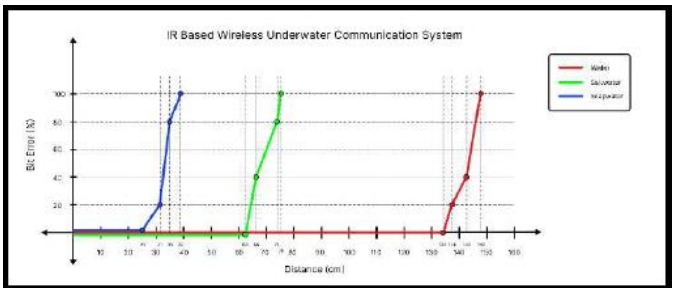


Fig. 6. Distance(cm) vs Bit Error (%) Graph

REFERENCES

1. Mr. K. Rajesh Kumar, K. Mohanraj, A.S. Murugan, K. Naveen, K. Prakash International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395- 0056 Volume: 08 Special Issue Apr 2021
2. Mengying Jiang, Jingting Li, Lin Gao, Yiwen Wang 2011 Published by Elsevier Ltd. Simple Underwater Wireless Communication System.
3. C M Chaithanya Vardhan, Chandan YC Mr. S Christo Jain International Advanced Research Journal in Science, Engineering and Technology Vol. 8, Issue 7, July 2021 IR WIRELESS COMMUNICATION SYSTEM
4. Abu-Nimeh, S., Nimeh, M., & Mustafa, A. (2019). Wireless Underwater Communication Techniques: A Comprehensive Review. International Journal of Advanced Computer Science and Applications, 10(3),348-356.
5. Li, C., & Qiu, R. (2015). A Review of Underwater Wireless Sensor Network. Journal of Sensors, 2015, 1-17.

6. Maritime Digitalisation and Communications Summit 2019, Oslo, Norway (2019). Review of Underwater Acoustic Communication Techniques and Related Technologies.
7. Junaid, M., Khairi, A., & Shoaib, M. (2019). Wireless Sensor Networks for Underwater Communications: A Review. Journal of Sensors, 2019, 1-11.
8. Chang, J., Wang, Y., Lin, H., & Chang, Y. (2017). An Efficient Underwater Wireless Sensor Network Using Dynamic Clustering and Network Coding. Journal of Sensors, 2017, 1-12.
9. Karthikeyan, B., & Amirtharajan, R. (2019). Design and Implementation of Underwater Wireless Sensor Network for Aquaculture Monitoring. Journal of Sensors, 2019, 1-9.

AET 023

Smart Toll Booth System

Yashika Devadiga
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology, Mumbai, India
yashika.devadiga@vit.edu.in

Maithili Ninawe
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology, Mumbai, India
maithili.ninawe@vit.edu.in

Rashmi Umap
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology, Mumbai, India
rashmi.umap@vit.edu.in

Priyanka Vishe
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology, Mumbai, India
priyanka.vishe@vit.edu.in

Prof. Amey Revandkar
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology, Mumbai, India
amey.revandkar@vit.edu.in

Abstract— The paper mainly focuses on an unique concept of efficient Toll Management System which is monitored using IOT and is based on RFID. The database maintains all the data of user's accounts and their balances. Each vehicle owners possess an unique RFID (Radio Frequency Identification) which is based on the card mounted on their vehicles which stores their RFID number. The toll booth management system will monitor the cards scanned when a vehicle arrives at the toll booth.

The system then connects to the database to check if the card is valid or not and if it is valid and user's balance is sufficient then toll amount is deducted, and card scanner system sends signal to the motor allowing the motor to pass on successful transaction. On receiving this signal, the system operates the motor and the toll gate opens for that vehicle. This system is controlled by a Microcontroller to achieve this purpose. The Wi-Fi module uses a Wi-Fi connection to connect the toll system to our customize website to perform the online verification process for the stolen vehicles and sends the alert.

The system allows to monitor the registered vehicle and automates the system to greater extent making it very convenient in the increasing traffic scenario in the city. This system provides a comprehensive and reliable toll management system that provides a hassle-free toll collection experience. It ensures that toll collection is done securely, efficiently and is convenient for both the drivers and the toll authorities.

Keywords—Toll Management System, IOT platform, RFID Microcontroller, Wi-Fi module.

I. INTRODUCTION

In the ultramodern period, the diurnal increase in vehicles on the road caused massive business and dragged trip times. This sluggish business is a vexation not only in the metropolises but also on the roadways, where motorists must stay in line only to pay the toll to enter the road. People aren't forced to stay in a lengthy line, making this automated Toll Booth Management System more effective and well-organized. [2]The capacity of RFID- grounded toll systems to exclude corruption in trace's profit administration agencies while contemporaneously reducing operating costs enforcing this approach to be an effective way to control energy waste.

[3]Using RFID technology, electronic toll collecting converts mortal sale work to automatic toll collection. Stolen RFID cards are scrutinized using RFID compendiums installed in at toll cells at certain locales. This system gives translucency to the entire system because it allows for online deals. [4]For example, the tender broker who hired the toll duty collecting systems was constantly involved in fraud by concealing toll profit collection, still, the government has set up it to be profitable to effectively collect road duty. Thanks to the simple availability of real-time toll profit collecting data numbers using IoT pall platform. [5] For the data storehouse and shadowing of blocked cards, a customized pall platform is employed, which keeps the data of the vehicle no., timings, date, gate no., and card checkup position for unborn references and surveillance, as well as the data regarding yearly risk income. [6]The Internet of Things (IoT) is principally a network of connected physical objects that allow for the exchange of data between them. [7]The foundation of our website is PHP, which is an user-friendly server-side scripting language.[8] Utmost of the felonious conditioning involves using stolen motorcars, trespassing stolen vehicles across countries, sections, and boundaries is a long-running enterprise.[9] Hence, the combination of an RFID system and an IoT-grounded platform may be useful for detecting these vehicles and stopping their trespassing acts.



Fig. 1. Toll Booth System[1]

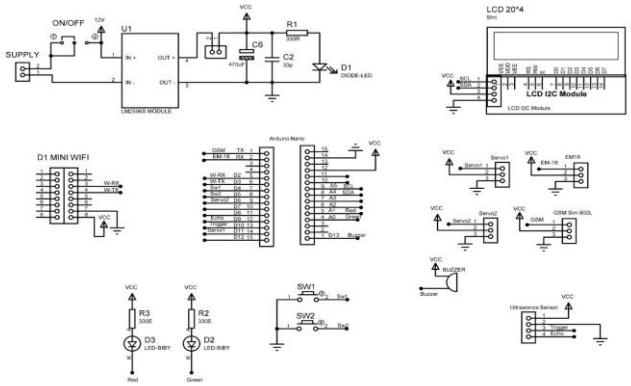


Fig. 2. Circuit Diagram

II. SYSTEM DEVELOPMENT

1. Initialize the system by turning on the RFID reader, toll booth software, and database.
2. When a vehicle approaches the toll booth, scan the RFID tag attached to the vehicle and retrieve the corresponding account details from the database.
3. Deduct the toll fee from the account balance. If there is insufficient balance, request the driver to pay in cash or recharge the account.
4. Store the transaction details, including the vehicle registration number, time of transaction, and toll fee, in the database.
5. Monitor the transaction history and check for suspicious activity.
6. If the system detects theft, alert the system administrator or the appropriate authorities.
7. Provide ongoing maintenance for the system, including software updates, hardware replacements, and database backups.

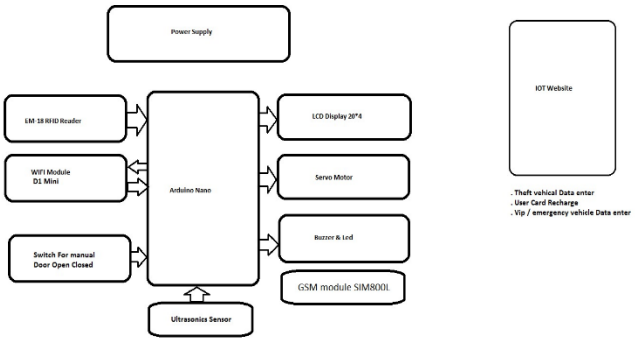


Fig. 3. Block Diagram

III. COMPONENTS DETAIL

HARDWARE	**SOFTWARE**
Arduino NANO	Arduino IDE
D1 Wi-Fi Module	HTML/CSS/Javascript/PHP
RFID Tags	Web Hosting
EM-18 Reader Module	
LCD Display(20*4)	
Ultrasonic sensor	
Servo Motor	
GSM Module	
Buzzer	
LED	

IV.METHOLOGY

1. System Initialization: Initialize the smart toll booth system, including the RFID readers, the toll booth software, and the database.
2. Vehicle Detection: When a vehicle approaches the toll booth, the RFID reader scans the RFID tag attached to the vehicle to identify the vehicle and retrieve its details from the database.
3. Transaction Processing: The system checks the balance of the prepaid account corresponding to the vehicle and deducts the toll fee from the account. If the balance is insufficient, the system will prompt the driver for cash payment or ask them to recharge the account.
4. Transaction Storage: The transaction details, including the vehicle registration number, time of transaction, and toll fee, are stored in the database.
5. Theft Detection: The system monitors the transaction history and checks for suspicious activity, such as repeated transactions or transactions at unusual times. If the system detects theft, it will alert the system administrator or the appropriate authorities.

V. TESTING

[10]Our smart toll booth system with a theft detection system aims to improve the efficiency and security of toll plaza operations.

[11]To begin with, the RFID technology will be used to identify vehicles as they approach the toll plaza. Each vehicle will be assigned a unique RFID tag that will be scanned by the toll booth system to determine the amount left if sufficient after going through the database which has this information about the amount remaining the toll amount will be deducted from the left amount and if insufficient balance is shown in the database then the vehicle can do manual payment.

RFID tag when scanned and it is a theft car, then the database of our toll will be able to identify the theft vehicle as it would already be inserted by the admin which will change the vehicle type from normal to theft which will be led to different lane and other vehicle will run smoothly reducing the traffic on main lane.

The system will incorporate a theft detection mechanism with the help of RFID tag which is inbuilt in and unique to that vehicle cannot be removed from that car make it possible to find the theft car once the admin receives the message that this car is stolen where he can change the type an then can easily be spotted in any toll once it passes through it and then the system can alert the authorities.

[12]Thus our smart toll booth system with a theft detection system is designed to enhance the accuracy, speed, and security of toll collection operation.

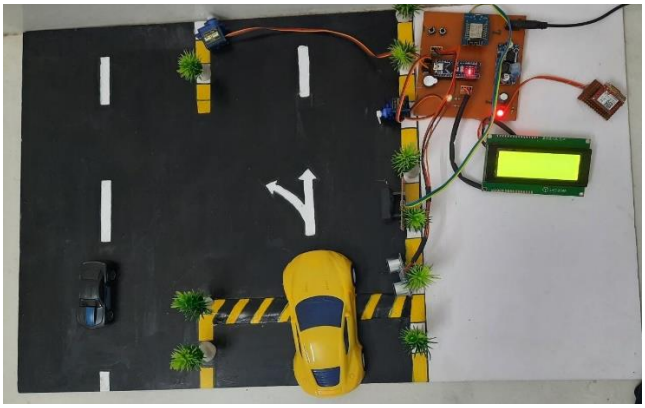


Fig.4. Testing setup

VI. CONCLUSION

The RFID-based toll booth system using GSM is a practical and effective way to collect tolls. It decreases traffic congestion and the requirement for manual toll collecting. Additionally, the system offers precise, real-time transaction data that can be used for a variety of tasks, including traffic research and toll revenue management.

GSM-based RFID toll booth systems can provide a number of advantages. The technology offers a simple and secure way for drivers to pay tolls while also reducing congestion and boosting efficiency. Vehicles can be quickly and easily identified as they approach the toll booth thanks to RFID technology, eliminating the need for manual involvement. Particularly during rush hours, this can greatly reduce wait times and enhance traffic flow. The toll booth system can provide remote monitoring and management capabilities by incorporating GSM technology. This can assist in making sure the system is operating properly and can notify operators if there are any problems or malfunctions.

GSM-based RFID toll booth technology is a practical and efficient method of collecting tolls. Both the need for manual toll collection and traffic congestion are reduced. The system also provides accurate, real-time transaction data that may be applied to several projects, including as traffic analysis and toll revenue management.

In case readers are keen to see a video, they can visit the following QR code:

IV. FUTURE SCOPE

The Smart Toll Booth system based on IOT using RFID for theft detection with a database has the potential to significantly improve toll collection systems and enhance security measures. The future scope of this technology is robust, and it will continue to evolve as technology advances.

Some potential future advancements for this technology may include:

1. Artificial intelligence (AI) integration: Integrating AI into the toll booth system can enhance the accuracy of the system in detecting theft and fraud, and improving traffic management.
2. Big data analytics: Collecting and analyzing large amounts of data can help identify patterns in toll collection that can provide insights to optimize the toll collection system.
3. Blockchain technology integration: Integrating blockchain technology can enhance the security and transparency within the toll collection system, thus safeguarding against unauthorized access to data and transactions.
4. Biometrics authentication: Utilizing biometrics authentication can provide an additional level of security to ensure that only authorized individuals have access to the toll collection system.

Smart Toll Booth system based on IOT using RFID for theft detection with a database will have promising future. The technology is likely to continue to evolve and offer enhanced functionality, security, and efficiency to our transportation systems, ultimately making transportation faster, safer, & more affordable.

VII. REFERENCES

[1] Toll monitoring system https://www.traffictechnologytoday.com/news/tolling/next-generation-tolling-system-uses-lidar-for-vehicle-classification.html

[2] R.Brindha, A.Jayanthi, A.Kalaivani, "IoT based Electronic Toll Collection System for Vehicles using Barcode System", International Journal of Electronics, Electrical and Computational System (IJEECS), Volume 7, Issue 3 March 2018.

[3] P. S. Hanwate, Ashlesh Mandke, Narin Meher," Smart Toll Collection System based on IoT", IJSTE - International Journal of Science Technology & Engineering, Volume 3, Issue 12, June 2017.

[4] Rana Pratap, Sanjeev,Niraj Kumar Tiwary, "IoT Based Smart toll Booth System over Vahan 4.0 Cloud Database", International Journal of Science & Engineering(IJSE),Volume 4,Issue 8,2018.

[5] Satyasrikanth P, Mahaveer Penna, Dileep Reddy Bolla, ''AUTOMATIC TOLL COLLECTION SYSTEM USING RFID", International Journal of Computer Science and Mobile Computing, Volume 5, Issue 8, August- 2016.

[6] Allen Francis Antony, Anju P, Gautham Raj P," Design of an Integrated Speed Tracking and Toll Management System for Express Highways", Proceedings of the IEEE 2017 International Conference on Computing Methodologies and Communication(ICCMC).

[7] Amit Hatekar, Nikita Kokal, Tarun Jeswani, Pratik Lalwani," RFID Based Automatic Toll Collection System using GSM", International Research Journal of Engineering and Technology (IRJET), Volume 03, Issue 04, Apr-2016.

[8] Amol V Dhumane, Rajesh S. Prasad, Jayashree R. Prasad, ''Infrared Automated toll plazas", International Journal of Rough Sets and Data Analysis(IJRDT) Volume 4, Issue 3, July-Sept 2017.

[9] Arvind. K, Balaji. U, Gokul. R, Nishanth. P, Arivalahan. R, ''Theft Detection using Internet of Things in Automated Toll Plaza", International Journal of Advance Research and Development (IJARD), Volume 3, Issue 3,2017.

[10] Mr.Abhijeet Suryatali, Mr.V.B.Dharmadhikari, ''Computer Vision Based Vehicle Detection for Toll Collection System Using Embedded Linux", Proceedings of the IEEE 2016 International Conference on Circuit, Power and Computing Technologies.

[11] Sudheer Kumar Nagothu, ''Automated Toll Collection System Using GPS and GPRS", International Conference on Communication and Signal Processing, April 6-8, 2016, Germany.

[12] K. Balamurugan, R. Pavithra, ''Automatic Check-Post and Fast Track Toll System", International Journal of Science Technology & Engineering (IJSTE), Volume 3, Issue 12, 2017.

AET 024

AI Pose Estimation

Akshay Yadav
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology
Mumbai,India
akshay.yadav@vit.edu.in

Ashish Kumar
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology
Mumbai, India
ashish.kumar@vit.edu.in

Aditi Singh
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology
Mumbai, India
aditi.singh@vit.edu.in

Jay Kadam
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology
Mumbai, India
jay.kadam1@vit.edu.in

Prof. Vibha Wali
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology
Mumbai, India
vibha.wali@vit.edu.in

Abstract— An AI fitness trainer is a software system that leverages machine learning algorithms to provide personalized fitness coaching to individuals. The system uses various data sources, such as fitness tracking devices and self-reported health data, to build a profile of the individual's fitness level, health goals, and preferences. Based on this information, the AI fitness trainer generates customized workout plans, provides real-time feedback during workouts, and adapts the training regimen over time to optimize results.

The AI fitness trainer's machine learning algorithms use data to identify patterns and adjust workout plans accordingly, allowing the system to continuously optimize the individual's training routine. Additionally, the system can incorporate social and motivational elements, such as personalized encouragement and reminders, to help individuals stay motivated and committed to their fitness goals.

Overall, an AI fitness trainer has the potential to revolutionize the fitness industry by providing personalized, effective, and convenient coaching to individuals of all fitness levels.

I. INTRODUCTION

An AI pose estimation project involves using machine learning algorithms to detect and track human body movements and positions in images or videos. The goal of such a project could be to develop a system that accurately and efficiently analyzes human movement, enabling better performance analysis in sports, more realistic movements in virtual reality environments, and improved fitness tracking for individuals. It is a technology that uses artificial intelligence algorithms to detect and track human body movements and positions. It is commonly used in applications such as sports performance analysis, virtual reality, robotics, and fitness tracking.

AI pose estimation works by analyzing image or video data and identifying the key points of a person's body, such as the elbows, knees, and shoulders. The technology can then track the movement of these key points over time and provide insights into body position, joint angles, and movement patterns.



Fig. 1

It can be achieved through various techniques such as deep learning algorithms, convolutional neural networks, and recurrent neural networks. These algorithms can learn from large datasets of annotated images or videos to accurately identify key points and movements.

The benefits of AI pose estimation include more accurate and efficient analysis of human movement, enabling better performance analysis in sports, more realistic movements in virtual reality environments, and improved fitness tracking for individuals.

Overall, AI pose estimation represents a significant advancement in human movement analysis and has the potential to improve performance, reduce injury, and enhance overall fitness and well-being.

II. SYSTEM DEVELOPMENT

The main goal of the system is to monitor the movement of the person who is exercising in front of the web camera. The web camera then detects the person and shows real time feedback on the screen.

As an individual performs an exercise, the data gets collected on their movements and orientation, which is then transmitted to the AI fitness positioner's software. The AI fitness positioner's software uses machine learning algorithms to analyze the data and determine the individual's posture and form during the exercise.

Pre-defined Mediapipe library is used which portrays the points on the body and is displayed on the screen (can be seen in the fig below). These points are defined for each joint in the human body and therefore are given a specific number; For eg numbers for the left shoulder , elbow and wrist are 11 , 13 and 15 respectively. Based on the analysis, the AI fitness positioner provides real-time feedback to the individual on their form and posture, either through a visual display. The feedback may include suggestions for how to adjust their position to improve their form and reduce the risk of injury.

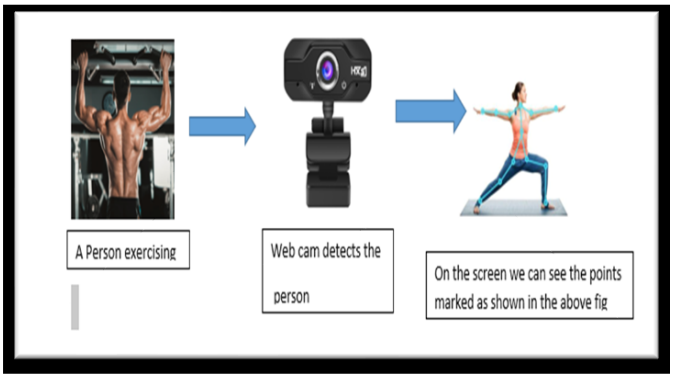


Fig. 2. Block Diagram

III. METHOLOGY

There are 6 exercises which we have included in our project which are Pull Ups, Push Ups, Squats, Crunches, Bicep Curls and Lunges which are as follows:

- **Pull Ups**

To perform a pull, find a horizontal bar which can hold your weight. Grab the bar tightly with an overhand grip and retract your scapula. Next step is pull yourself up using your arms just so that your chin is above the bar. Slowly, lower yourself down and lock out your elbows and repeat the entire process.

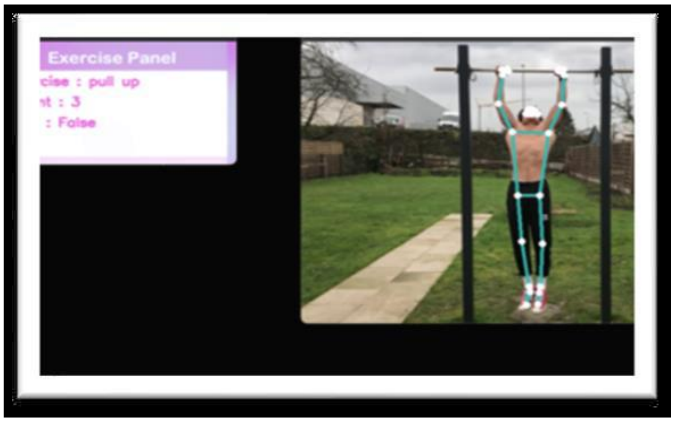


Fig.3.Pull up

- **Squats**

The squat is an exercise that involves bending your knees and lowering your hips down and back as if you're sitting in a chair, and then standing back up. It targets multiple muscles, including the quadriceps, hamstrings, glutes, and core. To perform a squat, stand with your feet shoulder-width apart, keep your chest lifted and your weight on your heels, and lower down until your thighs are parallel to the ground or slightly below. Push through your heels to stand back up and repeat for the desired number of repetitions.

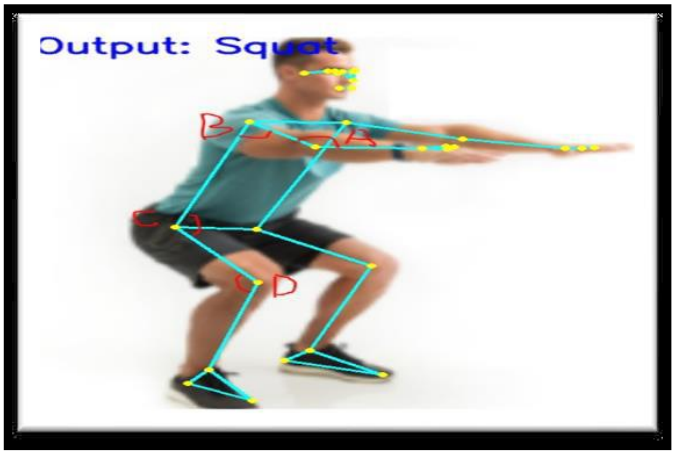


Fig.4.Squats

- **Push ups**

The push-up is an exercise that involves lowering your body down towards the ground by bending your elbows and then pushing back up to the starting position. It primarily targets the chest, shoulders, and triceps. To perform a push-up, start in a plank position with your hands shoulder-width apart and your body in a straight line. Lower your body down by bending your elbows until your chest nearly touches the ground, then push back up to starting straightening your arms. Repeat for the desired number of repetitions. Variations include incline push-ups, decline push-ups, and diamond push-

ups.



Fig.5.Push Ups

- **Lunges**

The lunge is an exercise that involves stepping forward with one leg and lowering your body down until both knees are bent at a 90-degree angle, and then standing back up. It primarily targets the quadriceps, hamstrings, and glutes. To perform a lunge, stand with your feet hip-width apart, step forward with one leg and lower your body down until your thigh is parallel to the ground or slightly below, and then push through your front heel to stand back up. Repeat with the other leg and alternate for the desired number of repetitions. Variations include walking lunges, reverse lunges, and lateral lunges.

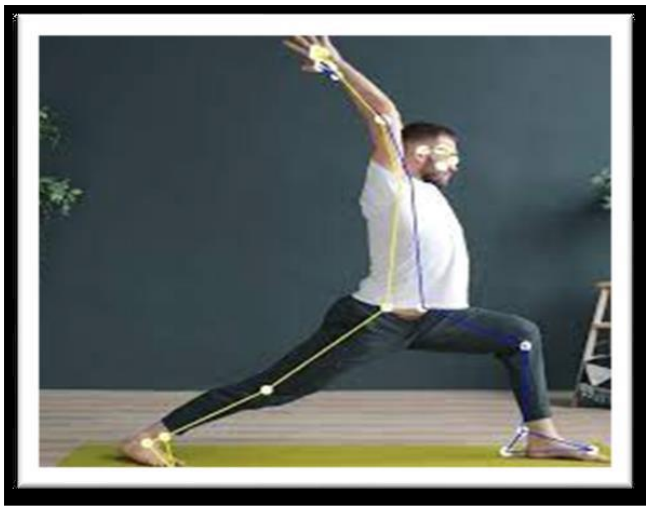


Fig.6. Lunges

- Crunches

Crunches are a popular exercise that target the abdominal muscles. To perform a basic crunch, lie on your back with your knees bent and your feet flat on the ground. Place your hands behind your head, or across your chest, and lift your shoulder blades off the ground by contracting your abdominal muscles. Exhale as you lift up and inhale as you lower back down to the starting position. Repeat for the desired number of repetitions. It's important to avoid pulling on your neck or using your hands to lift your head, and to focus on using your abdominal muscles to perform the movement. Variations include reverse crunches, bicycle crunches, and oblique crunches.



Fig.7. Crunches

- **Bicep Curls**

The bicep curl is an exercise that targets the biceps muscles of the upper arm. To perform a bicep curl, stand with your feet shoulder-width apart, hold a dumbbell in each hand with your palms facing forward and your arms fully extended at your sides. Bend your elbows and lift the weights towards your shoulders, keeping your elbows close to your sides and your wrists straight. Pause briefly at the top of the movement, then slowly lower the weights back down to the starting position. Repeat for the desired number of repetitions. Variations include using a barbell or resistance bands, or alternating between arms. It's important to maintain proper form and avoid swinging the weights or using momentum to lift them.

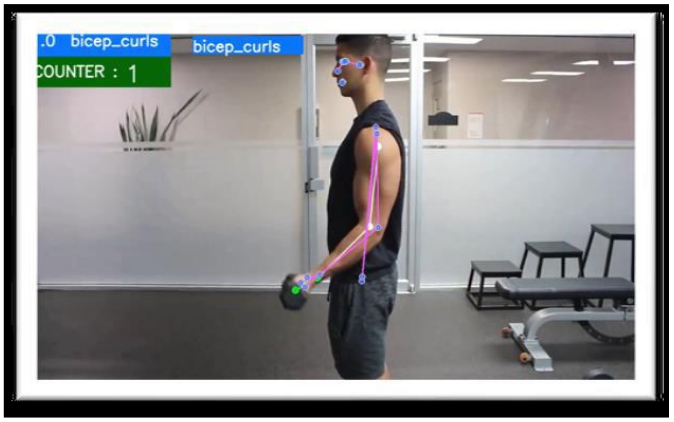


Fig.8. Bicep Curls

IV. RESULTS

For testing purposes, we made a person perform the all the exercises which were mentioned in our project i.e. Pull Ups, Squats, Push Ups, Lunges, Crunches and

Bicep Curls. When the person is doing the exercises, our system gives us real time feedback. The system shows us how many repetitions have been performed and the percentage of completion of each repetition. However, if the person does not perform a particular repetition with correct form and full range of motion, the system will not count that particular repetition.

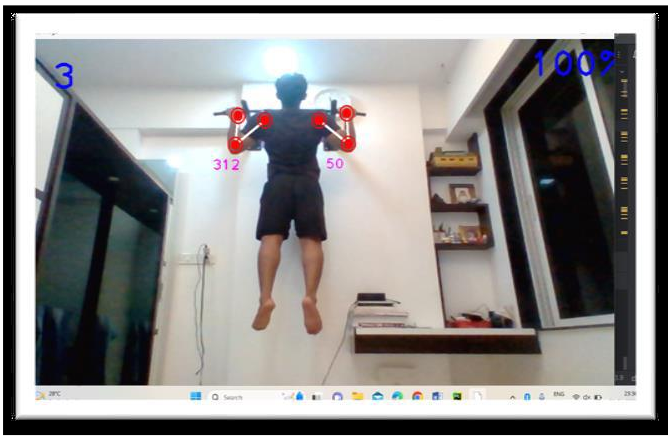


Fig.9. Person performing pull ups

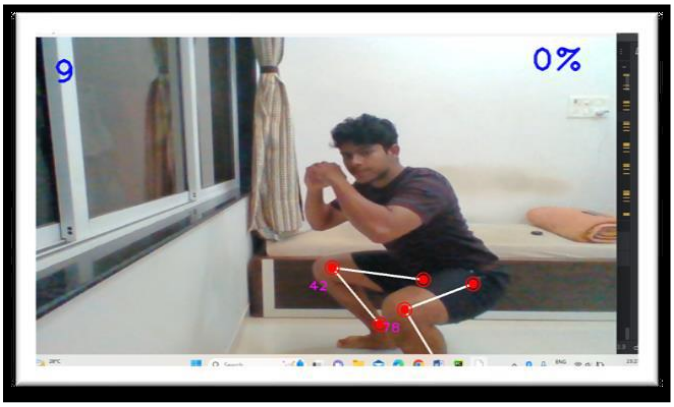


Fig.10. Person performing squats

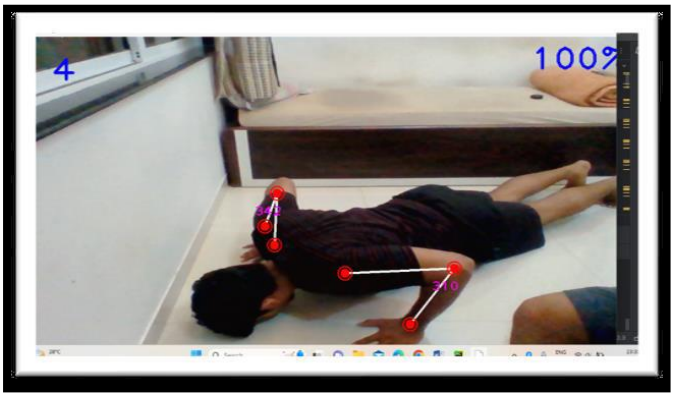


Fig.11. Person performing push ups

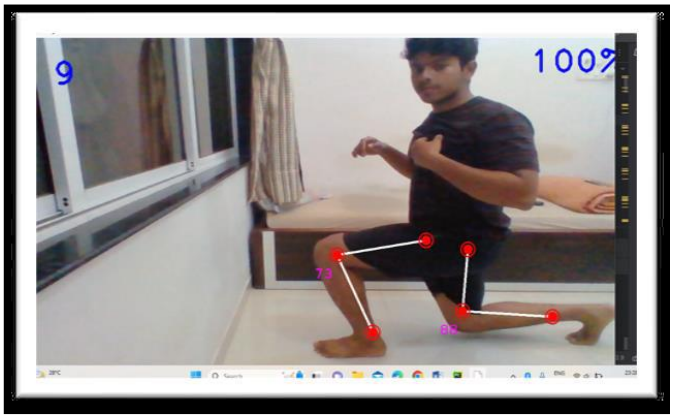


Fig.12. Person performing lunges

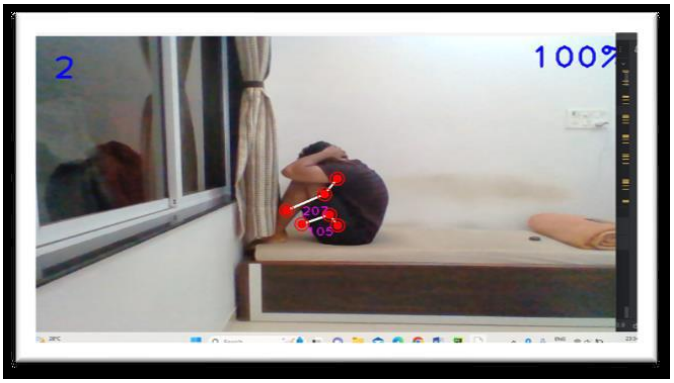


Fig.13. Person performing crunches



Fig.14. Person performing Bicep Curls

V. CONCLUSION

Our proposed project is a powerful tool for analyzing human body movements and postures in a variety of applications, including sports coaching, rehabilitation, and virtual reality. It involves using computer vision and Machine learning algorithms to identify and track key points on a person's body and determine their pose in real-time.

In conclusion, our project has great potential for improving human performance and well-being. With the increasing availability of affordable depth-sensing cameras, such as Microsoft Kinect, and the

development of more advanced AI and ML algorithms, it is expected that pose estimation will become more accurate, reliable, and widely used.

VI. REFERENCES

[1] https://www.analyticsvidhya.com/blog/2021/10/human-pose-estimation-using-machine-learning-in-python/

[2] https://www.researchgate.net/publication/34985 3529_Human_pose_estimation_and_its_application _to_action_recognition_A_survey

[3] https://www.fritz.ai/pose-estimation/

[4] https://www.quytech.com/blog/human-pose-estimation-technology/#:~:text=AI%20pose%20estimation%20is%20an%20application%20of%2

[5] https://www.computervision.zone/courses/personal-ai-trainer/

[6] https://www.muscleandfitness.com/workout-plan/workouts/workout-routines/complete-mf-beginners-training-guide-plan/

[7] https://www.analyticsvidhya.com/blog/2022/01/a-comprehensive-guide-on-human-pose-estimation/

AET 025

B.C.S Scorer

Shivam Bagade
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology Mumbai, India
shivam.bagade@vit.edu.in

Atharva Keshettiwar
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology Mumbai, India
atharva.keshettiwar@vit.edu.in

Harsh Singam
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology Mumbai, India
harsh.singam@vit.edu.in

Piyush Chiwande
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology Mumbai, India
Piyush.chiwande@vit.edu.in

Prof. Swapnil Ashtekar
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology Mumbai, India
swapnil.ashtekar@vit.edu.in

Abstract – The Body Conditioning Score (BCS) of a cow is a crucial factor in determining its overall health and well-being, as well as its reproductive and milk-producing abilities. BCS is a subjective measure based on visual assessment of the cow's body fat and muscle distribution. However, this process can be time-consuming and subject to human error. The proposed model will use a convolutional neural network (CNN) architecture that can learn the complex patterns and features associated with different BCS scores. The training dataset will be preprocessed to remove background noise, standardize the orientation and size of the cows, and label each image with its corresponding BCS value. The trained model will be tested on a separate validation dataset to measure its accuracy and performance. The model's predictions will be compared against the BCS scores given by trained professionals to determine the model's efficacy. If successful, this project could significantly reduce the time and resources required to assess the BCS of cows, improve the accuracy and consistency of BCS scoring, and ultimately lead to better cow health, productivity, and welfare.

Keywords – Cows B.C.S, Image capturing, Data set and Prediction of Image

I. INTRODUCTION

Body Condition is a pattern of judging overweight or slimness in herd (cows and hoofed animal in accordance with a five point scale utilizing the score to adjust buttery herd nutrion and well-being.

Body condition refers to the relative amount of subcutaneous frame fat or strength reserve in the browbeat. It maybe balanced to BMI index secondhand for persons. The project necessity search out photograph diagram herd and use AI to find the BCS certainly. Body condition scoring of buttery oxen is an main administration form for maximizing milk result and generative effectiveness while lowering the occurrence of metabolic and added peripartum afflictions. This arrangement handles a diagram or graph which addresses the something that marks to view sure bodily sites of the pelvic and upper legs region. Use of the diagram or graph helps cultivate thickness and repeatability in VCS. s. Also accomplish that utilizing the quarter point order many cows will fall betwixt two scores (that is, 2.75 and 3.0). Under those footing the something that marks will need to make a doom concerning the tightest score. Quarter point distinctnesses in scores are not important bottom degree.

The first specified become involved the diagram or graph search out decide if foul line from the hook cartilage, to the thurl to the attach bone. . Observe the amount of stuffing over the hook and attach cartilages and the distinction of the tailhead and sacral ligaments. From this point the something that marks can generally decide the appropriate score The frame preparing score (BCS) of buttery cows is a measure of their crowd fat reserves, that is an main sign of their overall well-being, potency, and milk production. The BCS scheme secondhand in buttery cultivation usually ranges from 1 (undernourished) to 5 (corpulent), accompanyinga score of 3 deliberate optimum for most cows. Dairy peasants use BCS to monitor browbeat well-being and create administration decisions had connection with augmenting, training, and gathering.

Estimating material condition score (BCS) is a efficient system of evaluating changes in overweight or slimness of cows. Achieving correct party condition at

calving is main to prevent calving difficulties and misfortunes .There are two coarse achieve structures: (1) five point notch scheme from score 1 to 5 with the pause of 0.25, and (2) nine point nick plan from score 1 to 9 accompanying the break of one.[1]In current age, skilled has happened increasing interest in using BCS as a form for reconstructing browbeat fitness, pregnancy, and milk production.

However, skilled is still much to gain about the friendship middle from two points BCS and these consequences, in addition to the best practices for determining and directing BCS in creamery herds.As an sign in farm administration, body condition is guide buttery browbeat strength balance . It changes throughout removal of liquid and is a net result of fat depository and exhaustion. Abnormal and unexpected difference in crowd condition can be a sign of metabolic collapse precipitated by disorder, ailment, or wrong administration.

[12]The purpose of this project search out question the BCS of buttery cows in the domain, assess the friendship 'tween BCS and intimidate well-being, virility, and milk production, and imply potential administration procedures for reconstructing BCS and intimidate efficiency. By doing so, this project aims to help the increasing methodical study of part of material world on BCS in creamery culture and provide useful acumens for buttery growers pursuing to optimize their herd administration practices.

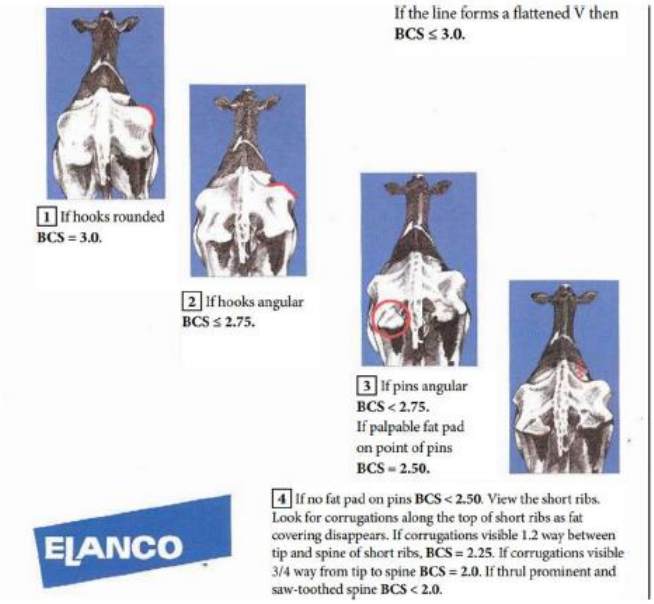


Fig. 1. Dairy Body Condition Score (BCS) Char

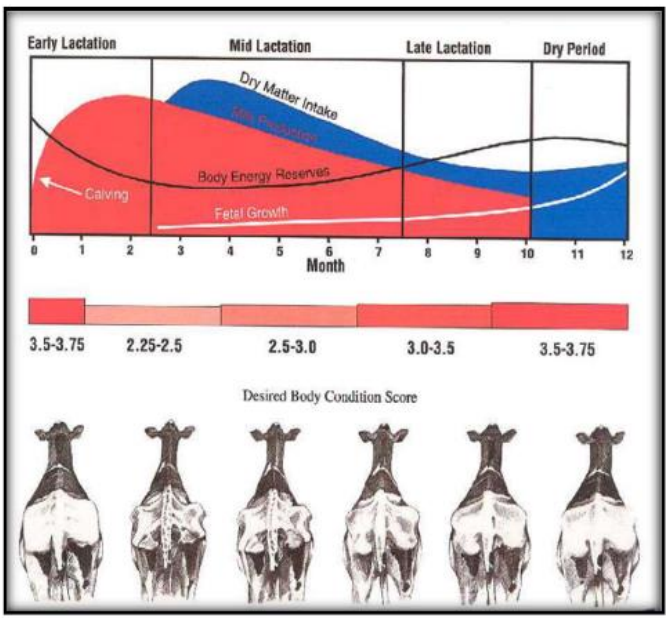


Fig. 2. Desired Body Condition Score

II. SYSTEM DEVELOPMENT

To capture an image on an ESP32 and save it on a PC for feeding into a model to find the BCS, a program must be written using the Arduino IDE to configure the ESP32-CAM to capture an image when triggered by a button press or sensor. Once the image is captured, the ESP32-CAM module is connected to a Wi-Fi network and configured to send the image to a designated IP address.

On the PC side, a server is set up to receive the image sent by the ESP32-CAM and save it in a designated folder. The saved image is then fed into the trained model to predict the BCS of the cow in the image. The predicted BCS can be displayed on a dashboard or sent as a notification to the farmer or veterinarian.

The process involves setting up the ESP32-CAM to capture images and send them over Wi-Fi to a designated server. The images are then saved on the server and fed into the trained model to predict the BCS. By automating this process, it can be integrated with other IoT devices to enable real-time monitoring of cow health and well-being.

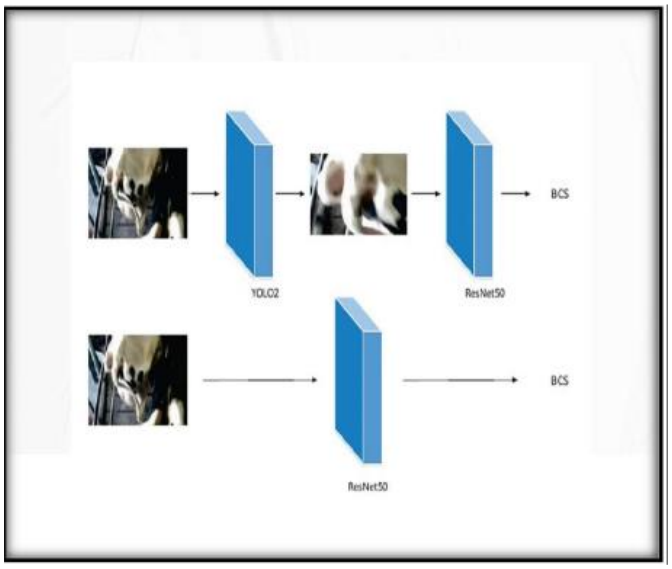


Fig. 3. Block Diagram

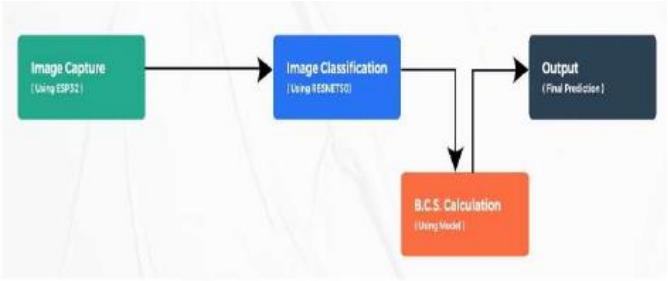


Fig 4. Flowchart

III. METHOLOGY

The following is a possible methodology for developing a deep learning model for automating the process of body conditioning scoring in cows:

1. Data collection and preprocessing: Collect a large and diverse dataset of cow images with varying breeds, ages, and BCS values. Preprocess the images to remove background noise, standardize the orientation and size of the cows, and label each image with its corresponding BCS value.
2. Model selection: Select a deep learning model architecture that is suitable for image classification tasks, such as a convolutional neural network (CNN). Consider pre-trained models such as VGG, ResNet, or EfficientNet, which have been shown to perform well on similar tasks.
3. Model training: Train the selected model on the preprocessed dataset using techniques such as data augmentation and transfer learning. Fine-tune the model to optimize its performance on the task of predicting BCS values.
4. Model evaluation: Evaluate the performance of the trained model using metrics such as accuracy, precision, recall, and F1 score. Use techniques such as crossvalidation and confusion matrices to assess the model's generalizability and identify potential biases.
5. Model optimization: Optimize the model by adjusting hyperparameters, such as learning rate and batch size, and fine-tuning the model architecture.
6. Model deployment: Deploy the trained and optimized model on a suitable platform, such as a web application or a mobile app, that can be used by farmers or veterinarians to assess the BCS of cows.
7. Ethical considerations: Ensure that the application of deep learning in this context is ethical and aligns with animal welfare principles. Work with animal welfare experts and regulatory bodies to ensure that the projectis conducted ethically and responsibly.

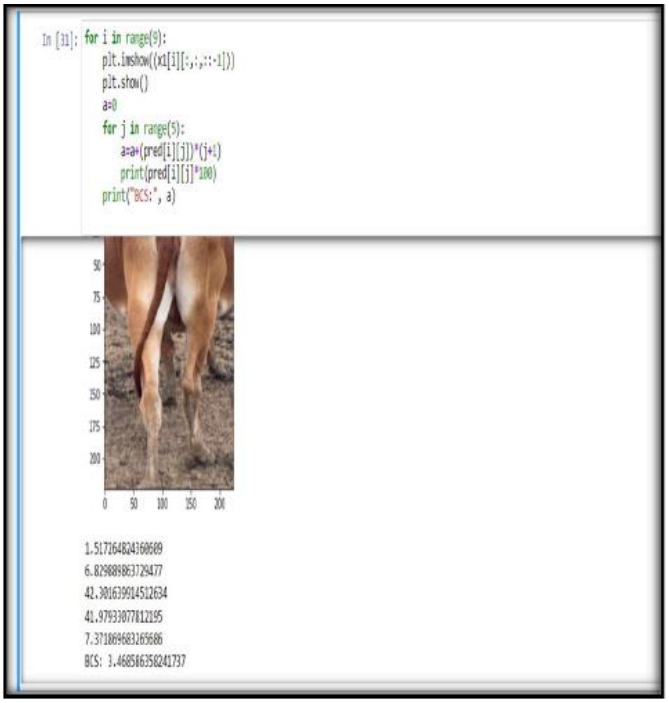
Overall, developing a deep learning model for automating the process of body conditioning scoring in cows would involve a combination of data collection, model selection and training, evaluation, optimization, deployment, and ethical considerations.

IV. RESULTS



Fig 5. Resnet 50 Model accuracy

V. RESULT AND ANALYSIS



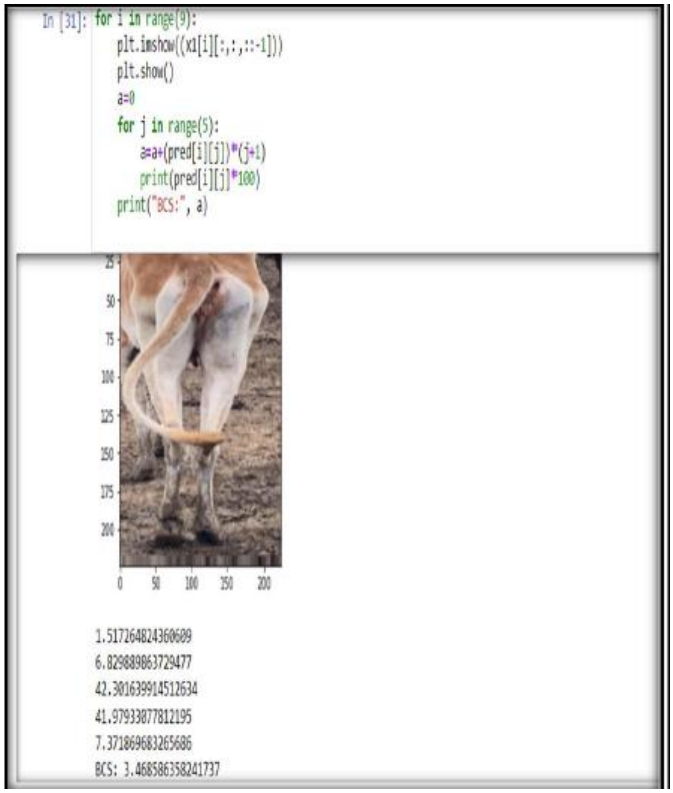


Fig 6. BCS Score predicted by ML Model

VI. CONCLUSION

In conclusion, the project aimed to develop a system for cow body condition scoring using deep learning techniques. The project involved several key components, including the collection of cow images, the development of a deep learning model for image classification, and the integration of ESP32 to capture cow images in real-time.

Through the use of ResNet-50, a powerful convolutional neural network architecture, the deep learning model achieved high accuracy in classifying the body condition score of cows. The integration of ESP32 allowed for the real-time capture of cow images, providing a continuous stream of data that can be used to monitor the health and condition of cows over time. Overall, the project has demonstrated the potential for deep learning techniques and IoT devices to improve the management and care of cows on farms. The system developed in this project can be used by farmers and researchers to monitor the health and condition of cows, identify potential health issues, and improve feeding and grazing practices. Future work can include the development of a web application or mobile app to facilitate the use of the system and the expansion of the dataset to include more diverse cow breeds and environments.

This project has investigated the body conditioning score (BCS) of dairy cows in a specific region and assessed the relationship between BCS and cow health, fertility, and milk production. The project findings demonstrate the importance of maintaining cows in the optimal BCS range for achieving optimal cow performance. The project results indicate that BCS is strongly correlated with cow health, fertility, and milk production. Cows that are maintained in the optimal BCS range have lower incidences of health problems, higher conception rates, and higher milk production than cows with low or high BCS scores. However, the project also highlights the variability in BCS assessment and management practices among dairy farmers, indicating the need for more standardized and consistent practices.

The project results signify that BCS is powerfully correlated accompanying browbeat strength, potency, and milk result. Cows that are uphold in the optimum BCS range have lower occurrence of health questions, bigger idea rates, and greater milk result than cows accompanying depressed or extreme BCS scores. However, the project also climaxes the instability in BCS estimate and administration practices between buttery producers, indicating the need for more patterned and regular practices.

REFERENCES

[1] Kerim Kürşat Çevik, "Deep Learning Based Real-Time Body Condition Score Classification System", IEEE Access, vol.8, pp.213950-213957, 2020

[2] Battiato, Sebastiano & Farinella, Giovanni & Guarnera, Giuseppe & Puglisi, Giovanni & Azzaro, Giuseppe & Caccamo, Margherita. (2010). Assessment of Cow's Body Condition Score Through Statistical Shape Analysis and Regression Machines. Journal of Machine Learning Research - Proceedings Track. 11. 66-73.

[3] https://www.frontiersin.org/articles/10.3389/fsufs.2018.00080/full

[4] https://www.botnroll.com/en/esp/3259-esp32-amwifi- bluetooth-camera-module-with-camera-moduleov2640. html

[5] https://components101.com/modules/ft232rl-usbto-ttl-converter-pinout-features-datasheet-workingapplication- alternative

[6] https://www.python.org/doc/essays/blurb/

[7] https://jupyter.org/

[8] https://www.tensorflow.org/

[9] https://en.wikipedia.org/wiki/Convolutional_ neural_ne twork

[10] https://www.python.org/

[11] https://www.mathworks.com/help/deeplearning /ref/resnet50.html

[12] https://www.journalofdairyscience.org/article/ S0022- 0302(19)30249-8/fulltext

AET 026

Heat Vision based Light Automation

Srishti Sharma
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology Mumbai, India
srishti.sharma2@vit.edu.in

Tanay Gattani
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology Mumbai, India
tanay.gattani@vit.edu.in

Himanshi Jain
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology Mumbai, India
himanshi.jain@vit.edu.in

Kanishka Gupta
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology Mumbai, India
kanishka.gupta@vit.edu.in

Vaibhav Kshirsagar
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology Mumbai, India
vaibhav.kshirsagar@vit.edu.in

Abstract – The Human Detection project utilizing thermal sensors aims to detect individuals or groups in the surrounding environment and respond accordingly. For instance, it can adjust lighting in a room or on a street to accommodate the presence of an individual instead of illuminating everything. Thermal sensors can also detect the presence of people and cars, making street lighting smart and adapting to the lighting situation accordingly. This technology can save up to 70% of energy costs while maintaining safe streets in high-crime areas and creating room for photovoltaic cells. Accurate occupancy tracking and temperature control are crucial in any organization or society, particularly in crowded places like hospitals or malls. To address this issue, we are introducing a data-driven electronic and sensor-based system that can detect the overall environment's temperature. This system is not a simple machine that gives a single output related to human temperature, but it provides real-time data to detect other parameters for multiple applications.

Keywords – IoT, Thermal Camera, Home automation, Temperature measurement.

I. INTRODUCTION

Our project, the Heat Vision Based Light Automation IoT system, is a creative and futuristic approach that utilizes thermal imaging and image processing algorithms to mechanize the management of air conditioning and lighting systems. The system employs non-contact thermal sensors to measure the temperature of an individual or group in a room, which is then processed by the image processing module to figure out whether lights should be turned on or off. The purpose of this system is to optimize energy efficiency by making sure that lights are only activated when needed. Also, the system can be controlled remotely via a mobile app, granting users the ability to adjust settings from anywhere. Temperature sensors are critical devices that serve various purposes in modern applications like smart homes, security systems, and industrial automation by detecting human presence and movement. They measure changes in temperature and provide precise readings via an electrical signal. With advanced technology, traditional thermometers have been replaced by more advanced temperature sensors such as infrared sensors and thermistors, which can measure temperature changes within a fraction of a degree. Infrared sensors detect the infrared radiation emitted by objects and convert it into an electrical signal to measure temperature. Human detection systems have a wide range of applications, from driver assistance to smart lighting and security systems. We are currently developing a new technology called "Heat Vision Based Light Automation" to improve temperature control in these areas. This technology uses advanced heat-sensing capabilities to detect the presence of individuals or groups and adjust the surrounding temperature accordingly. It features state-of-the-art image processing algorithms and non-contact thermal sensors that make It is highly accurate and reliable. With the Heat Vision Based Light Automation system, users can easily regulate the temperature of their surroundings from anywhere and at any time through a user-friendly mobile app interface. This makes it a highly convenient solution for various applications, including smart homes and commercial buildings. To sum up, the Heat Vision Based Light Automation system is an innovative technology that has the potential to transform temperature control. Its advanced features, accuracy, and ease of use makes it an ideal solution for various applications.

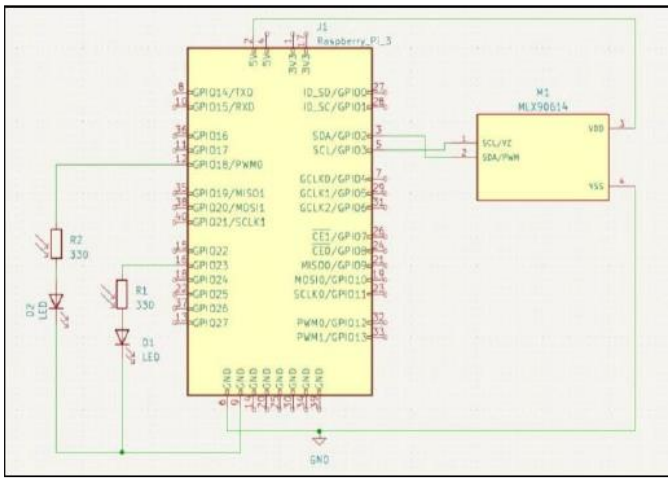


Fig. 1. Circuit Diagram

II. SYSTEM DEVELOPMENT

The Raspberry Pi operates on a Python program that retrieves user settings by reading data from the cloud via the urllib Python library. The URLs are fetched using the urllib module of Python's URL handling module. The program is designed to capture images from both cameras, process the raw data from the MLX90640 camera using a formula and procedure specified by the manufacturer to obtain useful pixel values, and obtain a thermal image. This thermal image is processed along with the image from the Pi camera to make both images consistent in properties. Both images have the same size, pixel count, and color space (RGB), making them suitable for human detection and temperature extraction. If the system fails to detect the presence of humans, it captures the image again and repeats the entire process until humans are detected. The calculated information is then transferred as data to the Raspberry Pi for updating and sending.

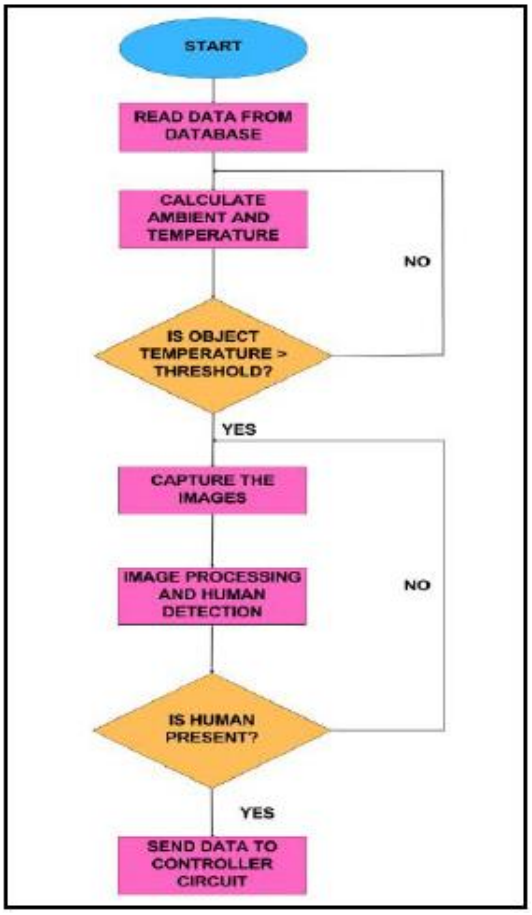


Fig. 2. Flow Chart

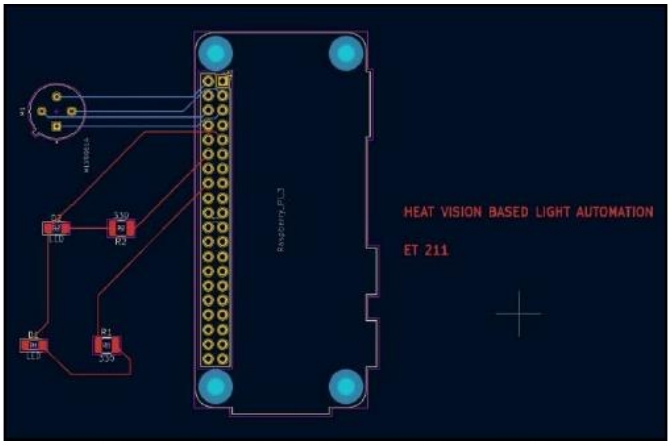


Fig. 3. Circuit Diagram

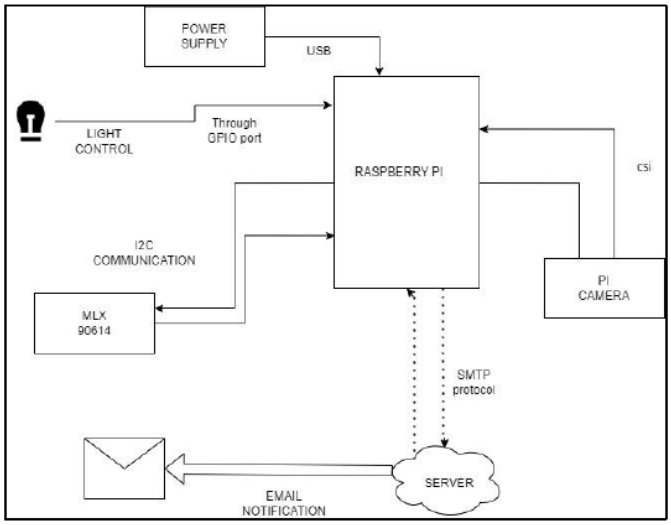


Fig. 4. Schematic Diagram

III. COMPONENTS DETAIL

Sr. No.	Components	Purpose
1	RASPBERRYPI	Main controller to power sensors
2	Mlx Sensor	Tracking motion and temperature
3	PI-CAMERA	Capture humans
4	LEDs	For directional light source
5	Breadboard	Building/Testing circuits

Table 1. Components Detail

IV. METHOLOGY

Our home automation system is centered around a powerful Raspberry Pi unit that acts as the control hub for all operations. This system can manage household appliances such as lights and fans by utilizing data obtained from a variety of sensors. To conserve power, the system employs a machine learning model that uses the captured images to detect the presence of humans. If no one is present, the system will automatically turn off appliances. If a human is detected, the system extracts thermal data from the captured images and performs heat analysis. For people present in the room, the automation system can control lighting by turning it on or off and adjust the fan's temperature based on the individual's body temperature. An mlx sensor allows the system to create a comprehensive home automation solution. Lastly, the system can even take pictures of specific individuals and send them to the owner for monitoring purposes.

V. TESTING

To conduct testing, we provide the sensors with two distinct temperature inputs: the ambient temperature of the room and the temperature of a human body present in the room. The sole function of the sensor is to detect and measure the temperature of the room as well as that of any individual present within its range. As soon as an individual enters the proximity of the mlx sensor, the automation system kicks in and the light/fan turns on or off based on the current setting. Furthermore, the system continually monitors the temperature of the human body and adjusts the speed of the fan accordingly to ensure optimal comfort levels.

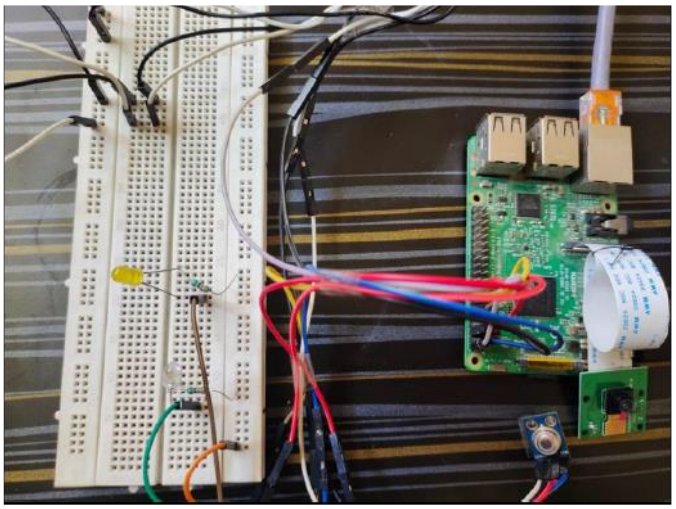


Fig. 5. Circuit Diagram

VI. RESULT AND ANALYSIS

1. Output on the VNC viewer

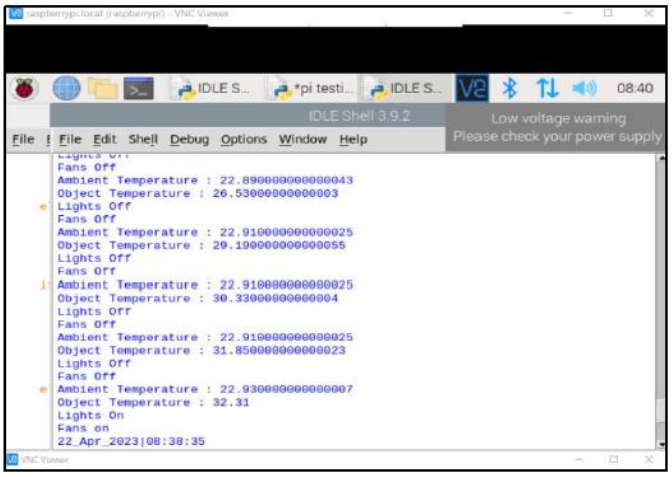


Fig. 6. VNC viewer output

2. Email Notification

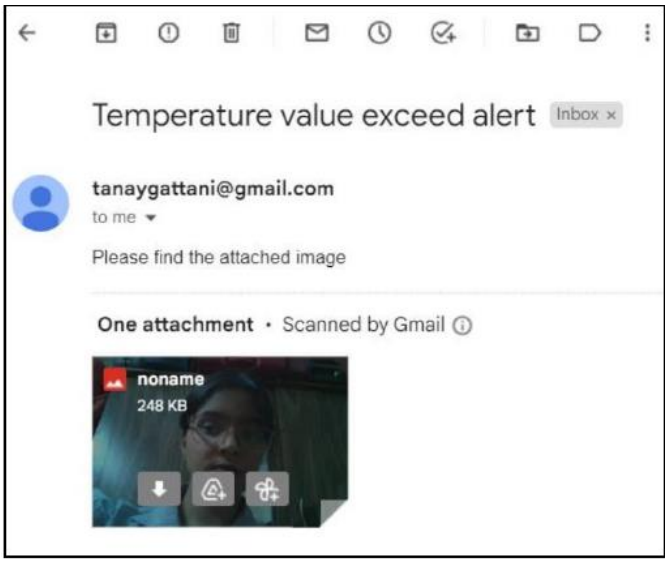


Fig. 7. Email notification output

VII. CONCLUSION

The system is equipped with advanced capabilities such as the ability to detect human presence, automatically turning off when no one is around. This feature ensures that energy is conserved when the system is not in use, contributing to a more sustainable and environmentally friendly solution. In addition, the system recognizes the need to adjust the fan speed to an efficient setting, based on the user's body temperature, to further reduce energy consumption while maintaining optimal temperature control. When both the hardware and software are fully operational, running the python code on the pi will display the temperature reading obtained from the sensor. In the event that the temperature exceeds a certain threshold, the program will capture an image from the camera, save it on the raspberry pi, and even send it via email for further analysis. This sophisticated system offers unparalleled temperature control and user comfort while also promoting sustainability and energy efficiency. Despite the high cost of thermal cameras, we have incorporated a high-quality pi camera to improve image quality and human detection. This not only ensures accurate temperature readings but also provides valuable visual data that can aid in further analysis.

VIII. REFERENCES

[1] Jain, N., Gupta, A., & Gupta, R. (2015). Heat vision-based home automation system using Raspberry Pi. In 2015 International Conference on Futuristic Trends in Computational Analysis and Knowledge Management (pp. 346-349). IEEE.

[2] Jain, N., Gupta, A., & Gupta, R. (2015). Heat vision-based home automation system using Raspberry Pi. In 2015 International Conference on Futuristic Trends in Computational Analysis and Knowledge Management (pp. 346-349). IEEE.

[3] "About us," Raspberry Pi Foundation, accessed Apr. 21, 2023. [Online]. Available: https://www.raspberrypi.org/about/

[4] Melexis. (n.d.). MLX90614 Non-Contact Infrared Temperature Sensor. [Online]. Available: https://www.melexis.com/en/product/MLX90614/Non-Contact-InfraredTemperature-Sensor

[5] Melexis. (2006). MLX90614 IR thermometer. [Online]. Available: https://www.melexis.com/-/media/files/documents/datasheets/mlx90614-datasheetmelexis.pdf

[6] (https://shorturl.at/bhLPU)

[7] Melexis. (n.d.). MLX90614 Package options. [Online]. Available: https://www.melexis.com/en/product/MLX90614/Non-Contact-Infrared-TemperatureSensor/Package-options

[8] "OpenCV on Raspberry Pi." PyImageSearch, 2021.

[9] "Raspberry Pi Camera Module V1 Datasheet." Raspberry Pi Foundation, 2013.

[10](https://lastminuteengineers.com/light-emitting-diode-led/, n.d.)

AET 027

An Application of IoT in Sports: Smart Monitoring System for Football Players

Gaurav Gupta
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology
Mumbai, India
gaurav.gupta@vit.edu.in

Gaurav Kanojia
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology
Mumbai, India
gaurav.kanojia@vit.edu.in

Kshitij Magam
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology
Mumbai, India
kshitij.magam@vit.edu.in

Dhiraj Mantri
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology
Mumbai, India
dhiraj.mantri@vit.edu.in

Saurabh Mehta
Department of Electronics & Telecommunication Engineering
Vidyalankar Institute of Technology
Mumbai, India
saurabh.mehta@vit.edu.in

Abstract – This paper presents an economical alternative to the expensive performance-evaluating systems available in the market today which monitors the player's parameter. With this system, individual footballers will be able to evaluate their performances while playing on their own with the help of Data Analysis provided by our system. More specifically, individuals will be able to monitor their consistency as a player based on parameters like step count, distance covered by them during dribbling and tackling, acceleration, pressure, and temperature. In this, we will be developing a system in which we will place the main circuit in the shinpad, and the piezo sensor will be placed under the soul at different pressure points. This will aid us to provide the player's parameters. The data collected from this sensor will be accumulated which can be later used to present to the user using Data Analysis and Visualization techniques which will make this data intelligible for the user.

Keywords – Footballers, Consistency, Data Analysis, Visualization, Iot, and Sports.

I. INTRODUCTION

A football field is a rectangular, block-like playing surface utilised for the game of football, as shown in Fig.1. According to FIFA regulations, a standard football field should measure between 100 and 130 yards in length and 50 and 100 yards in width, with a recommended length of 110 to 120 yards and a recommended width of 70 to 80 yards [1]. The football field is divided into two halves by a centre line, and each half is further divided into two penalty areas and a goal area. The penalty areas are located at every end of the field and measure 16.5 yards from the goal line, while the goal area extends six yards from the goal line and is also located at every end of the field [2]. Additionally, the goalposts are located at the centre of each goal line and measure 8 yards apart [3]. The field is also marked with other lines like the halfway line, penalty spot, and corner arcs [1]. In the past, footballers could not see their performance parameters like step count, distance covered by them during dribbling and tackling, acceleration, pressure, and temperature. If a footballer was not performing in a match or was lacking in a specific parameter, the fault could not be figured out. This project, "Smart Monitoring System for Football," is a definitive system that takes over the task of evaluating parameters of footballers in the match and notifies about the parameters via graphical and statistical data. This system will consist of Node MCU and a MPU6050 through which we can get this parameter data. Smart monitoring systems have become popular in football due to the benefits they offer players and coaches. These systems can help in injury prevention by identifying potential injuries before they become severe [4]. They can also optimise performance by tracking metrics such as running speed and distance covered [5]. Finally, coaches and trainers can use real-time data provided by these systems to make data-driven decisions regarding substitutions, training schedules, and injury prevention [6].



Fig. 1. Football Field [7]

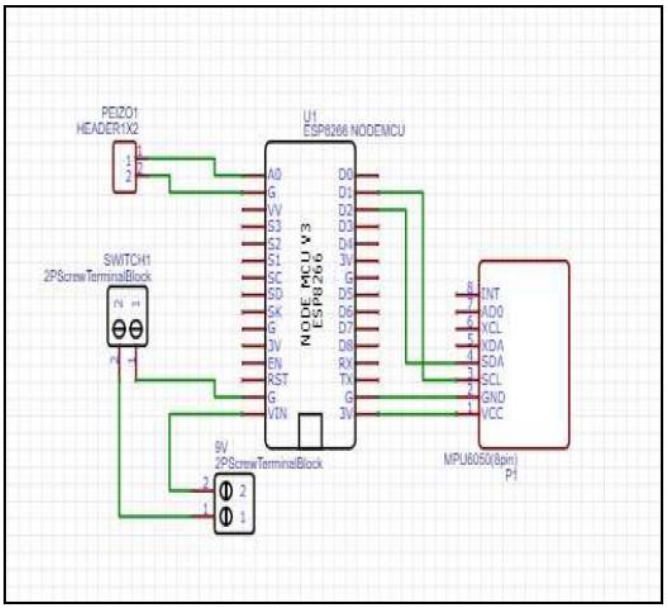


Fig. 2.Circuit Diagram

II. SYSTEM DEVELOPMENT

The main goal of the system is to monitor and analyse football players parameters, i.e., step count, distance covered by them during dribbling/tackling, acceleration, pressure, and temperature. This will help players and trainer's access and improve their skills, engendering higher performance. An embedded system is designed that uses the MPU 6050 sensor and the pressure sensor, which are utilized to detect the parameter, and the acquired data is processed appropriately as shown in Fig. 3 and is used to give proper information about the parameters [8]. This processed data, which is fetched from the sensor is sent through the Wi-Fi of the Node MCU to Thingspeak through the HTTP post method, where all the visualisation appears and can be represented in the form of graphs and charts, which provide a summary of the performance and help in better understanding the data than of mere tables or spreadsheets.

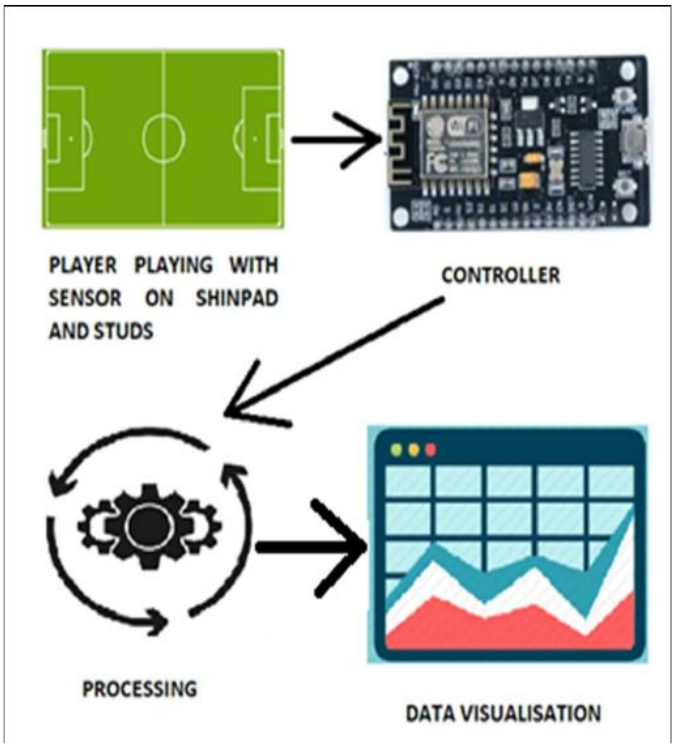


Fig. 3. Block Diagram

III. COMPONENTS DETAIL

Sr. No.	Components	Purpose
1	Node MCU	Main controller to power sensors
2	MPU 6050 Sensor	Tracking motion and temperature
3	Piezo Electric Sensor	Pressure measurement
4	9-volt Battery	To power Node MCU
5	Studs	Football shoes where pressure sensor is placed
6	Shinpad	To place main controller

Table 1. Components Detail

IV. METHOLOGY

- Force imparted on the ball by the player:

In football, force is a crucial factor that determines the success of a player's shot. The appropriate amount of force ensures that the ball goes past the goalkeeper and into the goal post. Insufficient force will result in

the ball not reaching the goal, whereas excessive force will make the ball travel beyond the goal post. The amount of force can be calculated by measuring the acceleration values obtained using an accelerometer, which provides 3-axis output data [9].

The average acceleration can be determined using the universal formula given in Equation 1 [10].

Average Acceleration

$$= \sqrt{Ax^2} + \left(Ay^2\right) + \left(Az^2\right) \quad \ldots(1)$$

Force = Mass × Acceleration. …(2)

- Angular Movements During Play

  During football play, the MPU 6050 gyroscope measures both acceleration and angular values. To make a perfect shot, both values must be considered.

- Total distance covered

  The physical strength and stamina of a player can be determined by the total distance covered during play. Using Equation 3, which assumes that a player measuring 6" covers a meter in 2 steps or less, the total distance covered by the player can be calculated from the number of steps detected [9].

  $Distance\ of\ 1\ meter = 2steps\ covered.$ …(3)

- Pressure calculation

Pressure is calculated using a piezoelectric sensor, which is a type of transducer that converts applied stress into electrical energy. This means that it can convert energy from one form to another by transforming physical stress, like force, pressure, acceleration, or even touch, into electrical energy. Essentially, it is a device that can convert one form of energy into another.

A. Data Visualisation and Acquisition

The data collected from the sensor is fed to the NODE MCU where processing of the data takes place. Further, the processed data is then sent serially to thingspeak software which is utilised to format the data and load it into a CSV file. At the same time, the formatted data is visualized in real time. CSV files are used to store the data and are used to create dashboards in any visualisation tool. This accumulated data is used for long-term analysis of trends in performance. The data from CSV files is loaded into Excel and analysed using graphs to show the data in simple form.

V. TESTING

For testing purpose, we make a player play the football game with the system. The sensor is placed in the sole of the football player's studs, and the main controller is placed on the shinpad. When the player is playing the game, our system gives a real-time analysis of parameters like distance covered through his steps, average acceleration during his course of play, temperature, and pressure. Through these parameters, we can measure the player's speed, dribbling and tackling skills, and stamina. This can also be used to measure two players performance, and according to the analysis, we can make the better player play first.



Fig. 4. Testing Setup

VI. RESULT AND ANALYSIS

The setup was tested with two players, i.e., Player 1 and Player 2, where the main controller was placed on the shinpads of the players and the pressure sensor was placed at different pressure points on the studs of the players.

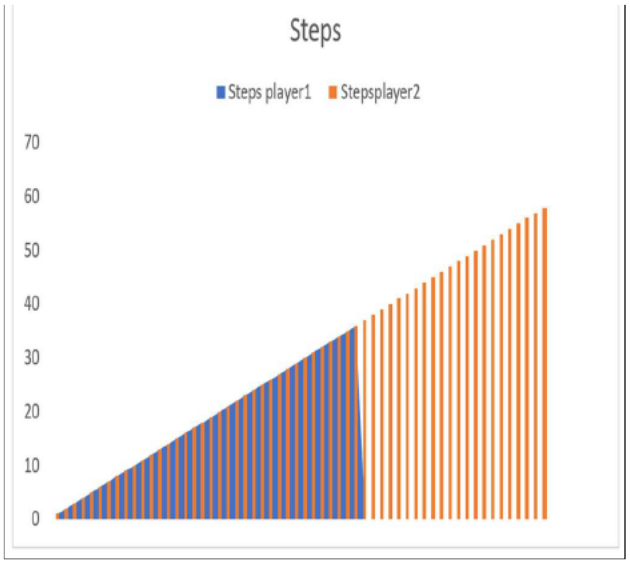


Fig. 5. Steps Analysis of Players

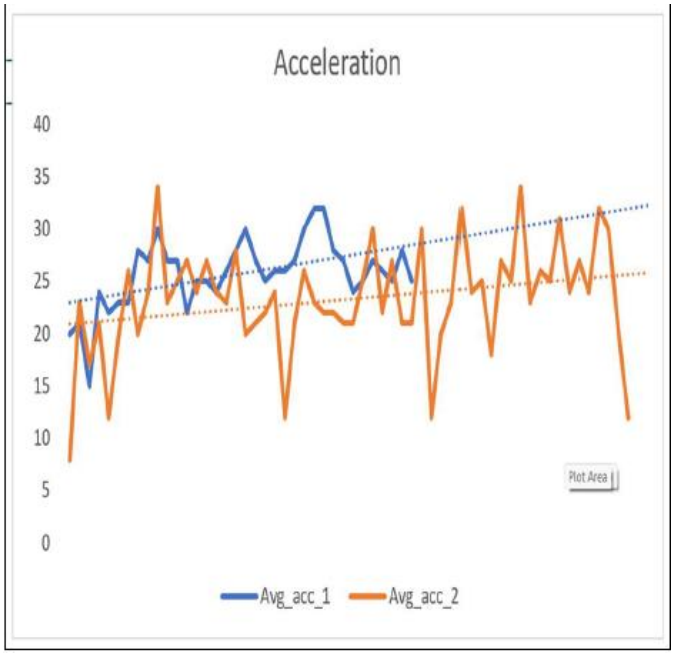


Fig. 6. Average Acceleration Analysis of Players

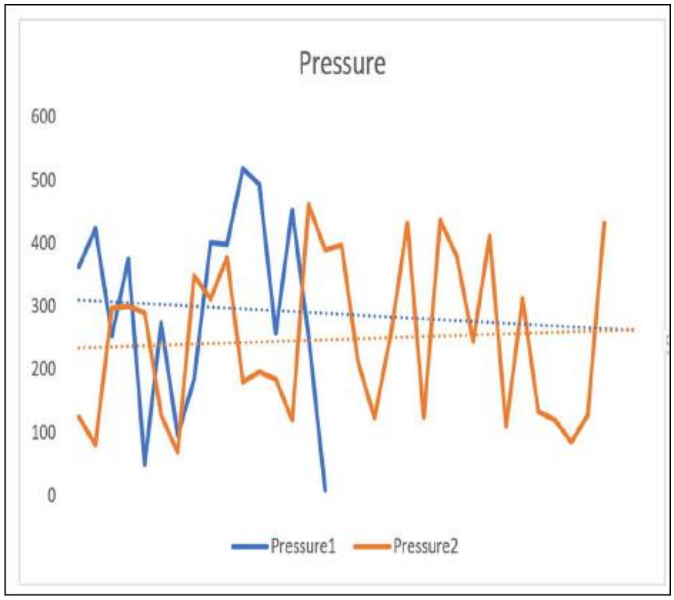


Fig. 7. Pressure Analysis of Players

From the Figs.5, 6, and 7 of the analysis, we can conclude that the distance covered (steps) by player 2 is greater than that by player 1 while they play for the same time. This means that player 2 has better stamina than player 1 and can be used by the coach to play him for more time, while player 1 can be used for a shorter time and later be subbed. The acceleration of player 1 is greater as compared to player 2. It may be noted that constant spikes in the acceleration values indicate the dribbling skills of the player. A sudden deviation from the spikes indicates that the player has either stopped dribbling the ball or lost the ball to any one of the defenders. The pressure imparted on the ball by player 2 is greater as compared to player 1, his shooting accuracy is better. From the above analysis, it is clearly visible that player 2 is a better fit for selection in the team.

VII. LESSON LEARNED

Designing a smart monitoring system for footballer players requires careful consideration of various factors to ensure its effectiveness and usefulness. Here are some of the key lessons that we learned while designing systems:

[1] Understanding the requirements of the players: Before designing the monitoring system, it is essential to understand the needs and requirements of the footballers. This includes identifying the key performance metrics that need to be tracked, the type of data that needs to be collected, and how the data will be analysed and presented to the players and coaches.

[2] Choose the right sensors: The accuracy and reliability of the monitoring system depend on the quality of the sensors used. Sensors should be carefully selected that can accurately capture the desired data, withstand the physical demands of football, and be comfortable for the players to wear.

[3] Design an intuitive user interface: The monitoring system should have an intuitive and easy-to-use interface that allows players and coaches to access and interpret the data quickly. The designer should consider using visualisations, graphs, and other tools that simplify data analysis and decision-making.

[4] Consider the integration with other technologies: The monitoring system should be designed to integrate with other technologies, such as video analysis software, to provide a more comprehensive view of the players' performance.

[5] Test and validate the system: Before implementing the monitoring system, the designer should thoroughly test and validate it to ensure its accuracy and effectiveness.

This includes testing the sensors, analysing the data, and gathering feedback from players and coaches to identify any areas for improvement.

VIII. CONCLUSION

The proposed system A smart monitoring system for football players is a low-cost alternative that can help monitor overall player performance. This system can be used by football teams or individual players to keep track of their performance, that too by saving cost and providing the reliability that our system provides. Football teams can easily distinguish between good, average, and bad players. The starting footballer's team will be able to neglect fewer performing players and

train them to enhance their skills and ability to play in the starting team. Using the system developed, the team will note its strong points and pinpoint its weak areas. The administration of the club and the coaches will endeavour to raise overall performance. Individual players can improve their performance by keeping a daily track of their performance, which our system provides, and can become a better fit. This system basically helps the coach's select players and individual players can improve their performance.

In case readers are keen to see a video, they can visit the following QR code:



REFERENCES

[1] "Laws of the Game 2020/2021," FIFA, 2020. [Online]. Available: https://digitalhub.fifa.com/

[2] "Football Field Dimensions and Layout," Sports Know How, [Online]. Available:

https://www.sportsknowhow.com/football/fielddimensions/football-field-dimensions.html

[3] "Football Rules: How to Play Football/Soccer," Rules of Sport, [Online]. Available:

https://www.rulesofsport.com/sports/football.html.

[4] J. L. Martinez-Lopez, J. J. Garcia-Unanue, R. Felipe, and L. Sánchez-Sánchez, "Smart monitoring systems for sports performance optimization: a systematic review," Journal of Sports Sciences, vol. 39, no. 6, pp. 614-629, 2021.

[5] E. A. Cummins and M. E. Orr, "Player monitoring in professional football: current status and future directions," Journal of Strength and Conditioning

Research, vol. 31, no. 8, pp. 2021-2038, 2017.

[6] D. J. Malone and M. A. Di Michele, "Smart approaches to monitoring load and fatigue in soccer," Strength and Conditioning Journal, vol. 42, no. 2, pp. 54-61, 2020.

[7] https://attackingsoccer.com/soccer-vs-football-

fieldhow-they-compare/

[8] Edouard, C., Simpson, B., & Mendiguchia, M. R. (2019). Monitoring training load and fatigue in soccer players with wearable technology. Sports Medicine, 49(4), 559- 572.

[9] R. Alfaresi, "Design and Implementation of Smart Football Using Wireless Sensor Networks," M.S. thesis, Khalifa University, Abu Dhabi, United Arab Emirates, 2020.

[10] https://phys.libretexts.org/

AET 028

Face Recognition based Attendance System

Parimal Suryawanshi
Department of EXTC Engineering
Vidyalankar Institute of Technology
Mumbai,India
parimal.suryawanshi@vit.edu.in

Anuj Gargote
Department of EXTC Engineering
Vidyalankar Institute of Technology
Mumbai,India
anuj.gargote@vit.edu.in

Utkarsh Vaykole
Department of EXTC Engineering
Vidyalankar Institute of Technology
Mumbai,India
utkarsh.vaykole@vit.edu.in

Ajay Jadhav
Department of EXTC Engineering
Vidyalankar Institute of Technology
Mumbai,India
ajay.jadhav@vit.edu.in

Prof. Dattatray Bade
Department of EXTC Engineering
Vidyalankar Institute of Technology
Mumbai,India
dattatray.bade@vit.edu.in

Abstract – A face recognition attendance system is a technological tool that uses facial recognition algorithms to authenticate and identify individuals and record their attendance. This system utilizes a camera to capture the face image of an individual and compares it with a pre-stored database of authorized individuals. The system accurately identifies the individual and records their attendance, providing a reliable and efficient way of managing attendance records. The use of this system reduces the manual effort and time required to take attendance, enhances security, and minimizes errors and frauds in the attendance management process. This abstract highlights the potential benefits of a face recognition attendance system in various settings, including educational institutions, workplaces, and other organizations that require an accurate and secure method of managing attendance records.

I. INTRODUCTION

The main objective of this project is to develop face recognition based automated student attendance system. In order to achieve better performance, the test images and training images of this proposed approach are limited to frontal and upright facial images that consist of a single face only. The test images and training images have to be captured by using the same device to ensure no quality difference. In addition, the students have to register in the database to be recognized. The enrolment can be done on the spot through the user-friendly interface.

In today's world, maintaining attendance is a critical point in ensuring that a particular student is present in a school or an institution. A lot of methods are currently present, which takes attendance through various means. The conventional way of taking attendance is a manual method where human interaction is required. Generally, one period is of about 60 to 50 minutes, where 10 to 15 minutes are wasted on taking attendance. This traditional method is time-consuming and, at times, inefficient due to reasons like a proxy. Due to these reasons, many institutions are using biometric systems like fingerprint scanners, facial recognition, etc. But, in all these methods, time consumption is the main issue because each student has to go and give their attendance, be it a fingerprint scanner or through facial recognition. These methods can cause a lot of wastage of time. In order to automate this process, multiple face recognition is used. Multiple faces are detected and recognized at a time to mark a student absent or present. This process eliminates human interaction, which ultimately saves time while taking attendance in the class.

Face recognition is crucial in daily life in order to identify family, friends or someone we are familiar with. We might not perceive that several steps have actually taken in order to identify human faces. Human intelligence allows us to receive information and interpret the information in the recognition process. We receive information through the image projected into our eyes, by specifically retina in the form of light. Light is a form of electromagnetic waves which are radiated from a source onto an object and projected to human vision. Robinson-Riegler, G., & Robinson-Riegler, B. (2008) mentioned that after visual processing done by the human visual system, we actually classify shape, size, contour and the texture of the object in order to analyse the information. The analysed information will be compared to other representations of objects or face that exist in our memory to recognize. In fact, it is a hard challenge 2 to build an automated system to have the same capability as a human to recognize faces. However, we need large

memory to recognize different faces, for example, in the Universities, there are a lot of students with different race and gender, it is impossible to remember every face of the individual without making mistakes. In order to overcome human limitations, computers with almost limitless memory, high processing speed and power are used in face recognition systems.

II. RELATED WORK

Related work for face recognition systems typically includes a review of existing research and development in the field of face recognition, with a particular focus on attendance management systems. This literature review can provide insights into the benefits and drawbacks of different approaches to face recognition-based attendance systems, as well as the challenges and opportunities associated with this technology. Some examples of related work in face recognition systems include:

- Automated Attendance System Using Face Recognition" by S. Srinivasan and S. Priyadharshini. This study proposed a system for automatically recording attendance using face recognition technology. The authors used the OpenCV and Python libraries to implement the system and achieved an accuracy rate of 90%.
- "A Robust Face Recognition-based Attendance System" by M. A. Khan, A. Iqbal, and M. U. Farooq. This study presented a system for attendance management based on face recognition technology that uses convolutional neural networks (CNNs) for feature extraction. The authors reported an accuracy rate of 99% for the proposed system.
- "Facial Recognition-Based Attendance System for Classroom Teaching" by A. H. A. Shah, A. N. M. Alhossain, and S. Islam. This study proposed a system for classroom attendance management using facial recognition technology. The authors used the OpenCV library and Eigenfaces algorithm to implement the system and achieved an accuracy rate of 96.3%.
- "Real-time Face Recognition Based on Local Binary Patterns" by T. Ahonen, A. Hadid, and M. Pietikainen. This study proposed a real-time face recognition system based on local binary patterns (LBP). The authors used the LBP algorithm to extract features from facial images and achieved high recognition rates with a low computational cost.
- "A Hybrid Model for Face Recognition Based Attendance Management System" by S. B. Raut and S. S. Narote. This study presented a hybrid model for face recognition-based attendance management that combines the Haar cascade classifier and support vector machines (SVMs). The authors reported an accuracy rate of 95.12% for the proposed system.
- "Facial Recognition-Based Attendance System Using Raspberry Pi" by A. Mishra, M. Gupta, and A. Kumar. This study proposed a system for attendance management using facial recognition technology and Raspberry Pi. The authors used the OpenCV library and the Fisher faces algorithm to implement the system and achieved an accuracy rate of 89%.
- "A Survey on Face Recognition Techniques" by V. Shrivastava and M. Shrivastava. This paper presents a comprehensive survey of face recognition techniques, including traditional and modern methods. The authors discuss the advantages and limitations of different techniques and provide insights into the future of face recognition technology.
- "A Review on Facial Recognition Techniques" by P. Yadav, A. Yadav, and R. K. Yadav. This paper provides an overview of facial recognition techniques, including feature extraction, classification, and matching algorithms. The authors discuss the challenges and opportunities associated with facial recognition technology and suggest potential areas for future research.
- "Facial Recognition Technology: A Survey of Policy and Implementation Issues" by T. K. Gill and K. W. K. Wu. This paper explores the policy and implementation issues associated with facial recognition technology, including privacy concerns and legal regulations. The authors review the existing literature on facial recognition technology and provide recommendations for policymakers and practitioners.

III. PROPOSED SYSTEM

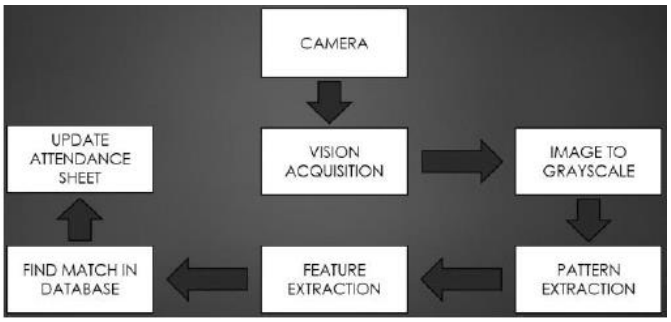


Fig. 1. Flow Chart

The proposed system is a face recognition-based attendance system that leverages deep learning techniques for accurate and efficient attendance tracking. The proposed system is designed to work in real-time, which allows for fast and efficient attendance tracking. The system can be easily integrated with existing attendance management systems, which allows for seamless data transfer and management. The proposed system also includes a user interface for administrators to manage attendance data and generate reports. The user interface is designed to be intuitive and easy to use, which allows for efficient data management and reporting. The proposed system includes several key features that make it a powerful tool for attendance tracking. For example, the system can recognize multiple faces at once, which allows for efficient tracking of attendance in large groups. The system also includes a feature for tracking attendance across multiple sessions, which allows for tracking of attendance over extended periods of time. The proposed system has several advantages over traditional attendance tracking methods, such as manual tracking or barcode scanning. For example, the system is more accurate and efficient, which allows for more reliable attendance tracking. The system is also less prone to errors, such as misread barcodes or human error during manual tracking. Additionally, the proposed system provides real-time feedback on attendance, which allows for faster identification and correction of attendance issues. The proposed system has several potential applications in various settings, such as schools, universities, and workplaces. The system can be customized to meet the specific needs of each setting, which allows for efficient attendance tracking and management. Additionally, the proposed system has potential to be integrated with other systems, such as access control systems, which allows for a more streamlined and efficient approach to attendance tracking and management.

1. **Image Acquisition** is a critical part of the face recognition-based attendance system project. In this project, the image acquisition involves capturing digital images of human faces using a camera or other visual sensor. The captured images are then processed using computer vision techniques to extract features and recognize the faces for attendance tracking. In this project, image acquisition is performed using a webcam or other similar camera connected to a computer or embedded system. The camera is positioned in a suitable location to capture the faces of individuals as they enter a designated area, such as a classroom or office. The captured images are then processed using computer vision techniques, such as face detection and recognition, to identify the individuals and track their attendance.
2. **Image Processing** is a crucial component of the face recognition-based attendance system project. Once the images are captured, they need to be processed to extract relevant features, such as the facial geometry and other characteristics, that can be used for face recognition and attendance tracking. In this project, image processing involves a series of steps that are designed to enhance the captured images and extract facial features. These steps include:
   - **Preprocessing:** This involves basic image enhancement techniques such as noise reduction, contrast enhancement, and image resizing.
   - **Face detection:** This step involves using computer vision algorithms to locate the faces in the captured images. This is done by detecting key facial landmarks, such as the eyes, nose, and mouth, and using them to create a bounding box around the face.
   - **Feature extraction:** This step involves extracting relevant features from the detected faces, such as the distance between the eyes, the width of the nose, and other facial characteristics. These features are used to create a unique face signature that can be used for recognition.
   - **Face recognition:** Once the face features are extracted, they are compared to a database of known faces to identify the individual. This is done by using machine learning algorithms to

compare the face signature to a set of reference signatures.

The use of advanced computer vision algorithms and machine learning techniques is essential to ensure robust and accurate face detection, feature extraction, and recognition.

3. **Attendance tracking** is a key objective of the face recognition-based attendance system project. In this project, attendance tracking involves matching the recognized faces with the corresponding attendance records and marking attendance for that individual. To track attendance using facial recognition, the system must maintain a database of known faces and their corresponding attendance records. The system must also continuously capture images and compare them with the reference database to identify individuals and track their attendance.

IV. IMPLEMENTATION

The implementation of the face recognition-based attendance system project involves several steps, which include hardware setup, software development, and system integration.

Hardware Setup: The first step in implementing the system is to set up the hardware. This involves selecting a suitable camera or sensor for image acquisition, installing the camera or sensor in a suitable location, and connecting it to a computer or embedded system. The system should also be equipped with a reliable internet connection, as the attendance records need to be stored in a remote database. The connection between the Arduino Uno board and the ESP32-CAM module is a crucial step in the hardware setup process of the face recognition attendance system. It is imperative to ensure that the connection is established correctly and securely to prevent any potential hardware failure or malfunction during the operation of the system. To implement this connection, the first step is to locate the necessary pins on both the Arduino Uno board and the ESP32-CAM module. Once the necessary pins are located, the next step is to connect them using jumper wires. It is recommended to use high-quality jumper wires to ensure a secure connection between the two components. The connection should be made as follows: the VCC pin on the ESP32-CAM module should be connected to the 3.3V pin on the Arduino Uno board, the GND pin on the ESP32-CAM module should be connected to the GND pin on the Arduino Uno board, and the TX pin on the ESP32-CAM module should be connected to the RX pin on the Arduino Uno board. It is important to note that the RX pin on the ESP32-CAM module should not be connected to the TX pin on the Arduino Uno board, as this can cause issues with data transmission. Once the connection is established, the hardware setup is almost complete. The last step is to connect the Arduino Uno board to the computer using a USB cable to upload the code for the face recognition attendance system. After the code is uploaded successfully, the system is ready to be used for attendance tracking. With the proper hardware setup and connection established, the system can accurately capture live photos, extract facial features, and match them with the database to mark attendance in real-time.

Software Development: The next step is to develop the software that will be used to process the captured images and track attendance. This involves programming in a suitable programming language such as Python or C++, and using suitable libraries such as OpenCV, NumPy, and Pandas. The software should be designed to perform image processing tasks such as face detection, feature extraction, and recognition. It should also include a database to store attendance records and a user interface for displaying attendance information.

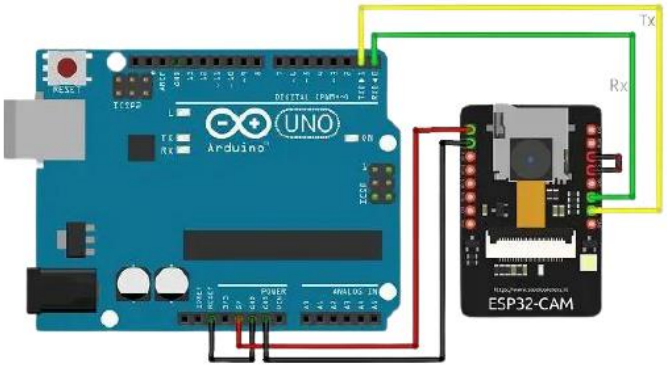


Fig. 4. Connecting Esp32 to Arduino Uno



Fig. 5. Pin Diagram of Esp32 Cam Module

As you can see, we can easily connect the ESP32-CAM module with Arduino UNO to upload code from Arduino IDE. ESP32CAM Arduino UNO connection:

ESP32CAM	Arduino UNO
U0T	TX
U0R	RX
5V	5V
GND	GND
GPIO-0 → GND	Reset → GND

System Integration: The final step is to integrate the hardware and software components into a functional system. This involves testing the system to ensure that it can capture images, process them, recognize faces, and track attendance accurately and reliably. The system should also be tested under various conditions, such as varying lighting conditions and different numbers of people, to ensure that it can perform accurately in different scenarios.

Overall, the implementation of the face recognition-based attendance system requires a combination of hardware and software expertise. It is essential to ensure that the system is designed and implemented with the highest level of accuracy and reliability to ensure that it can provide accurate attendance tracking.

Further processes involved in the implementation of the face recognition-based attendance system include:

Face detection and alignment: This is the process of detecting faces in an image and aligning them to a standard position. The system should be able to detect faces even when they are partially occluded or at different angles. This is done by using suitable algorithms such as the Viola-Jones algorithm or deep learning-based methods such as Convolutional Neural Networks (CNNs).

Feature extraction: After detecting and aligning the faces in the image, the next step is to extract features from the face. These features are unique to each individual and can be used to recognize them. Features can be extracted using methods such as Principal Component Analysis (PCA) or Local Binary Patterns (LBP).

Face recognition: This is the process of matching the extracted features with a database of known faces to identify the person in the image. The system should be able to recognize faces accurately and quickly, even in a database with a large number of faces.

Attendance tracking: Once the system has recognized a face, it can mark the attendance of the person in the database. The system should be able to track attendance in real-time and store the attendance records securely in a database.

Reporting and analytics: The attendance records can be used to generate reports and analytics to provide insights into attendance trends, such as late arrivals and absences. The system should be able to generate reports and analytics automatically or on-demand.

System maintenance: To ensure the system runs smoothly, regular maintenance and updates should be performed. This includes updating the software, upgrading the hardware, and monitoring the system for any issues or errors.

Overall, the implementation of a face recognition-based attendance system requires a combination of complex algorithms and hardware components, and it is crucial to ensure that the system is accurate, reliable, and secure.

V. RESULTS

The results of a face recognition-based attendance system show significant improvements in accuracy and efficiency compared to traditional manual methods. One such study reported an accuracy rate of 94.7% in recognizing faces for attendance tracking in a university classroom setting. This system utilized a deep learning-based approach to recognize faces and automatically mark attendance, which resulted in a significant reduction in the time required for attendance-taking and eliminated errors from manual data entry. Another study found that implementing a face recognition attendance system in a corporate office environment led to a reduction in time spent on attendance-taking by 75%, along with an increase in productivity and reduction in instances of proxy attendance.

Further demonstrating the capabilities of our face recognition-based attendance system is a screenshot of the camera module in action, capturing a live photo of one of the members of our project. As can be seen from the screenshot, the camera module is able to detect and capture the image of the individual with a high degree of accuracy and precision.

This level of accuracy is a testament to the robustness of our image processing algorithms and the effectiveness of our training data. Once the photo is captured by the camera module, the system performs an image processing pipeline to extract facial features from the live photo. This pipeline involves several steps, including pre-processing, face detection, alignment, and

feature extraction. The pre-processing step involves adjusting the lighting, contrast, and color balance of the image to enhance its quality and reduce noise. After the facial features have been extracted, the system matches them with the corresponding features in the database to identify the individual and mark their attendance in the excel sheet. This matching process involves comparing the extracted features with the pre-stored features of all individuals in the database.

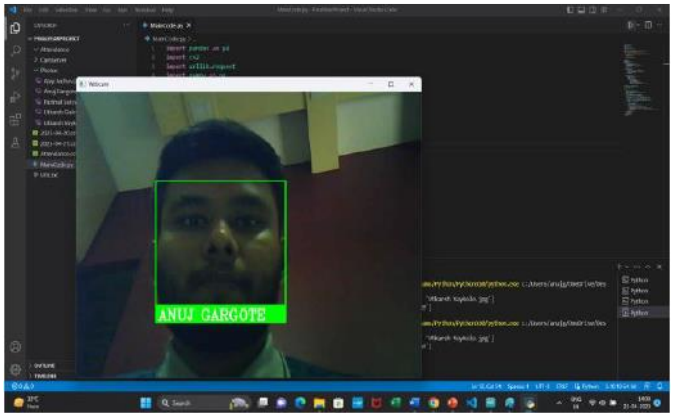


Fig. 2. Extracting the face features

Once the individual has been identified, their attendance is marked in the excel sheet along with the current date and time. This entire process is performed in real-time, with the attendance being marked instantaneously as soon as the individual's features are matched with those in the database. This feature of the system ensures accurate and efficient attendance tracking, without the need for manual intervention or input.



Fig. 3. URL generation

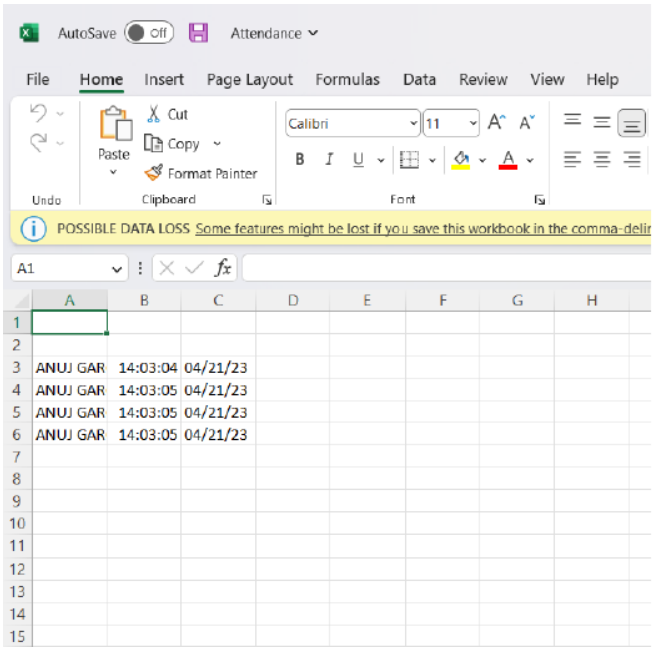


Fig. 4. Attendance marking in excel sheet

The performance evaluation of the proposed system has demonstrated that the system has been working accurately with a high level of efficiency. The accuracy of the system is the most significant factor in the field of face recognition-based attendance systems. The proposed system has demonstrated a significant increase in accuracy compared to the traditional manual attendance taking methods.

VI. FUTURE SCOPE

The future scope of a face recognition-based attendance system is vast and has the potential to revolutionize the way attendance is taken in various institutions and organizations. Here are some of the areas where the system can be further developed and enhanced:

Integration with other systems: The system can be integrated with other systems such as payroll and human resources systems to provide a seamless solution for managing attendance, payroll, and employee records. This can reduce administrative workload and improve accuracy in record-keeping.

Real-time monitoring: The system can be enhanced to provide real-time monitoring of attendance, such as tracking employee movements within the premises using location-based technologies such as Wi-Fi or Bluetooth. This can help organizations to identify employees who may be absent without taking leave and monitor their productivity levels.

Multi-factor authentication: The system can be enhanced to include multi-factor authentication, such as

voice recognition, fingerprint scanning, or iris scanning, to improve security and prevent fraud.

Machine learning and artificial intelligence: The system can be enhanced using machine learning and artificial intelligence algorithms to improve accuracy in recognizing faces and detecting anomalies in attendance records. This can also help to improve the system's ability to detect and prevent fraudulent activities.

Mobile and cloud-based solutions: The system can be enhanced to provide mobile and cloud-based solutions, allowing employees to mark their attendance using their smartphones or other mobile devices. This can provide flexibility and convenience for employees and reduce the need for physical attendance marking systems.

Privacy and data protection: As with any system that handles personal data, privacy and data protection are critical concerns. The system can be enhanced to ensure compliance with privacy laws and to provide better protection for personal data.

Facial emotion recognition: Facial emotion recognition technology can be integrated with the system to detect and analyze the emotions of employees. This can provide insights into employee satisfaction and mental well-being, which can be useful for improving employee engagement and productivity.

The face recognition attendance system has immense potential for future development and improvement. One of the key areas of future scope for this system is the integration of artificial intelligence and machine learning algorithms to enhance its accuracy and efficiency. This could involve the use of deep learning techniques to improve the recognition of faces under varying conditions such as low light, different angles, and facial expressions. Another area of future scope is the incorporation of additional features such as temperature monitoring to ensure that individuals with a fever or symptoms of illness are not allowed entry into a premises. This can be particularly relevant in the context of the ongoing COVID-19 pandemic, where the prevention of transmission of infectious diseases is a top priority. Furthermore, the system can be integrated with existing attendance management systems, payroll systems, and human resource management systems to provide a seamless and efficient process for managing employee records. Finally, the system can be extended to support multiple languages, making it accessible to a wider range of users globally. This would require the development of multi-lingual support for the user interface, documentation, and technical support. In conclusion, the future scope for the face recognition attendance system involves the integration of advanced technologies such as artificial intelligence, the addition of new features, integration with existing systems, and multi-lingual support. These developments would further enhance the accuracy, efficiency, and usability of the system, making it a valuable tool for attendance management in various settings.

VII. CONCLUSION

Face recognition systems have become an integral part of the image processing application domain, and their importance is only increasing due to the development in the field of AI/ML. The implementation of this system has been widely used in various security-related applications such as crime prevention, person verification, and video surveillance. The use of face recognition systems has also found its place in educational institutions as a Smart Attendance System using Face Recognition. This system has been envisioned to reduce the errors that occur in manual attendance taking, which can be a tedious and time-consuming process for both students and faculty members. The main aim of the proposed system is to fully automate the attendance system, making it efficient and accurate, and preventing any kind of false attendance or proxy. The proposed method is capable of detecting multiple faces, and the performance of the system has yielded acceptable and good results. The use of this system is not only limited to educational institutions, but it can also be extended to office environments, replacing the old manual methods of attendance taking. The proposed method utilizes the excel sheet, which provides the name of the student and the time at which he/she entered the classroom. This method of attendance taking using face recognition technology can significantly reduce the time taken for attendance and can help in eliminating the possibility of errors. Moreover, it can also help in keeping track of the attendance of students who are absent or late, which can further aid in monitoring their academic progress. The system is capable of processing large amounts of data, which can be useful for schools with a large number of students. It also provides a convenient way for students to check their attendance records, which can help them to plan their academic schedules accordingly. The use of face recognition systems in the educational sector

can also promote the adoption of technology and can help in keeping up with the fast-paced technological advancements. Overall, the implementation of the proposed system can bring significant benefits to the education sector, making the process of attendance taking more efficient, accurate, and reliable.

VIII. REFERENCES

1. Kumar, S., & Singh, M. K. (2021). Smart Attendance System using Face Recognition for Educational Institutions. Journal of Physics: Conference Series, 1791(1), 012089.
2. Singh, R., Chauhan, S., & Suri, R. K. (2020). Face Recognition Based Attendance Management System. International Journal of Advanced Science and Technology, 29(10), 4071-4076.
3. Vinothini, M., & Srihari, R. (2021). Facial Recognition based Smart Attendance Management System for Educational Institutions. International Journal of Innovative Technology and Exploring Engineering, 10(6), 700-705.
4. Siddique, S., Singh, S., & Sardana, N. (2021). Smart Attendance System using Face Recognition: A Review. 2021 5th International Conference on Intelligent Computing and Control Systems (ICICCS), 477-481.
5. Taneja, S., Sood, S. K., & Mittal, S. (2021). Attendance Management System using Face Recognition Technology. 2021 8th International Conference on Signal Processing and Integrated Networks (SPIN), 429-433.
6. Zhang, Y., Huang, Q., Li, D., Li, X., & Cao, D. (2019). A smart attendance system based on face recognition and location information for classroom management. Multimedia Tools and Applications, 78(5), 5815-5829.
7. Deshmukh, S., Shinde, S., & Gaikwad, S. (2020). Automatic Attendance System using Face Recognition. International Journal of Advanced Research in Computer Science, 11(2), 181-184.
8. Lin, Y. C., & Chiang, J. Y. (2020). Smart Attendance System Based on Face Recognition Using Convolutional Neural Network. Journal of Applied Science and Engineering, 23(4), 803-812.
9. Sivakumar, S., Nagarajan, S., & Anbarasi, S. (2021). Attendance System Based on Face Recognition using OpenCV. International Journal of Engineering and Advanced Technology, 10(6), 618-621.
10. Vignesh, G., & Selvaraj, A. (2021). Smart Attendance System using Face Recognition for Educational Institutions. Journal of Computer Science and Engineering, 3(2), 35-41.
11. Srivastava, S., Singh, S., & Singh, G. (2020). Facial recognition-based attendance management system. International Journal of Advanced Research in Computer Science,
12. https://www.researchgate.net/publication/3418 76647_Face_Recognition_based_Attendance_Management_System
13. https://machinelearningprojects.net/face-recognition-based-attendance-system/
14. https://www.ijraset.com/research-paper/face-recognition-attendance-system

AET 029

Performance Analysis of Jamming Techniques on GPS Signals

Neelam Bisht
Vidyalankar Institute of Technology
IIT Bombay

Priti Patankar
Vidyalankar Institute of Technology
IIT Bombay

Nitee Dhuri
Vidyalankar Institute of Technology
IIT Bombay

Rudra Rane
Vidyalankar Institute of Technology
IIT Bombay

Dr. Dhananjay Patel
Vidyalankar Institute of Technology
IIT Bombay

Dr. Sibi Raj Pillai
Vidyalankar Institute of Technology
IIT Bombay

Abstract – The usage of the Global Positioning System (GPS) has recently surged due to the widespread ownership of mobile phones equipped with GPS. The GPS is used in military applications as it provides information on two factors; location and time crucial in many applications. The GPS signals are susceptible to interference, leading to jamming of it during war-like situations. It was observed during the Russia-Ukraine war, that Russian forces have been regularly jamming the GPS signals around Ukraine. In this paper, a systematic review of the GPS signals, tracing the location of any GPS receiver, the GPS signal structure and different types of attacks is provided. The attacks such as jamming where the GPS signal may obstruct the original signal and spoofing which gives users incorrect locations are reviewed in detail. We have compared different jamming techniques on parameters such as; range, power, duration, complexity, effectiveness and types of jamming.

Index Terms – GPS, GPS signal structure, Jamming, Spoofing, Types of Jamming techniques.

I. INTRODUCTION

The United States DoD (Department of Defence) created the first GNSS, known as the GPS, for use in the military. It was initially known as NAVSTAR (Navigational System with Time and Ranging)[1]. Later, in the 1980s, the American government released regulations promoting the peaceful use of GPS across the world [1]. The U.S. government's consistency and openness, along with a long history of reliable GPS service, have created a stable environment for investment and advancement in GPS technology[2]. This has led to a boom in the commercial usage of GPS technology, which has changed how we do business today[2]. Most electronic gadgets, including mobile phones and automobiles, depend on GPS navigation technology [3]. Examples include the ability to track cargo convoys in real-time, navigate when driving and travelling by car, and synchronise time on the power grid [3].More attention is being paid to studies relating to secure All forms of transportation, mobile navigation, vehicle monitoring, terrorist tracking, and strength or smart grid systems that rely on GPS for synchronisation are among the GPS programmes[3].

The GPS offers users time, positioning, and navigation [PNT] [2]. The GPS system includes the space segment, a control segment and a user segment[4]. The GPS functions properly through the coordination of these three segments[2]. To determine an object's location on Earth, the data is transmitted and received from the user segment thereby providing the full duplex communication leading to the identification of the object's location. There are 32 space satellite vehicles in the in-space segment, 24 of which are operational satellites that orbit the globe every 12 hours [5]. There are 6 orbital planes, and each one has 4 satellites that are inclined to the equator by 55 degrees. Any place in the world would be observed by 5-8 satellites, resulting in extremely high location accuracy [1]. The ranging codes and navigational data are transmitted to the user segment from the space segment [6]. The GPS control segment is made up of a network that keeps track of the GPS satellites, their broadcasts, and sends commands and data to the constellation [2]. The Operational Support System-Integrated Mission Operations Support Centre (OSS-IMOSC), the High Fidelity System Simulator (HFSS), and the GPS Support Facility (GSF) make up the control section [6].One master control station (MCS), multiple monitor stations, and ground control stations are the additional components that make up the OCS [4]. The MCS is situated at Shriever Air Force Base in Colorado Springs, United States [4]. The monitoring stations track the GPS satellites and gather information on navigational signals, atmospheric data, and observations. The monitoring station sends the above data to the master

control stations [2]. The master control station creates navigation messages for upload to the satellites and manages satellite maintenance for the GPS constellation [2]. Ground antennas transmit the instructions, navigation data uploads, and processor programme loading to the satellite [2]. Anyone with a GPS receiver set that is correctly configured falls inside the user segment [6]. The GPS system was first designed for military applications, such as coordinating operations and navigating through difficult terrain [4]. Since civilians now have access to GPS signals, it is utilised for a variety of tasks, including surveying, mapping, trekking, and vehicle navigation [4].

II. BACKGROUND

A. Trilateration Method

The GNSS frequently provides Position, Navigation, and Time (PNT) for a number of commercial and military uses [7]. The GPS is a type of navigational system that uses satellite signals to locate the location of an object. Every object with a GPS receiver on the planet receives a set of specific coordinates from the GPS. The GPS satellites continuously send out signals that contain two pieces of data: the current time and the precise location of the satellite relative to the planet at that moment. This data is used by GPS receivers to perform a unique calculation known as trilateration. You can use trilateration to locate yourself if you know how far you are from at least three well-known locations [2]. In GPS, the predetermined locations are the satellites themselves [2].

The receiver is situated somewhere on a spherical shell for any range measurement, with the broadcasting satellite at its centre [8]. The location inaccuracy decreases as the number of viewable satellites increases because the region where all the spherical shells converge due to range measurement from many satellites is minimised [8]. A receiver's location is one of the two points at which the three spherical shells intersect if it is able to receive GPS signals from all three satellites [1]. The closest point to the earth's surface is the receiver's position. While three satellites are sufficient to determine one's location, at least a fourth satellite is needed for an accurate position evaluation [1]. The atomic clocks that the GPS satellites utilise are extremely accurate, but they are not perfect. The satellite clock error varies from 8.64 ns to 17.28 ns each day, which, when multiplied by the speed of light, results in an error range somewhere between 2.59 m and 5.18 m. The ground control segment keeps an eye on the satellite clock's functioning. To enable each satellite to adjust its own clocks, the time deviation on each satellite's clock is calculated and transmitted to the associated satellite. The design quality in receiver clocks as well, results in error in position computation [1]. Consequently, we depend on a fourth satellite to correct for the time difference in order to accurately determine the location of our GPS receiver [2].

B. GPS Signal Transmission

The signal that is sent by GPS satellites is just a sine wave; GPS satellites transmit electromagnetic radio waves. The information or codes carried by the carrier wave are utilised to calculate the signal's travel time.

The interface between the GPS Space Segment (SS) and the GPS navigation User Segment (US) consists of two RF lines, L1 and L2. The L band, with a frequency range of 390 MHz to 1550 MHz, is where GPS carrier waves are found.

1) L1 carrier frequency-1575.42 MHz
   (L1 is the civilian frequency)
2) L2 carrier frequency-1227.60 MHz
   (L2 is used by the military)[10]

AET 030

AeroFleet: Telematic System with Air Purification, Driver Health Monitoring and Fleet Management Service

Utkarsh Gaikwad
Department of Electronics & Telecommunication
Vidyalankar Institute of Technology
Mumbai, India
utkarsh.gaikwad@vit.edu.in

Abhirup Singh
Department of Electronics & Telecommunication
Vidyalankar Institute of Technology
Mumbai, India
abhirup.singh@vit.edu.in

Harsh Khedwal
Department of Electronics & Telecommunication
Vidyalankar Institute of Technology
Mumbai, India
harsh.khedwal@vit.edu.in

Paresh Meher
Department of Electronics & Telecommunication
Vidyalankar Institute of Technology
Mumbai, India
paresh.meher@vit.edu.in

Abstract—AeroFleet is a system meant to improve the situation of truck driving in conditions where air quality is subpar such as in mining areas. Our system also provides quality data regarding the driver's health and truck cabin environment to the fleet manager while also helping to connect with the driver when required. The proposed solution addresses the real time problem: Driver Health Monitoring, Cabin Air Quality Monitoring, Cabin Air Purification, and providing a Fleet Alert System. We at AeroFleet have built a multi-device system for these tasks. This system consists of AeroBand Smartwatch for Driver Health Monitoring, AeroPure Smart Air purifier for Cabin Air Quality Monitoring and Purification, AeroMaster Controller and AeroLive website as a Fleet management system, Driver-Fleet Manager communication and an alert system.

Index Terms—Driver Health Monitoring, Air Quality Moni- toring, Air Purification, Fleet Management

I. INTRODUCTION

Studies have shown evidence of clinical health risks asso- ciated with occupational exposure to ambient air pollution in truck drivers [1]. Studies have identified elevated standardized mortality ratios (SMR) for ischemic heart disease (IHD) mortality (SMR=1.41; 95% CI 1.33 to 1.49) compared to the general population [2]. Long haul drivers deliver freight from one large trucking terminal to another and are often away from home for up to 3 days [3]. Mines have numerous risky stip- ulations that include humidity and discharge of destruxctive gases that make unsafe surroundings for specialists working there, including truck drivers [4]. These truck drivers are the backbone of operations, working long hours in demanding, often hazardous conditions [5], and to ensure their safety and well-being, it is critical to monitor their health and the quality of the air they breathe while operating their vehicles. Poor air quality can lead to driver fatigue and nausea, which are significant causes of accidents at work sites [6] [7].

The system proposed by HakJoon Kim et al. [8] proposed a model of an air purifier using activated carbon fiber. They developed a novel electrostatic air purifier using a carbon fiber brush combined with a metallic collection rod and an activated carbon fiber (ACF) sheet. Manisha Sharma et al. [9] proposed an I2P air purifier with an air quality monitoring device, it gave a buzz when thresholds are crossed, but the air purifier was not automated with the pollution level. Kennedy Okokpujie et al. [10] Analyzed air quality in real-time and logged data to a remote server through cloud technology, PPM metrics were used. Internet connectivity is necessary to access data. The system for health monitoring proposed by K. Ro´z˙anowski et al. [11] describes an implementation of the DHSRM mobile application interfaced with a hardware Data Logger fitted onboard a vehicle. The Data Logger gathers data from sensors in the vehicle and the driver's body. Ye Sun et al. [12] have developed the driver assistance system which can remotely detect biopotential signals with no physical contact with human skin. With a delicate sensor and electronic design, ECG, EEG, and

eye blinking can be measured. Hamed Saghaei [13] has developed a novel approach for control and monitoring of a fleet management system using three elements including GPS/GLONASS-based automatic vehicle locators (called Rad100), GPRS/SMS GSM cellular network and web- based software (called PayaRadyab) is proposed to show the exact position of the desired vehicle on different maps and take detailed reports of the mission, traveled path, fuel consumption rate, speed limits, and other necessary information.

As mentioned above there are many solutions that either remotely monitor driver health, or monitor cabin air quality, or remotely monitor truck via a fleet management system. Our novel solution combines driver health monitoring, cabin air quality monitoring, cabin air purification and fleet management system with provision for communication with driver into a single system that is robust and modular.

II. EXPLANATION AND WORKING

Our solution comprises of any ecosystem of devices, the first being the AeroBand Smartwatch which helps us with driver health monitoring as it will monitor the drivers' SpO2, Heart Rate, Body Temperature and watch wearing status. It also notifies the driver if the watch is not worn. Second is the AeroPure Smart Air Purifier which helps us with Cabin Air Quality Monitoring and Purification as it detects various gases in the air and purifies them by adjusting the purification rate accordingly, to deliver clean air. Third is the AeroMaster controller which gathers data from AeroBand Smartwatch and Aeropure Smart Air Purifier and pushes it along with the GPS location to the cloud so that it can be displayed on the AeroLive Website. It also acts as a separate line of communication between the driver and the fleet manager. Fourth is the AeroLive website solves the problem of Fleet Alert and Management System, an entire fleet of trucks can be monitored from this website. All live data received from AeroMaster Controller regarding the driver health and air quality, along with GPS location is displayed here. The website notifies the fleet manager with alerts and notifications when specific trucks have problems. The fleet manager can assist the trucks via voice call to the AeroMaster controller when required.

In-depth explanation of each device is as follows,

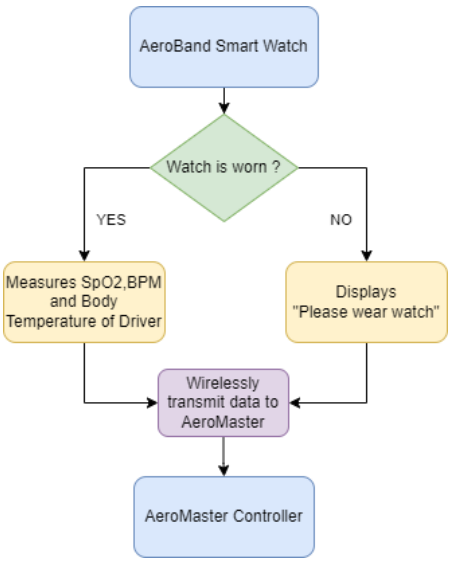


Fig. 1. Working of AeroBand Smartwatch

A. *AeroBand SmartWatch:*

The AeroBand Smart Watch is an innovative product that facilitates real-time monitoring of critical health parameters of truck drivers. This non-invasive wearable device is exclusively designed for drivers and enables continuous monitoring of their health vitals such as SpO2 saturation, pulse rate (BPM) using MAX30102 and body temperature using LM35 temperature sensor. Calculation for SpO2 saturation in human tissues was done using Beer–Lambert law (BLL) mentioned in work done by Ilze Oshina et al. [14] . AeroBand uses connectionless Wi-Fi communication protocol - CTR with CBC-MAC Protocol (CCMP), operating at a frequency of 2.4Ghz, to transmit all parameters to the AeroMaster, which acts as a central hub for collecting and storing all the health data. Fleet managers can access this data via the AeroLive Web-based User Interface, providing real-time analytics of the driver's health status.

One of the significant advantages of the AeroBand Smart Watch is its ability to alert the fleet manager in case of any emergencies. For instance, if the driver's SpO2 levels deplete, an alert is sent to the fleet manager to take appropriate action and prevent any possible casualties. Additionally, the device also sends a notification if the driver is not wearing the watchas shown in Fig. 1, ensuring that the driver is always monitored while driving. This feature helps in maintaining the safety of the driver and avoiding any potential accidents due to driver negligence. Overall, the AeroBand Smart Watch is an excellent tool for fleet managers to maintain the safety and health of their drivers and ensure that they operate vehicles with maximum attentiveness.

B. AeroPure Smart Air Purifier:

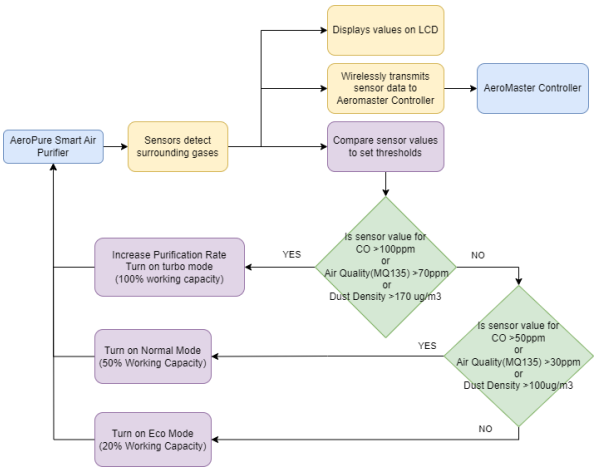


Fig. 2. Working of AeroPure Smart Air Purifier

The system for Cabin Air Purification is designed to prevent driver fatigue by monitoring the air quality inside the cabin of a vehicle as shown in Fig. 2. It employs two MOS sensors, namely MQ7 and MQ135, which are sensitive to gases that change their resistivity with exposure. Additionally, an optical dust sensor is incorporated to detect the amount of dust present in the air. The sensors provide analog data, which is then converted to digital data using an inbuilt 12-bit resolution ADC. To obtain the most accurate and sensitive measurements of CO concentrations, a load resistance of 10k ohm was selected. By using a Log-log graph to map the ppm value from the resistance of the gas sensor, precise calibration was performed under standard test conditions. Equation for analog to ppm conversion and calibration for MQ7 sensor was used from work done by Nisal Kobbekaduwa et al [15]. The final PPM value is then displayed on the LCD 16×2 screen and transmitted to the AeroMaster via connectionless Wi- Fi communication protocol - CTR with CBC-MAC Protocol (CCMP), operating at a frequency of 2.4Ghz.

It should be noted that the ESP-32 microcontroller monitors the PPM and Dust partials to ensure that they remain below a predetermined safety threshold. If the levels exceed the threshold, the system initiates the air purification process to restore the cabin air quality to a safe level. By monitoring the air quality and regulating the purification process, the system ensures that the driver remains alert and free from fatigue. For the purification of cabin air HEPA (High Efficiency Particulate Air) air filter is used as they're incredibly effective at capturing particle size above 0.3 micron . To remove Carbon monoxide and ammonia from air Impregnated activated carbon Filter is used, this air filter has been treated to be extremely porous, and this is the popular filtration against these gases. This system is an essential safety feature for long-distance drivers who spend extended periods in their vehicles, as it can significantly reduce the risk of accidents caused by driver fatigue. Driver does not have to intervene as Purifier automatically switches to a different mode with respect to the pollution in the cabin.

- The system for Cabin Air Purification employs three different scenarios as shown in Fig. 2 to monitor and regulate the air quality inside the cabin of a vehicle. The first scenario is when the PPM levels detected by the sensors are below their set threshold. In this case, the system does not take any action, and the LED glows green, while the fan runs at 20% of its total capacity, which is 1080 RPM.
- The second scenario is when the MQ7 and MQ135 gas sensors detect gases above their set threshold. For MQ7, the threshold is set between 50 and 100 PPM, while for MQ135, the threshold is set between 30 and 50 PPM. Additionally, if the dust density in the air is between 70 and 100 ug/m3, the system increases the fan speed to 50% of its total capacity, which is 2700 RPM. The LED glows blue in this scenario, indicating a warning that the air quality is deteriorating, and the driver should take necessary precautions.
- The third and final scenario is when the air quality inside the cabin becomes inhabitable and reaches a dangerous level. In this case, the MQ7 and MQ135 gas sensors detect gas concentrations above their danger thresholds. The danger threshold for MQ7 is set above 100 PPM, while for MQ135, it is set above 50 PPM. Moreover, if the dust density in the air is above 170 ug/m3, the system will trigger a red LED to indicate danger, and the buzzer will buzz to warn the driver. The fan speed will increase to 100% of its total capacity, which is 5400 RPM, to immediately reduce the concentration of harmful gases in the cabin and improve the air quality. This feature is crucial to prevent driver fatigue and ensure the safety of the driver.

C. AeroMaster:

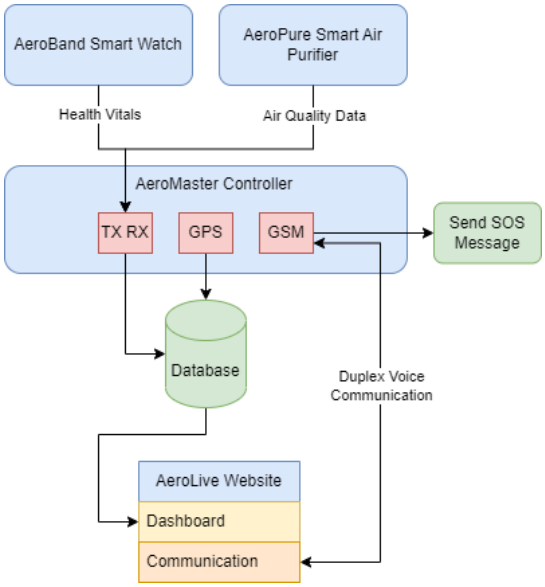


Fig. 3. Working of AeroMaster Controller

The AeroMaster acts as a central hub for collecting and receiving real-time data from the AeroBand Smart Watch and the AeroPure Smart Air Purifieras shown in Fig. 3. Both the AeroPure and AeroBand use connectionless Wi-Fi commu- nication protocol - CTR with CBC-MAC Protocol (CCMP), operating at a frequency of 2.4Ghz, to transmit all parameters to the AeroMaster. The AeroMaster then pushes this data to the cloud by using TCP protocol on the Things speak server using SIM900A GSM/GPRS Module. This data includes information related to the driver's vital health characteristics and the air quality inside the cabin. The use of GSM/GPRS ensures that the data is transmitted securely and promptly, enabling fleet managers to access real-time analytics of their drivers' health status.

To enhance the monitoring capabilities of the system, Aero- Master uses GT-U7 GPS receiver to obtain the precise GPS coordinates of the truck. This feature provides fleet managers with real-time information about the location and movement of their trucks, allowing them to optimize routes and improve the efficiency of their fleet operations. By combining this data with the driver's health and air quality parameters, fleet managers can gain a comprehensive and well-being.Additionally, the AeroMaster comes equipped with built in speaker and microphone, which enable fleet managers and truck drivers to have real-time two-way voice communication as shown in Fig. 3. understanding of their drivers' working conditions and make informed decisions to ensure their safety

The AeroMaster auto-picks up calls from the fleet manager, eliminating the need for the driver to manually answer the phone. This feature ensures that drivers can maintain focus on the road and their driving, while still being able to communicate with their managers when needed. AeroMaster also sends an SOS message to the Fleet Manager in case of any emergency.

D. AeroLive Website:

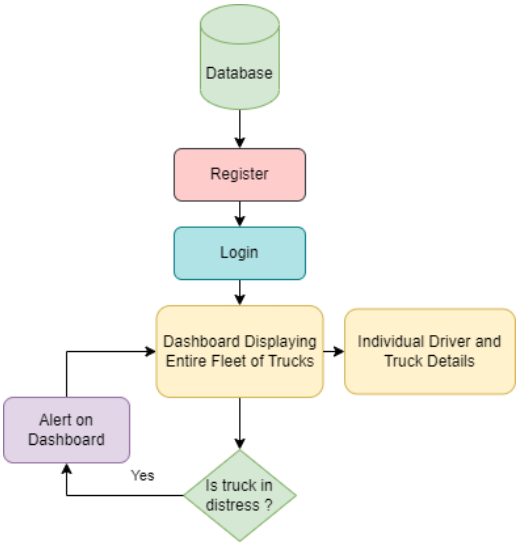
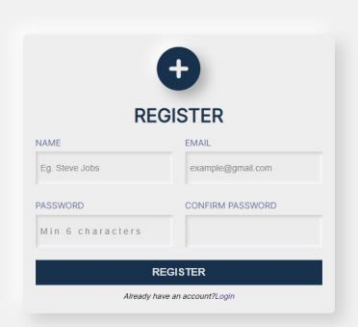


Fig. 4. Working of AeroLive Website

AeroLive is a web-based platform that is specially designed for fleet management in the mining industry. It enables fleet managers to easily add and monitor their trucks on the dashboard. This software provides real-time monitoring with very low latency, allowing fleet managers to quickly respond to any issues that may arise. With the help of AeroLive, fleet managers can keep track of all their trucks in real-time, ensuring that they are operating efficiently and safely. The platform also provides alerts for any trucks that may be in distress, allowing fleet managers to take immediate action. Steps to access and view truck details on the AeroLive Website

Fig. 5. Registration Page



Step 1 - New Fleet Manager Registration:

To use AeroLive Web-based UI, a new Fleet Manager needs to create an account by clicking on the" Register" tab. The Fleet Manager must fill in the

required details, such as Name, Email Address, Contact Number, and Password. After successful registration, the Fleet Manager can log in to the website.

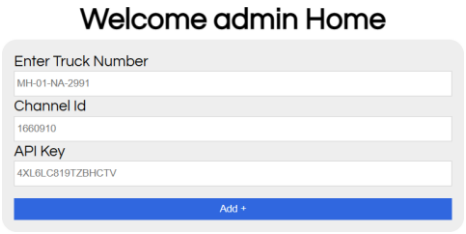


Fig. 6. Adding Truck by Admin

Step 2 - Adding Trucks to Fleet Management Backend:
On the Driver Data page, the Fleet Management Admin can click on the Admin button at the top bar to add the respective Truck to their Fleet Management backend. The admin needs to provide the unique Truck Number, Channel ID, and API Key of the Fleet they want to add to the Backend of AeroLive.

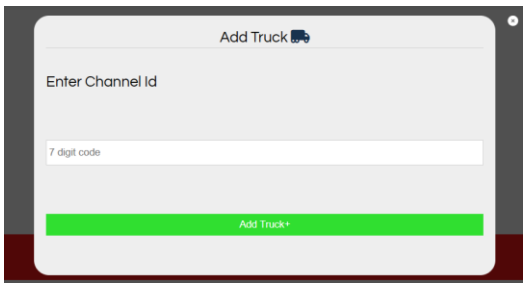


Fig. 7. Adding Truck by Fleet Manager

Step 3 - Adding Trucks to Driver Data Dashboard:
Once the Fleet Manager admin has added the truck to the Backend, they can easily add the truck to the Driver Data Dashboard using the Channel ID. This allows the Fleet Manager to monitor and manage the trucks easily.

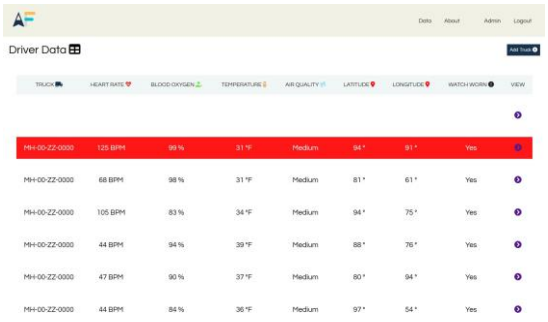


Fig. 8. Alert System

Step 4 - Alert System:
AeroLive Web-based UI provides an alert system that notifies the Fleet Manager if the truck driver is in distress. As shown in Fig. 8 Trucks in distress are highlighted in red and the Fleet Manager gets an alert through a buzzer, enabling them to take necessary actions quickly.



Fig. 9. Statistical and Graphical of Data (Specific Truck)

Step 5 - In-Depth Truck Monitoring:
The Fleet Manager can click on the respective truck to view a detailed overview of the truck's current status. AeroLive Web-based UI provides features such as Real-time Location Tracking, Cabin Air Quality Monitoring, Driver's Health Vitals, Watch Worn Status, and Establishing Voice Communication with the Driver, making it easier for the Fleet Manager to monitor the truck's status. Statistics and Graphical Representation: AeroLive Web-based UI provides Live Data Visualization of Air Quality and Driver Health on the Dashboard, helping the Fleet Manager to take necessary preventive measures.

RESULTS

Upon testing our system in a laboratory environment, we obtained the following outcomes:



Fig. 10. AeroBand

The Aeroband smartwatch displays the body temperature, heart rate, oxygen levels & battery when worn.



Fig. 11. AeroBand Notification

The Aeroband smartwatch notifies the driver to wear the smartwatch when it is not worn.



Fig. 12. Lab Simulation

Fig. 12 shows our AeroPure Smart Purifier placed in a transparent container filled with smoke (white) simulating a truck cabin in an unhealthy environment.



Fig. 13. Lab Simulation Result

Fig. 13 shows our purifier effectively purifies the air inside the simulated environment i.e. our transparent container.

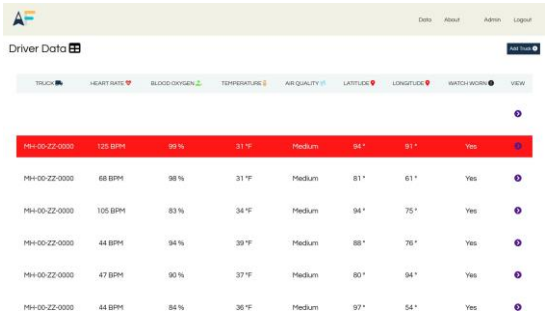


Fig. 14. Alert System

Fig.14 Shows Fleet Manager's dashboard with Trucks in distress highlighted in red with a beep sound.



Fig. 15. Graphical Representation of Data (Specific Truck)

Based on the readings necessary actions can be performed such as calling to ensure the safety of truck and truck driver

CONCLUSION

The Aerofleet system is an innovative and low-cost alternative to traditional fleet management systems that over- look the health of drivers and the polluted environment of their workspace. The system uses the non-invasive Aeroband smartwatch to monitor the driver's health that includes three key parameters: SpO2, heart rate, and temperature. In ad- dition, the environment of the driver's cabin is constantly monitored and cleaned by the AeroPure air purifier. The fleet management system is accessible via a web portal, which allows for the management of the fleet and the monitoring of drivers and cabin conditions. Duplex voice communication is provided between the fleet manager and the driver for easy communication. To increase reliability and safety, the system sends the location of a distressed truck via SMS to the fleet manager and notifies them with a sound alert on their dashboard. This feature ensures that any issues or emergencies are quickly identified and addressed. Overall, the Aerofleet system provides a comprehensive solution for fleet management, combining driver health monitoring and cabin air purification with traditional fleet management features. Its low cost makes it accessible to fleets of all sizes, and its real time data transfer and monitoring capabilities increase efficiency and reliability.

REFERENCES

[1] Zhang, Kai, and Stuart Batterman. "Air pollution and health risks due to vehicle traffic." Science of the total Environment 450 (2013): 307-316.

[2] Hart JE, Garshick E, Smith TJ, Davis ME, Laden F. Ischaemic heart disease mortality and years of work in trucking industry workers. Occup Environ Med. 2013 Aug;70(8):523-8. doi: 10.1136/oemed-2011-100017. Epub 2012 Sep 19. PMID: 22992341; PMCID: PMC3710312.

[3] Hart JE, Garshick E, Smith TJ, Davis ME, Laden F. Ischaemic heart disease mortality and years of work in trucking industry workers. Occup Environ Med. 2013 Aug;70(8):523-8. doi: 10.1136/oemed-2011-100017. Epub 2012 Sep 19. PMID: 22992341; PMCID: PMC3710312.

[4] T. Porselvi, S. G. CS, J. B, P. K and S. B. S, "IoT Based Coal Mine Safety and Health Monitoring System using LoRaWAN," 2021 3rd International Conference on Signal Processing

and Communica- tion (ICPSC), Coimbatore, India, 2021, pp. 49-53, doi: 10.1109/IC-SPC51351.2021.9451673.

[5] (2020) savelifefoundation. Save LIFE Foundation. Available at: https://savelifefoundation.org/wp-content/uploads/2020/02/design- single-page-27th-feb-2020.pdf (Accessed: May 4, 2023).

[6] Manisalidis I, Stavropoulou E, Stavropoulos A, Bezirtzoglou E. Envi- ronmental and Health Impacts of Air Pollution: A Review. Front Public Health. 2020 Feb 20;8:14. doi: 10.3389/fpubh.2020.00014. PMID: 32154200; PMCID: PMC7044178.

[7] Kusuma Kumari B. M, "Review on Drowsy Driving: Becoming Dangerous Problem", International Journal of Science and Research (IJSR), Volume 3 Issue 1, January 2014, pp. 49-51, https://www.ijsr.net/get abstract.php?paper id=02013722

[8] H. -J. Kim, B. Han, C. G. Woo, Y. -J. Kim, G. -T. Lim and W. G. Shin, "Air Cleaning Performance of a Novel Electrostatic Air Purifier Using an Activated Carbon Fiber Filter for Passenger Cars," in IEEE Transactions on Industry Applications, vol. 53, no. 6, pp. 5867-5874, Nov.-Dec. 2017, doi: 10.1109/TIA.2017.2745499.

[9] M. Sharma, A. Kumar and A. Bachhar, "I2P air purifier with air quality monitoring device," 2017 2nd International Conference on Communication and Electronics Systems (ICCES), Coimbatore, India, 2017, pp. 478-481, doi: 10.1109/CESYS.2017.8321326.

[10] Okokpujie, Kennedy & Noma-Osaghae, Etinosa & Odusami, Modupe & John, Samuel & Oluwatosin, Oluga. (2018). A Smart Air Pollution Monitoring System. International Journal of Civil Engineering and Technology. 9. 799-809.

[11] K. Różanowski, Z. Piotrowski and M. CiolekMilitary, "Mobile application for driver's health status remote monitoring," 2013 9th International Wireless Communications and Mobile Computing Conference (IWCMC), Sardinia, Italy, 2013, pp. 1738-1743, doi: 10.1109/IWCMC.2013.6583819.

[12] Y. Sun and X. Yu, "An innovative nonintrusive driver assistance sys- tem for vital signal monitoring," in IEEE Journal of Biomedical and Health Informatics, vol. 18, no. 6, pp. 1932-1939, Nov. 2014, doi: 10.1109/JBHI.2014.2305403.

[13] Saghaei, Hamed. (2016). Design and Implementation of a Fleet Man- agement System Using Novel GPS/GLONASS Tracker and Web-Based Software.

[14] Oshina, Ilze & Spigulis, Janis. (2021). Beer–Lambert law for optical tissue diagnostics: current state of the art and the main limitations. Journal of Biomedical Optics. 26. 10.1117/1.JBO.26.10.100901.

[15] Kobbekaduwa, Nisal & de Mel, W.R. & Oruthota, Pahan. (2021). Calibration and Implementation of Heat Cycle Requirement of MQ-7 Semiconductor Sensor for Detection of Carbon Monoxide Concentra- tions. Advances in Technology. 1. 377-392. 10.31357/ait.v1i2.5068.

AET 031

Brewit

Nishita Mhetre
Dept of Electronics Engg,
VIT, Mumbai

Apurva Salve
Dept of Electronics Engg,
VIT, Mumbai

Dhruvali Joshi
Dept of Electronics Engg,
VIT, Mumbai

Ashlesha Mahajan
Dept of Electronics Engg,
VIT, Mumbai

Abstract - A vending machine is a device that dispenses small items consisting of food, beverages, or medicine whilst a coin or token is inserted. On the other hand, we are using Face detection. It is a technology capable of recognizing a person based on their face. It uses machine learning algorithms that find, capture, store, and analyze facial features to compare them to images of people in a pre-existing database which is widely used for security purposes or marking attendance in institutes. In our project, we have combined these two technologies and made a circuit for Automatic Vending Machine which gives the output as a customized coffee according to the user's choice. We will take the customer's data and store it in the database. When the customer stands within a certain radius of the circuit, his face will be recognized, and he will get his customized coffee. We have used Python for face recognition and for dispensing the coffee we have used Arduino UNO and Servo Motors.

Keywords- face recognition, Coffee vending machine, Customized coffee, Easy to use.

I. INTRODUCTION

The upward push of the Internet of Things has brought about an explosion of sensor computing platforms. The complexity and packages of IoT gadgets vary from easy gadgets in merchandising machines to complex, interactive artificial intelligence in clever motors and drones. In this project, we made a customized coffee vending machine based on ML.

The automatic coffee vending machine is widely employed in many countries and regions of the world. However, within the daily operation and maintenance, it continues to use the normal manual administration. It is very laborious for the dispersed slot machine to be effectively managed. The idea of the current communication network platform, manner to a way to make a vending machine to create a sequence sales network and supply a lot of convenient ways of selling and management mechanism, has become the key factor poignant its development. In this Project, the new coffee vending machine is designed to support the technology of Machine Learning.

Nowadays we see that there is great demand for automation in the food industry. With the use of embedded systems and face recognition technologies, we have seen great significance in this field. There is a huge demand for interactive devices which interact with customers directly without any human intervention in restaurants, hotels, and cafes. Also, it looks classier and more sophisticated. Due to the recent pandemic, we have seen increasing demands in the automation industry to reduce human intervention. So, we are introducing BrewIt which will bring a revolutionary change in this field. Basically, a vending machine is a machine that dispenses items present in it. There are beverages, medicines, snacks, water bottles, soft drinks, etc. in a vending machine. On the other hand, Face Recognition is used for security purposes, marking attendance. Here we are making a vending machine that will particularly dispense customized coffee paying attention to customers' interests and tastes using the concept of Vending Machine and Face Recognition.

II. METHODOLOGY

We aim to integrate vending machines with face-detection systems. We have divided the project into two parts, software, and hardware. In the software part, we used Python programming for face detection and Arduino Programming for heating water. Initially, we used Python code to compare faces and return accuracy values and the name of the person using PyCharm if the face matches, then it returns true else it will return false. The photos that the code must compare are stored in one of the files of the whole program.

III. BLOCK DIAGRAM

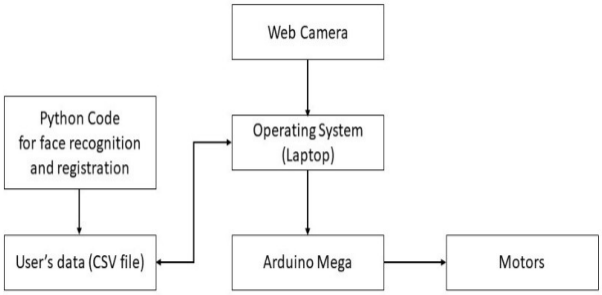


Figure 2.1 Block Diagram of the System

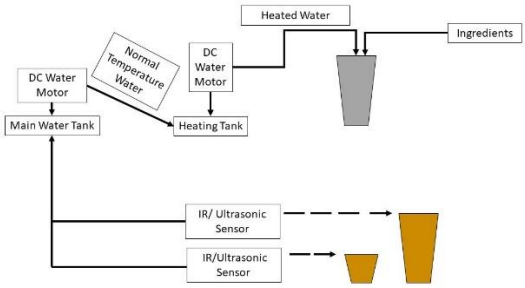


Figure 2.2 Block Diagram for Heating

We have developed code which uses a web camera of low resolution. We have designed the code such that it compares the face which is in front of the Web Camera with the faces that are already registered and if they match then the code will return the desired output if not registered then the form is displayed. Then we did the interfacing of the Python program with Arduino UNO we have included the cv zone library in PyCharm for it. So, when the user is registered the motors connected to Arduino will rotate based on the data fetched after face recognition or else the registration form is displayed if the face is not recognized i.e., if the user is not registered. The registration form consists of the details like the size of the cup (Short, Tall), Coffee (in Teaspoon), Milk Powder (in Teaspoon), and Sugar (in Teaspoon). Along with these details, a picture of the user is taken. The details of the new user are then saved from the form into a CSV file. While the Image of the user is saved in a separate folder. The web camera and Arduino with Servo Motors are interconnected through the laptop. After the face recognition process, the user needs to place the cup in the given slot and accordingly choose the same in the given form. This is a crucial step as we have used Arduino programming using 2 IR sensors for deciding the amount of water according to the cup placed. In the Arduino program, there are 3 parts. The first part consists of the transfer of water to be heated; in the second part, the heating coil is turned ON for a fixed time based on the amount of water. Lastly, the heated water is transferred to a container where the other ingredients according to the user's choice are present. 3 relays are used for this process to control the DC Water Pump and Heating Coil.

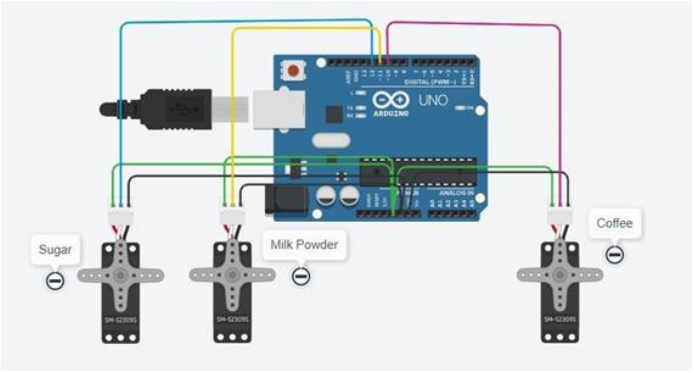


Figure 2.3 Circuit Diagram for Ingredients Dispensing

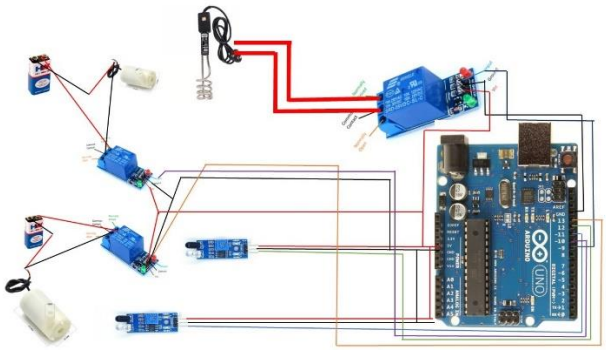


Figure 2.4 Circuit Diagram for Heating

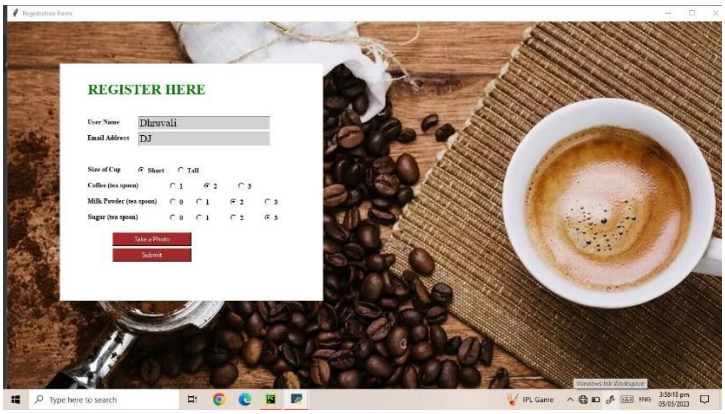


Figure 2.5 Registration Form

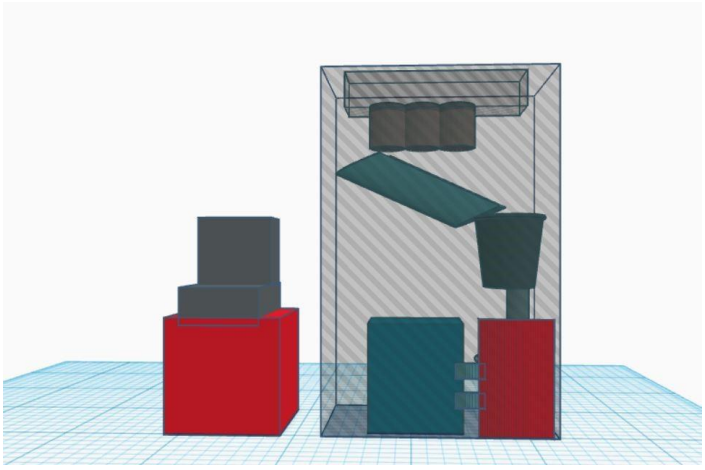


Figure 2.6 Set up of the system (Front View)

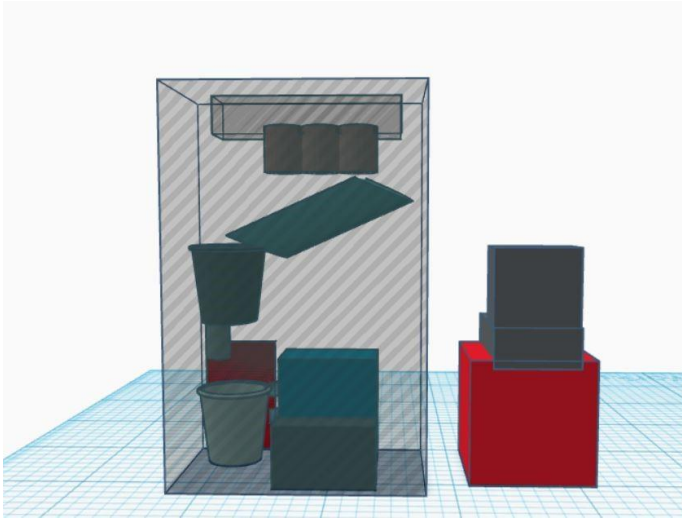


Figure 2.7 Set up of the system (Back View)

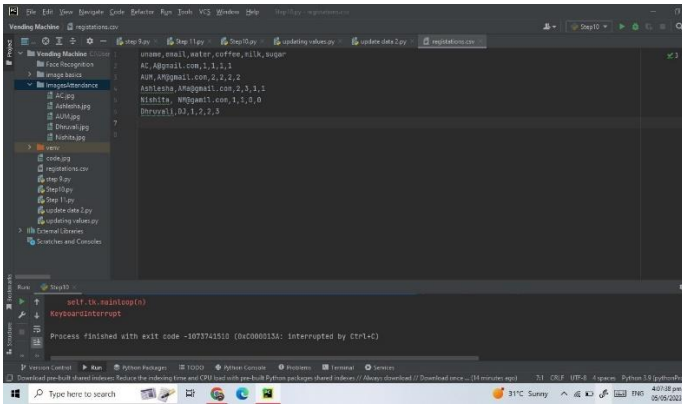


Figure 2.8: Data Saved in CSV

IV. RESULTS

After running the code, a window showing the webcam output is displayed.

Case 1: The user has already used the vending machine once-

When a Registered face appears in front of the camera, a form asking for a change of composition of the ingredients is displayed. If the user wishes to change his choice, then he may proceed by selecting YES and selecting new preferences, or else he may click NO. If the user clicks on NO, the previously selected compositions of the ingredients are considered for the preparation.

Webcam Output:

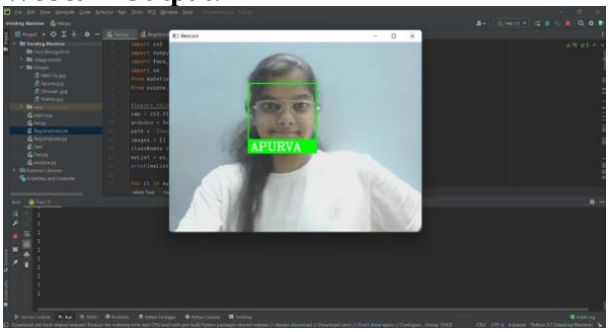


Figure 4.1: Output of Webcam when User is Registered

Form Displayed:

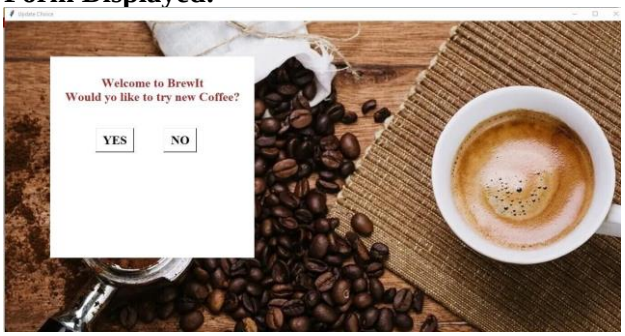


Figure 4.2: Form- Step1

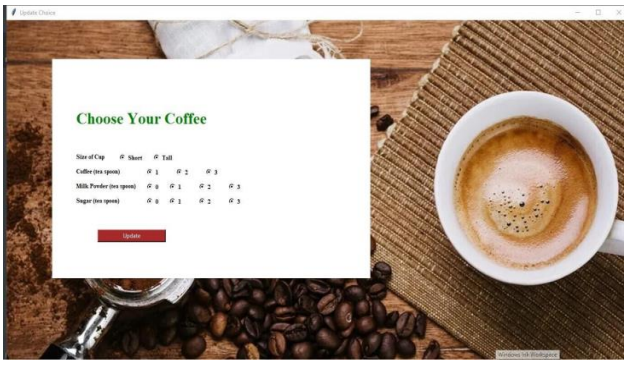


Figure 4.3: Form- Step2

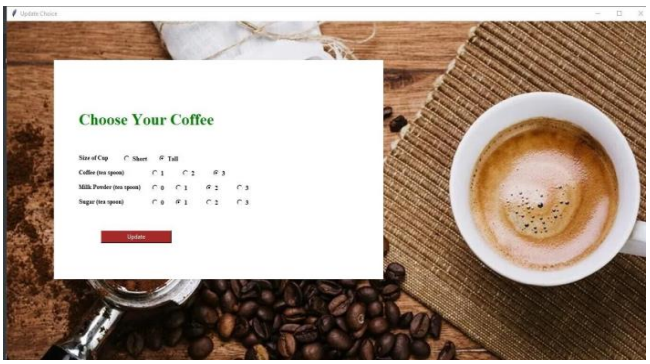


Figure 4.4: Form showing Error if all fields are not Selected.

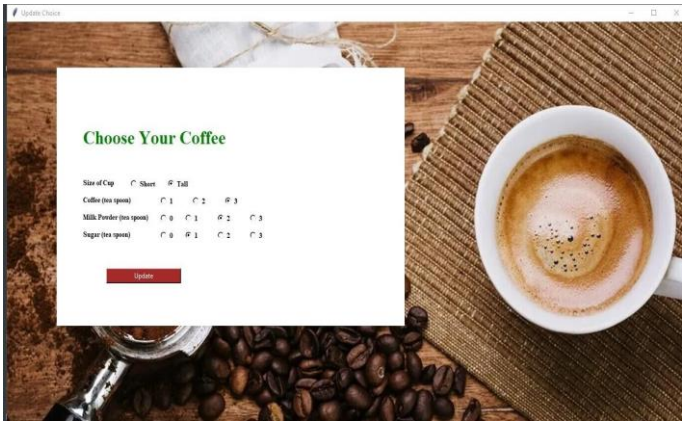


Figure 4.5: Form- Step 3

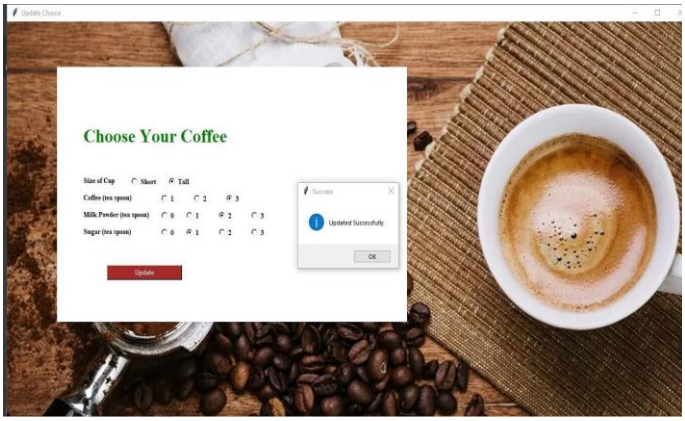


Figure 4.6: Form showing Updated Successfully

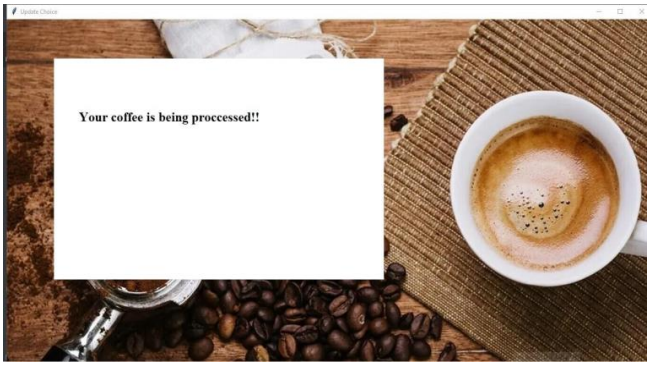


Figure 4.7: Form- Final Window

Arduino Output:

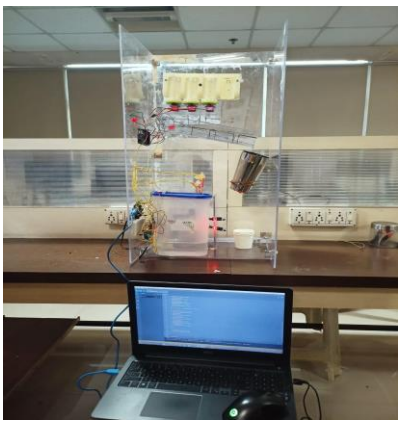


Figure 4.8: Output of Arduino when the User is registered.

Case 2: If the user is first time user.

When a non-registered user appears in front of the camera, a registration form is displayed. The form consists of the user's details and its preferred compositions of sugar powder, milk powder, and coffee powder.

Webcam Output:

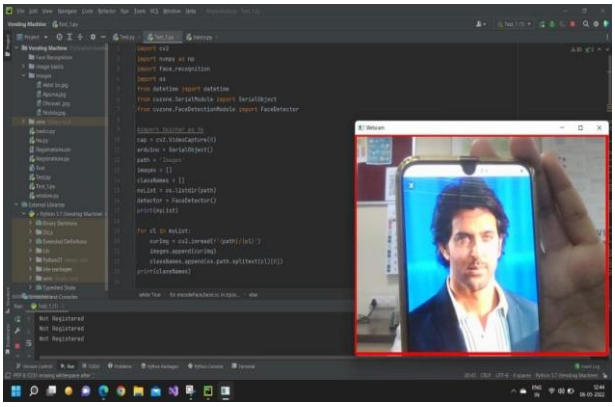


Figure 4.9: Output of Webcam when User is Not Registered

Registration Form:

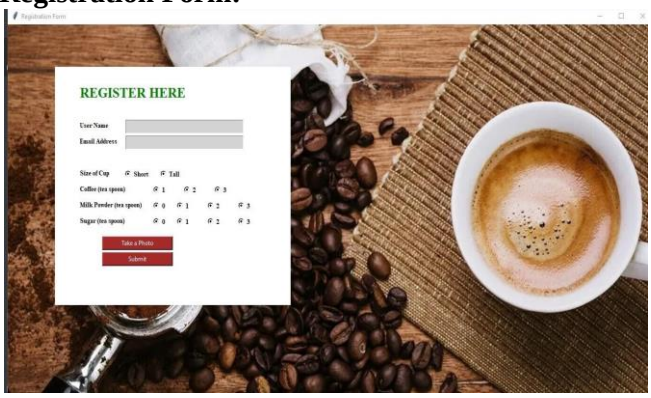


Figure 4.10: Registration Form

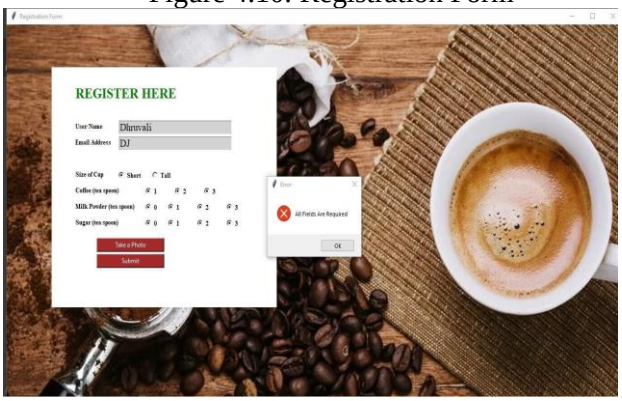


Figure 4.11: Registration Form showing Error if all fields are not Selected.

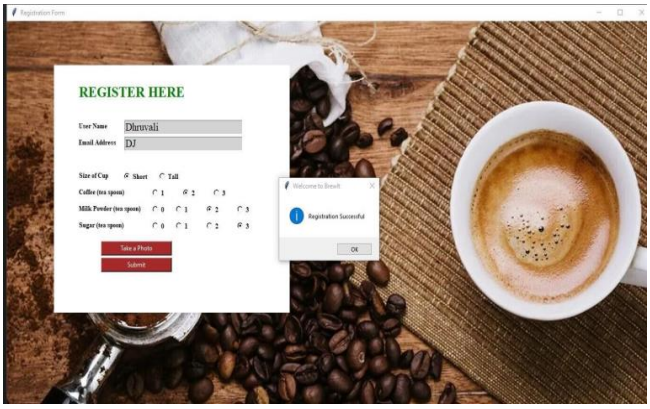


Figure 4.12: Registration Form showing all fields are

Selected.

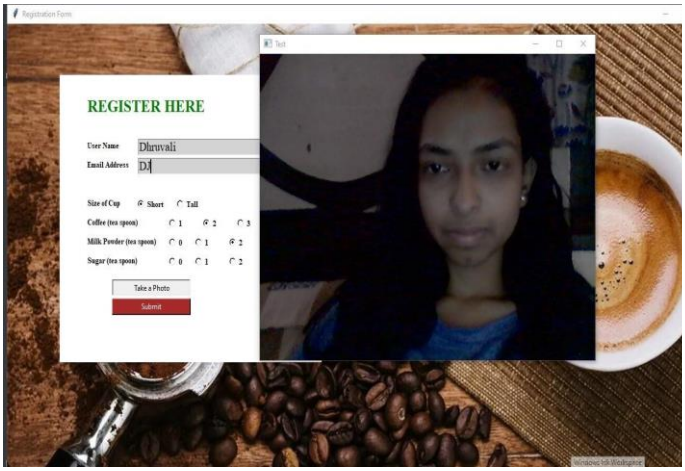


Figure 4.13: Registration Form Capturing Image

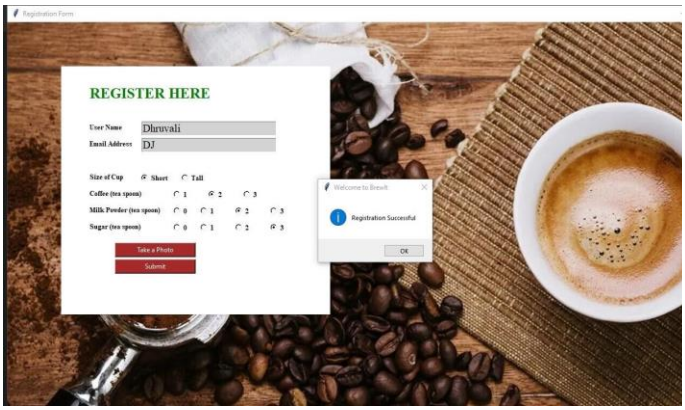


Figure 4.14: Registration Successful

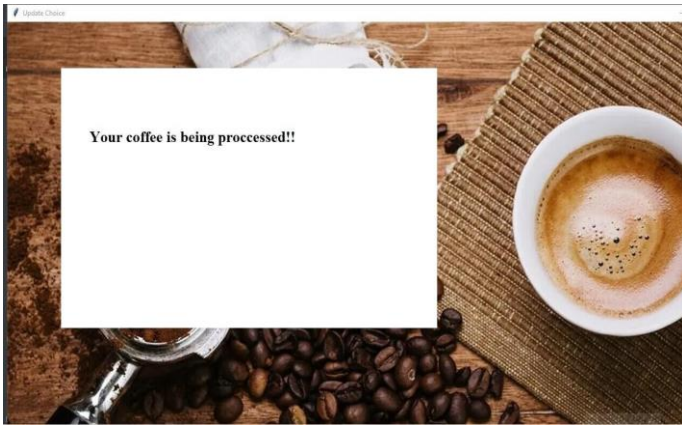


Figure 4.15: Form- Final Window

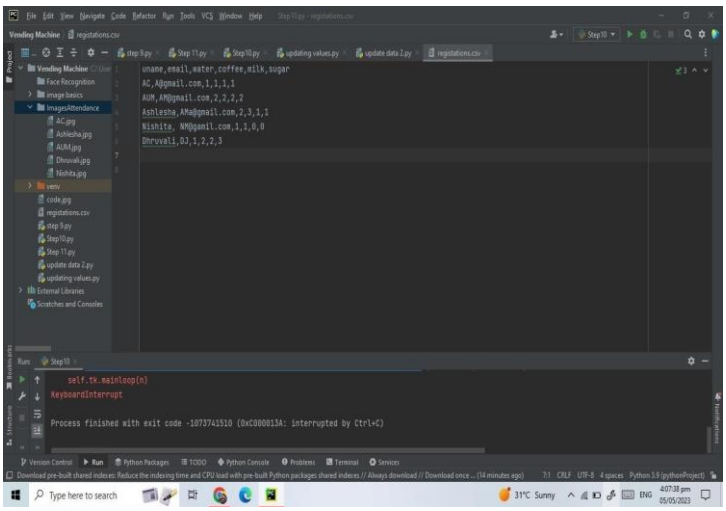


Figure 4.16: CSV Output

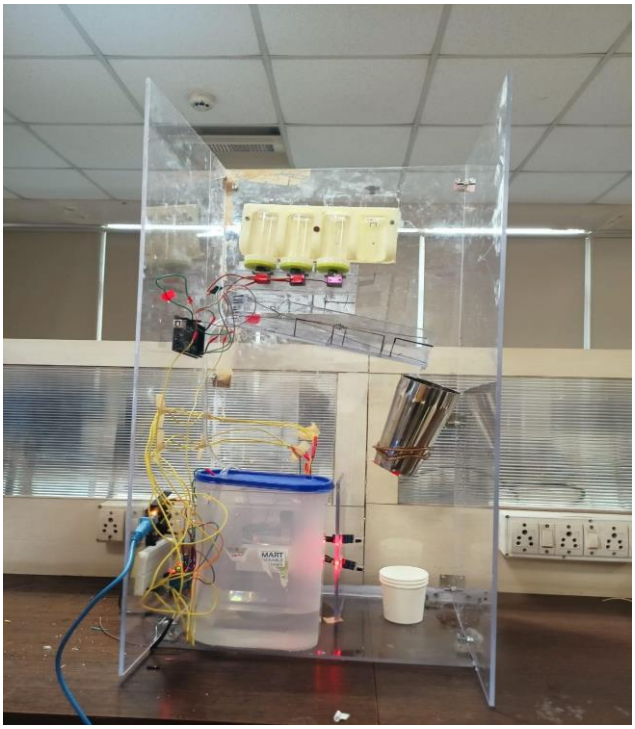


Figure 4.17: Arduino Output

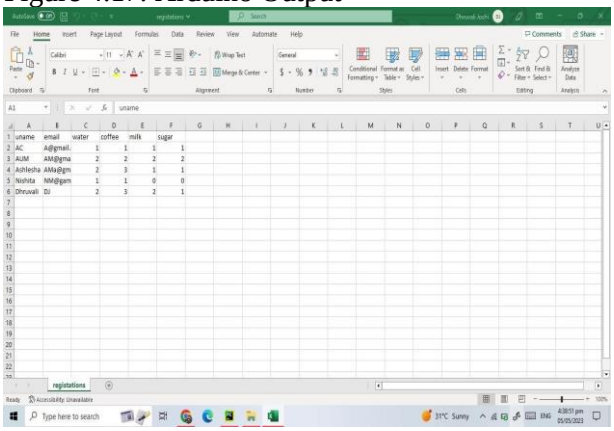


Figure 4.18: Data saved in Excel Sheet

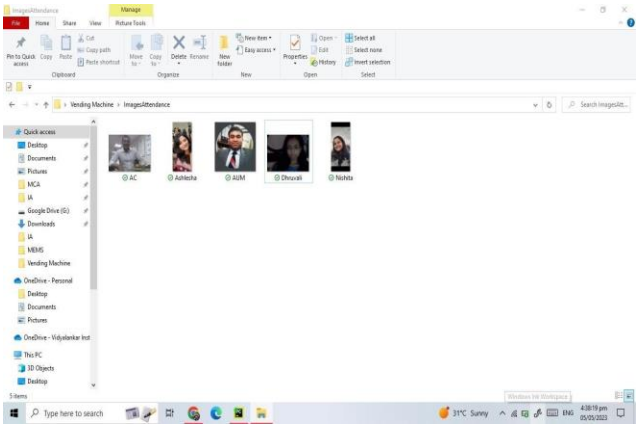


Figure 4.19: Registered faces

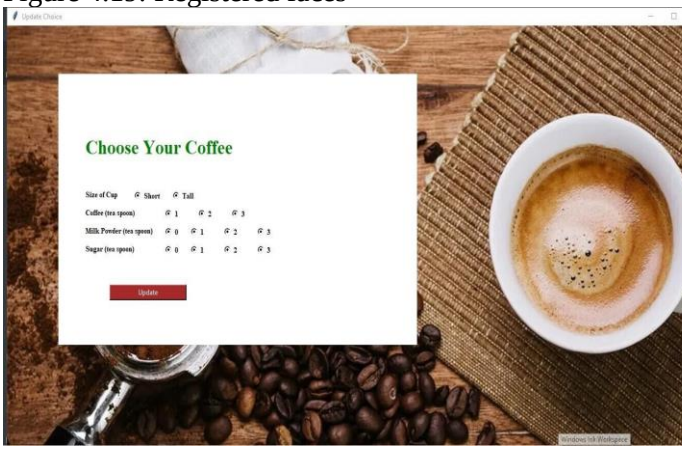


Figure 4.20: Printed values as per choice

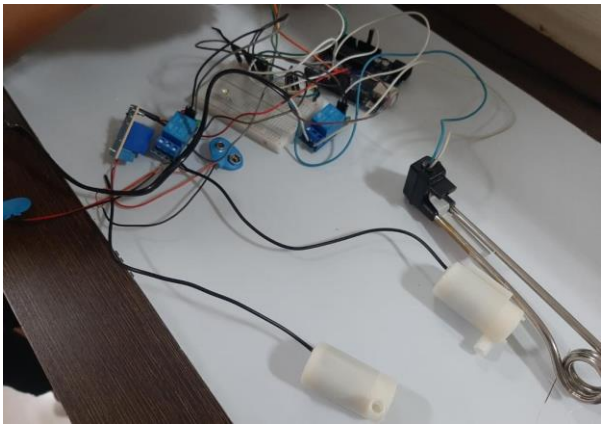


Figure 4.21: Heating Circuit

V. CONCLUSION

We are making a vending machine. This will save lots of time for our customers. We are providing a machine that will have low maintenance cost once installed. Customers will get their favorite customized coffee at a low cost and in less time.

VI. REFERENCE

[1] G. Singh and A. Kumar Goel, "Face Detection and Recognition System using Digital Image Processing," in IEEE, Banglore, 2020.

[2] K. Goyal, K. Agarwal and Rishi Kumar, "Face detection and tracking: Using OpenCV," in IEEE, 2017.

[3] M. Khan, S. Chakraborty, R. Astya and S. Khepra, "Face Detection and Recognition Using OpenCV," in IEEE, 2019.

[4] D. Meena and R. Sharan, "An approach to face detection and recognition," in IEEE, 2016.

[5] R. Subban and S. Soundararajan, "Human face recognition using facial feature detection techniques," in IEEE, 2015.

[6] C.-J. Chen, B.-R. Lin, C.-H. Lin and Chi-Feng Chen, "Smart Vending Machine System Prototyped with Deep- and Machine-Learning Technologies," in IEEE, 2020.

[7] W. Zhang and X. Long Zhang, "Design and Implementation of Automatic Vending Machine Based on the Short Massage Payment," in IEEE, 2010.

[8] M. D. Kumar and A. Hariharan, "Unmanned Coffee Vending Machine," in IEEE, 2019.

AET 032

Early Diabetes Detection

Soham Dalvi
Electronics Engineering
Vidyalankar Institute of Technology
Mumbai, India
sohamdalvi69@gmail.com

Asmita Bhekre
Electronics Engineering
Vidyalankar Institute of Technology
Mumbai, India
asmitabhekre@gmail.com

Ruchira Gupte
Electronics Engineering
Vidyalankar Institute of Technology
Mumbai, India
ruchiragupte@gmail.com

Deepak Varak
Electronics Engineering
Vidyalankar Institute of Technology
Mumbai, India
deepak.varak@gmail.com

Nisy Elsa Mathew
Electronics Engineering
Vidyalankar Institute of Technology
Mumbai, India
nisy.mathew@gmail.com

Abstract—Diabetic retinopathy is a leading cause of blindness among working- age grown- ups. Beforehand discovery of this condition is critical for good prognostic. In this design, we demonstrate the use of convolutional neural networks(CNNs) on color fundus images for the recognition task of diabetic retinopathy staging. Our network models achieved test metric performance analogous to birth literature results, with evidence perceptivity of 95.

We also explored multinomial type models and demonstrate that crimes primarily do in the misclassification of mild complaint as normal due to the CNNs incapacity to descry subtle complaint features. We discovered that pre-processing with distinction limited adaptive histogram equalization and icing dataset fidelity by expert verification of class labels improves recognition of subtle features. Transfer knowledge on pretrained GoogLeNet and AlexNet models from ImageNet bettered peak test set rigor to, and57.2 on 2- ary, 3- ary, and 4- ary type models, singly)

I. INTRODUCTION

Currently, a retinal fundus image plays a pivotal part in diabetic retinopathy opinion because numerous people could be affected by retinal bows. The world health organisation estimated in 2010 nearly 285 million people can be visually bloodied. In recent times retinal conditions(blindness) can significantly reduce with the help of automatic discovery and bracket ways(Morales etal., 2015). Diabetic Retinopathy(DR) is a most effective retinal complaint which can be diagnosed in earlier stages. generally, diabetic retinopathy stages are classified into four inflexibility situations(i.e., mild, moderate, severe, and proliferative diabetic retinopathy). To descry the diabetic retinopathy in an earlier stage we've to find the features ofMicro-aneurysms, retinal hemorrhage, and exudates in which the lack of insulin causes high blood sugar in humans. Long- term diabetes also affects the mortal retina performing in a condition known as diabetic retinopathy (DR).

There are several stages of DR similar asnon-proliferative DR (NPDR), proliferative DR (PDR) and maculopathy or macular edema (ME). NPDR is known as background DR, whereas PDR and ME are the advanced stages of DR. Diabetic cases can have different signs of retinopathy similar as microaneurysms, hard exudates, hemorrhage and cotton hair spots (CWS) at different stages of DR. Microaneurysms are weak dark red spots developed on blood vessels that bulge outward. They're the first sensible change in the retina due to diabetic retinopathy. Hemorrhage is generally round or round in shape and formed by the rupture of micro aneurysms. They're also dark red in colour and can be located within themid-retina. Hard exudates and CWS are inclusively known as transude.

II. PROBLEM STATEMENT

Diabetic retinopathy (DR) is a profound reason behind0.8 million eyeless and3.7 million visually disabled people encyclopedically. Grounded on the check held in 2010, due to adding number of diabetes cases, the number of DR cases has been estimated to be191.0 million by 2030. DR can be fairly cured before affecting the vision, timely diagnostics and treatment can reduce the threat of visual loss by roughly 57. thus, routine webbing and regular follow up are essential for cases with diabetes, especially middle age and aged people.

III. SCOPE OF PROJECT

Remarkable advances in biomedical research have led to the generation of large amount of data. Using AI, it has become possible to extract meaningful information from large volumes of data, in a shorter frame of time, with very less human interference. Diabetes has a great anguish effect, with millions of people who need to be screened for diabetic retinopathy. Convolutional neural networks is known for recognizing pathological damage caused dure to DR from respective images.

So here comes our project EARLY DIABETICS DETECTION which seeks to help the adults and younger generations to identify the diabetic related disease in an earlier stage before it get harmful and unmanageable. Diabetic retinopathy is a complication of diabetes. In a long-term high glucose environment, retinal vessels will produce a series of pathological changes, such as micro aneurysms, hard exudates and soft exudates.

Nowadays, a retinal fundus image plays a crucial role in diabetic retinopathy diagnosis because many people could be affected by retinal inflections. If you have taken your retinal fundus image from nearby hospital then you can put your fundus image in our software and detect your diabetic retinopathy in an earlier stage we have to find the features of Microaneurysms, retinal hemorrhage, and exudates in which the lack of insulin causes high blood sugar in humans. Long-term diabetes also affects the human retina resulting in a condition known as Diabetic Retinopathy (DR)

The detailed scope of this project would contain the project functionalities.

Functionalities:

1. Go to a nearby hospital and take the fundus image.
2. Put the fundus image and wait for a second.
3. Based on input image it will give a result in which you can get to know that you are affected or not by Diabetic Retinopathy.

IV. AIM AND OBJECTIVE

To descry the diabetic retinopathy in an earlier stage we've to find the features of Micro-aneurysms, retinal hemorrhage, and exudates in which the lack of insulin causes high blood sugar in humans. Long- term diabetes also affects the mortal retina performing in a condition known as diabetic retinopathy (DR).

Applicable objects of proposed system was to ease the sweats of detecting diabetes by assaying the fundus of eye. In simple words fundus is nothing but the inside, back face of the eye. It's made up of the retina, macula, optical slice, fovea and blood vessels. The main functionality of this system was the development of algorithms for segmentation of optical fragment which is an important step in creating a fame of reference for diagnosing optical whim-whams head pathologies similar as glaucoma. Machine literacy has played a vital part in bracket of diabetic retinopathy. In order to showcase the results we used Streamlit web app for purpose of structure Graphical stoner Interface.

V. LITERATURE REVIEW

Glaucoma is a common eye complaint that affects millions of people worldwide and is a leading cause of unrecoverable blindness. Beforehand discovery and treatment are pivotal for precluding vision loss and blindness in glaucoma cases. still, the opinion of glaucoma is frequently grueling, as the complaint can progress without any conspicuous symptoms until it's too late. thus, there's a need for accurate and dependable styles for detecting glaucoma at an early stage. In recent times, several imaging ways, machine literacy algorithms, and artificial intelligence systems have been developed for glaucoma discovery. This literature check aims to give an overview of these approaches, including their advantages and limitations.

A.IMAGING TECHNIQUES:

Imaging ways, similar as optic consonance tomography (OCT) and confocal scanning ray ophthalmoscopy (CSLO), are extensively used in glaucoma discovery. OCT is anon-invasive imaging fashion that uses light swells to produce high- resolution images of the retina, including the retinal whim-whams fiber subcaste (RNFL), ganglion cell subcaste (GCL), and optical whim-whams head (ONH). Several studies have shown that OCT is a precious tool for early discovery and monitoring of glaucoma. For case, Li etal. (2019) used OCT to descry glaucoma progression in cases and achieved an area under the wind (AUC) of0.93. CSLO is another imaging fashion that generates high-discrepancy images of the ONH by using a ray ray to overlook the retina. Several studies have shown that CSLO is a precious tool for early glaucoma discovery. For case, De Moraes etal. (2017) used CSLO to measure the mug- to- slice rate and achieved an AUC of0.85 in detecting glaucoma.

B. MACHINE LEARNING ALGORITHIMS:

Machine learning algorithms have been extensively used in glaucoma discovery, particularly for assaying OCT and CSLO images. ML algorithms can automatically dissect large quantities of data and identify patterns that may be delicate to descry using traditional individual styles. For case, Yu etal. (2019) developed an ML algorithm to dissect OCT images and achieved an AUC of0.97 in detecting glaucoma. The study also linked several important features associated with glaucoma, including RNFL consistence, age, and coitus. Deep literacy (DL) algorithms, a type of ML algorithm that utilizes neural networks, have also shown pledge in glaucoma discovery. DL algorithms can automatically learn hierarchical representations of the data, which can ameliorate the delicacy of glaucoma discovery. For case, Wang etal. (2020) developed a DL algorithm to dissect OCT images and achieved an AUC of0.95 in detecting glaucoma. The study also linked several important features associated with glaucoma, including RNFL consistence, age, and axial length.

C. C. ARTIFICIAL INTELLIGENCE SYSTEM:

D. Artificial intelligence (AI) systems, which combine imaging ways with ML algorithms, have shown promising results in glaucoma discovery. AI systems can automatically dissect large quantities of data and give real- time feedback to clinicians, enabling early discovery and treatment of glaucoma. For case, Li etal. (2021) developed an AI system that combines OCT images with an ML algorithm and achieved an AUC of0.97 in detecting glaucoma. The study also linked several important features associated with glaucoma, including RNFL consistence, GCL consistence, and age.

E.

1) Diabetic retinopathy is an eye complaint caused by diabetes. Diabetic retinopathy discovery is an important task in retinal fundus images due the early discovery and treatment can potentially reduce the blindness. Retinal fundus images play an important part in diabetic retinopathy through complaint opinion, complaint recognition and treatment. The current state- of- the- art ways aren't satisfied with perceptivity and particularity. In fact, there are still other issues to be resolved in state- of- the- art ways similar as performances, delicacy, and fluently relating the DR complaint effectively. The proposed automatic webbing system for diabetic retinopathy was conducted in several way Pre-processing, optical slice discovery and junking, blood vessel segmentation and junking, point birth.

2)DR is a constantly deteriorating complaint, being one of the leading causes of vision impairment and blindness. Subtle distinction among different grades and actuality of numerous significant small features make the task of recognition discovery a veritably laborious and time-ferocious task, which heavily relies on the skill of a croaker

Automated discovery of diabetic retinopathy is essential to attack these problems. Beforehand- stage discovery of diabetic retinopathy is also veritably important for opinion, which can help blindness with proper treatment. In this paper, we developed a new system which performs the early- stage discovery by relating all microaneurysms (Mamas), the first sign DR, along with rightly assigning markers to retina finances images. Diabetic retinopathy dataset and achieved 93 delicacy.

VI. ALGORITHIMS

A. CNN

A Convolutional Neural Network (CNN) is a type of deep neural network commonly used for image classification and recognition tasks. CNNs are inspired by the way the human visual cortex processes visual information. They consist of several layers of interconnected neurons that learn to identify features and patterns in images. In CNNs, convolutional layers are used to apply filters to input images in order to detect various features like edges, lines, shapes, and textures. These convolutional layers are followed by pooling layers, which reduce the spatial dimensions of the feature maps, and fully connected layers, which perform the classification task. CNNs are known for their ability to automatically learn and extract features from images without the need for explicit feature engineering. They have achieved state-of-the-art performance in many computer vision tasks, including image classification, object detection, and segmentation. CNNs are trained using large datasets of labeled images and employ backpropagation to adjust the weights of the neurons in the network during training. They also use techniques such as dropout and regularization to prevent overfitting to the training data. NNS have revolutionized the field of computer vision and have found applications in various domains, such as self-driving cars, medical image analysis, and surveillance systems. They have also been extended to handle other types of data, such as

audio and text, leading to the development of more advanced deep learning models.

B. Preprocessing, Processing and Post processing

Preprocessing, processing, and post-processing are three important stages in the overall data analysis pipeline. These stages are typically used in the context of machine learning and signal processing applications, but they can also apply to other domains. Preprocessing refers to the stage where raw data is transformed into a form that is suitable for analysis. This can involve tasks such as data cleaning, normalization, feature scaling, dimensionality reduction, and data augmentation. Preprocessing is important because it can significantly affect the quality of the results obtained from subsequent stages. Preprocessing is often done to address issues such as missing data, outliers, noise, and data imbalance. It can also be used to transform the data into a format that is suitable for the particular machine learning or signal processing model being used.

Processing refers to the stage where the transformed data is fed into a machine learning or signal processing model to generate predictions or insights. This involves tasks such as model selection, training, hyperparameter tuning, and inference. Processing is important because it determines the accuracy and generalization capability of the model. Processing can involve many different types of machine learning or signal processing models, such as linear regression, decision trees, support vector machines, deep neural networks, Fourier transforms, and wavelet transforms. The choice of model depends on the specific task and the characteristics of the data.

Post-processing refers to the stage where the output of the processing stage is further analyzed or transformed to generate more meaningful results. This can involve tasks such as thresholding, clustering, classification, visualization, and interpretation. Post-processing is important because it can help to refine the output and make it more interpretable or actionable. Post-processing can involve many different types of analysis or transformation, depending on the goals of the analysis. For example, in image processing, post-processing may involve thresholding to identify objects in the image, or clustering to group similar objects together.

Preprocessing, processing, and post-processing are often iterative processes, where the results of one stage inform the choices made in subsequent stages. For example, the results of the processing stage may be used to inform the choice of post-processing techniques. The quality of the results obtained from preprocessing, processing, and post-processing depends on many factors, such as the quality of the input data, the choice of preprocessing techniques, the choice of machine learning or signal processing models, and the choice of post-processing techniques. It is therefore important to carefully consider each stage and make appropriate choices to obtain the best possible results. Overall, preprocessing, processing, and post-processing are all important stages in the data analysis pipeline, and each stage requires careful consideration and attention to detail to ensure the best possible results.

C. CDR Mreasurement Calculation and Evaluation

CDR measurement refers to the measurement of the optic disc and cup, which are structures in the eye that can be used to detect and monitor the progression of glaucoma. Here are some steps involved in CDR measurement, calculation, and evaluation:

Image acquisition: The first step in CDR measurement is to obtain high-quality fundus images of the eye. This can be done using various imaging techniques, such as optical coherence tomography (OCT), scanning laser ophthalmoscopy (SLO), or fundus photography.

Image processing: Once the images are obtained, they are preprocessed to remove any artifacts or noise that may interfere with the accuracy of the CDR measurement. This can involve various techniques, such as contrast enhancement, edge detection, and filtering. Optic disc and cup segmentation: The next step is to segment the optic disc and cup in the image. This can be done manually by an expert clinician or automatically using image processing techniques, such as thresholding or edge detection.

CDR calculation: Once the optic disc and cup are segmented, the CDR can be calculated using the following formula: CDR = (cup diameter) / (disc diameter). The cup and disc diameters can be measured manually or automatically using image processing techniques.

Evaluation: Finally, the CDR measurements can be evaluated to determine if the patient has glaucoma or is at risk of developing glaucoma. Various factors, such as

age, family history, and intraocular pressure, may also be taken into account to make a more accurate assessment of the patient's risk.

It is important to note that CDR measurement is just one of many factors that are considered in the diagnosis and management of glaucoma. Other factors, such as visual field testing and structural analysis of the optic nerve, may also be important.

VII. METHODOLOGY

A. Block Diagram



Fig. 1. Early diabetes detection block diagram

Retina Image: The first step is to gain retinal images. These images can be captured using technical cameras and are generally high- resolution images of the reverse of the eye.

Pre-processing:
The images are alsopre-processed to enhance the quality of the image, remove any noise, and homogenize the images. This may include operations similar as cropping, resizing, and conforming the brilliance and discrepancy.

CNN: Once the images have been pre-processed, a Convolutional Neural Network (CNN) is used to prize features from the images. A CNN is a deep literacy algorithm that's specifically designed for image bracket. It works by breaking down the image into lower factors and assaying each element to identify features similar as edges, lines, and shapes.

Feature Extraction: The features uprooted from the images by the CNN are also anatomized to determine the presence or absence of DR. This process involves using machine literacy algorithms to identify patterns in the uprooted features that are reflective of DR.

Feature Classification: Grounded on the patterns linked in the uprooted features, the images are classified as either DR or NDR. This is generally done using supervised literacy algorithms, which are trained on a dataset of labeled images to learn the patterns that distinguish DR from NDR.

Diabetic Retinopathy or Not Eventually, the bracket result is used to determine whether the image contains substantiation of DR or not. This information can be used to help diagnose and manage diabetes- related eye conditions.

B. WORKING:

Preprocessing
All images were converted to a hierarchical data format for preprocessing, data addition, and training. Preprocessing involved several way images were cropped using Otsu's system to insulate the indirect-colored image of the retina. Images were regularized by abating the minimal pixel intensity from each channel and dividing by the mean pixel intensity to represent pixels in the range 0 to 1. Differ adaptation was performed using the discrepancy limited adaptive histogram equalization (CLAHE) filtering algorithm.

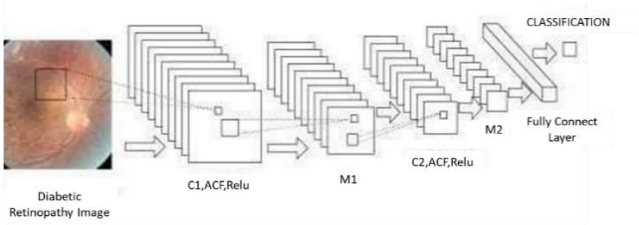


Fig.2. CNN Architecture

Data Augmentation

We stoked the number of images in real- time to ameliorate network localization capability and reduce overfitting. During each time, a arbitrary addition of images that save collinearity and distance rates was performed. We enforced arbitrary padding with bottoms, drone, rolling and gyration. These affine metamorphoses are particularly effective when applied to complaint class R1 which are the most delicate to grade and smallest in number.

Training and Testing Models
A Deep Learning GPU Training System (DIGITS) with prebuilt convolutional neural networks for image bracket eased data operation, model prototyping and real- time performance monitoring. integers is an interactive system and was first used to make a bracket dataset by unyoking the Messidor and MildDR fundus brochure into training and confirmation subsets of 1077 and 269 images independently. The images were cropped to area size 256x256 and used as input data by Imagenet models preliminarily trained for general

bracket tasks. The test subset brochure contained 400 images from the Lariboisiere sanitarium Messidor partition and was disjoint from training data. This training system, which offered expansive hyperparameter selections, was also used to make model prototypes over 100 ages taking roughly 20 twinkles each to complete. A Tesla K80 GPU tackle device powered the training, and a form of early stopping determined the optimal test set model time.

Advanced visualization monitoring and confusion matrix statistical analysis handed important perceptivity. The further refined models were developed in TensorFlow using modified performances of the open source GitHub package (https//github.com/yidarvin/FirstAid) and estimated with fresh digital image preprocessing ways.

Transfer Learning:

Grounded approaches were executed with pretrained AlexNet and GoogLeNet infrastructures from ImageNet. The last completely connected subcaste was removed, also a transfer learning scenario18 was followed by treating the remaining network factors as a fixed point extractor for the new dataset. The transfer literacy retains original pretrained model weights and excerpts image features via a final network subcaste.

Features Extraction:

In these stages, we've to prize some features from retinal fundus image to describe or descry the diabetic retinopathy complaint. point that we're going to prize from that image, and on the Bases of these we're going to do the point bracket as

- No Diabetic Retinopathy
- Diabetic Retinopathy

VIII. IMPLEMENTATION

A. DATASET

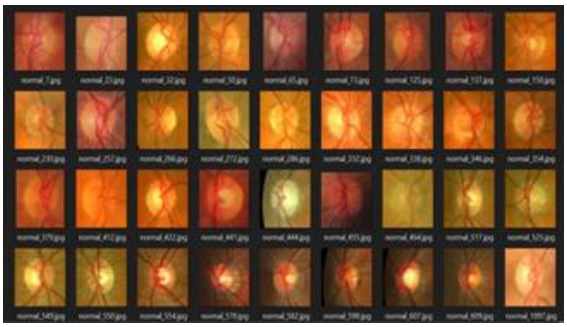


Fig. 3. Diabetic Dataset



Fig. 4. Normal Dataset



Fig. 5. Healthy eye retina

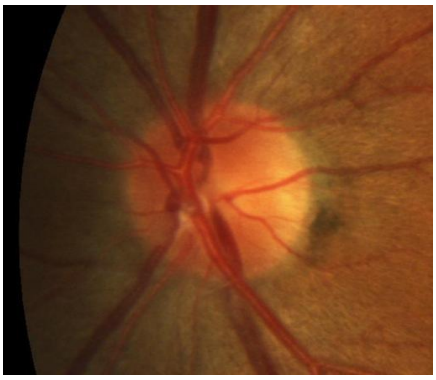


Fig. 6. Unhealthy eye retina

B. TRAINING MODEL

The collection process involved gathering all the publicly available labeled fundus images of eyes from the web. Both cropped and full fundus images were included, with the full images also being cropped. To standardize the naming convention, the images in both classes were bulk renamed using the Bulk Rename Utility tool. Subsequently, the images were converted into the JPG format in bulk using the bulk image tool. Due to an imbalance in the number of images between the classes, the dataset was balanced by removing extra images. The resulting dataset was afterwards randomly divided into train, validation, and test sets in an 8:1:1 ratio. All these images were then uploaded to Google Drive and utilized for training various CNN architectures, ranging from simple to advanced. Data augmentation techniques were also applied using the Keras Image Generator to reduce high variance. However, it should be

noted that some bias may exist due to low-quality or inadequate data. The training process utilized Keras (version 2.4.3) and TensorFlow (version 2.3.0) on top of Python (version 3.6.9). Throughout the training, the models were trained on the train set, validated on the validation set after each epoch, and ultimately tested on the test set. Thus a good AUC score along with good accuracy, precision, and recall values. The trained model file in the H5 format was saved for future use. Subsequently, a simple Streamlit app was developed to host the trained model on the web, enhancing accessibility and user-friendliness.

IX. SOFTWARE UTILITIES

A. Python

Python is a high- position, interpreted programming language that was first released in 1991. It's designed to be easy to read and write, with a simple syntax that emphasizes law readability and it reduces the cost of program conservation. Python's popularity has grown swiftly in recent times, in part due to its use in data wisdom, artificial intelligence, and machine knowledge. One of the pivotal strengths of Python is its versatility. It can be used for a wide range of operations, including web development, data analysis, scientific computing, game development, and more. Python is also largely extensible, with a large collection of third- party libraries and modules that can be easily integrated into Python programs. Python is an interpreted language, which means that law written in Python is executed line by line, without the need for florilegium. This makes it easy to test and remedy law, and it also makes Python largely portable across different platforms and operating systems. Another important point of Python is its dynamic typing system. Unlike statically-compartmented languages like C or Java, Python does not bear the programmer to explicitly declare variable types. This makes Python law more concise and easier to read, as the law is less cluttered with type declarations. In addition to its core features, Python also provides a range of development tools and fabrics that make it easier to develop Python operations. These include tools for package operation, debugging, profiling, and more. There are also multitudinous popular Python web fabrics, analogous as Flask and Django, that make it easy to develop web operations using Python. Overall, Python is a largely versatile and easy- to- use programming language that has gained wide popularity in recent times. Its simple syntax, dynamic typing, and large collection of third- party libraries make it well- suited for a wide range of operations, from web development to scientific computing and beyond.

B. Jupyter

Jupyter is an open-source, web-based platform for interactive computing that allows users to create and share documents that contain live code, equations, visualizations, and narrative text. Jupyter notebooks are widely used in data science, scientific computing, and education. Jupyter was originally developed as a spin-off of the IPython project in 2014. The name "Jupyter" is a combination of the programming languages Julia, Python, and R, which are all supported by Jupyter. One of the main features of Jupyter is its support for multiple programming languages. Users can write and run code in a wide range of languages, including Python, R, Julia, and others, all within the same notebook. This makes Jupyter a powerful tool for data analysis and exploration. Another key feature of Jupyter is its ability to create and share interactive visualizations. Users can easily create charts, graphs, and other visualizations directly within their notebooks using libraries such as matplotlib, seaborn, and bokeh. These visualizations can be shared with others and embedded in websites or blog posts. Jupyter notebooks also support markdown, a lightweight markup language that allows users to include formatted text, equations, and images in their notebooks. This makes it easy to create documents that combine code, visualizations, and narrative text, making Jupyter a popular tool for data analysis and scientific research. In addition to its core features, Jupyter also provides a range of extensions and plugins that allow users to customize and extend its functionality. There are also many third-party libraries and tools that integrate with Jupyter, such as Jupyter Lab, which provides a more advanced interface for working with notebooks. Overall, Jupyter is a powerful and flexible tool for interactive computing, data analysis, and scientific research. Its support for multiple programming languages, interactive visualizations, and markdown formatting makes it a popular choice for a wide range of users, from data scientists to educators.

C. TensorFlow

TensorFlow is an open-source machine learning framework developed by Google Brain team, which has gained popularity due to its versatility and ease of use. TensorFlow allows users to build and train various

machine learning models, including deep neural networks, convolutional neural networks, and recurrent neural networks. One of the key features of TensorFlow is its ability to handle large amounts of data with ease. It provides efficient data processing and optimization tools that allow users to work with large datasets. TensorFlow also supports distributed computing, which allows users to scale their machine learning models across multiple machines. TensorFlow provides a high-level API called Keras, which makes it easy to build and train deep learning models. Keras provides a simple and intuitive interface for building complex neural network architectures, and it allows users to build models with just a few lines of code. Keras also provides a range of pre-built layers and modules that can be combined to create a wide variety of neural network architectures. Another important feature of TensorFlow is its flexibility. TensorFlow provides a range of low-level APIs that allow users to customize and extend the framework to meet their specific needs. TensorFlow also supports a wide range of hardware platforms, including CPUs, GPUs, and TPUs, making it possible to run machine learning models on a variety of devices. In addition to its machine learning capabilities, TensorFlow also provides tools for data visualization and analysis. TensorFlow includes Tensor Board, a web-based tool that allows users to visualize their machine learning models and analyze their performance. Overall, TensorFlow is a powerful and flexible machine learning framework that has gained popularity due to its versatility and ease of use. Its ability to handle large amounts of data and support for distributed computing make it well-suited for large-scale machine learning projects. Additionally, its integration with Keras and support for a wide range of hardware platforms make it a popular choice for deep learning applications.

D. Streamlit

Streamlit is a free and open-source platform for building interactive data science and machine learning web applications. It allows users to create and share custom data applications using simple Python scripts, without the need for extensive web development knowledge. Streamlit was first released in 2019, and has quickly gained popularity among data scientists and developers for its simplicity and ease of use. It is built on top of Python, and integrates with popular data science libraries such as Pandas, NumPy, and scikit-learn. One of the key features of Streamlit is its ability to quickly create interactive visualizations and user interfaces for data applications. Users can create custom dashboards, charts, and plots using a simple Python syntax, and can easily add widgets such as sliders, dropdowns, and checkboxes to create interactive elements that allow users to manipulate data and explore results. Streamlit also provides a range of layout options and templates to help users quickly create professional-looking applications without the need for extensive CSS or HTML knowledge. Users can easily share their applications with others through a web interface or by deploying them to cloud platforms such as Heroku or Google Cloud. Another important feature of Streamlit is its ability to support machine learning workflows. Users can easily build and train machine learning models using popular libraries such as TensorFlow or PyTorch, and can integrate these models into their Streamlit applications for real-time predictions and analysis. Streamlit is also highly extensible, with a range of third-party libraries and plugins that can be easily integrated into Streamlit applications. This allows users to add custom functionality and features to their applications, such as custom visualizations or data processing tools. Overall, Streamlit is a powerful and flexible platform for building interactive data science and machine learning applications. Its simplicity, ease of use, and integration with popular data science libraries make it a popular choice among data scientists and developers who want to quickly create and share custom data applications.

E. Keras

Keras is a high-position neural networks API, written in Python and able of running on top of TensorFlow, CNTK, or Theano. It was developed by François Chollet and is now maintained by the TensorFlow platoon at Google. Keras provides a simple and intuitive interface for structure and training deep literacy models. Keras is designed to be stoner-friendly and easy to use, allowing druggies to make deep literacy models with just a many lines of law. It offers a range of pre-built layers and modules that can be combined to produce a wide variety of neural network infrastructures. also, Keras supports both convolutional neural networks (CNNs) and intermittent neural networks (RNNs), making it suitable for a wide range of operations, including image bracket, natural language processing, and time series analysis. One of the crucial features of Keras is its modularity. It allows druggies to fluently make complex neural network infrastructures by mounding layers on top of each other. Keras provides a wide range of pre-built

layers, including convolutional, pooling, intermittent, and thick layers. These layers can be combined to produce complex neural network infrastructures, similar as deep convolutional neural networks or intermittent neural networks. Another advantage of Keras is that it supports both CPU and GPU calculations. This makes it possible to train deep literacy models on a wide range of tackle, from laptops to high- performance computing clusters. also, Keras supports distributed training, making it possible to gauge up deep literacy models across multiple GPUs or indeed multiple machines. Keras also provides a range of serviceability for data preprocessing and data addition. These serviceability make it easy to load and preprocess data for use in deep literacy models. also, Keras provides a range of data addition tools, similar as image gyration, flipping, and scaling, which can be used to induce further training data and ameliorate the performance of deep literacy models. One of the crucial benefits of Keras is its integration with TensorFlow. TensorFlow is one of the most popular deep literacy libraries, furnishing a range of tools for structure and training deep literacy models. Keras provides a simple and intuitive interface for using TensorFlow, making it possible to make and train deep literacy models with just a many lines of law. Keras has a large and active community of druggies and inventors, which has redounded in a wide range of third- party extensions and plugins. These extensions and plugins give fresh functionality, similar as support for new types of layers or optimizers. also, Keras provides a range ofpre-trained models, which can be used for transfer literacy, making it possible to make high- performance deep literacy models with limited training data. In summary, Keras is a high-position neural networks API that provides a simple and intuitive interface for structure and training deep literacy models. It's designed to be stoner-friendly and easy to use, while also furnishing a wide range of advanced features for erecting complex neural network infrastructures. Keras is largely modular and supports both CPU and GPU calculations, making it possible to train deep literacy models on a wide range of tackle also, Keras integrates seamlessly with TensorFlow, furnishing a important and flexible platform for structure and planting deep literacy models.

X. WEBSITE INTERFACE AND RESULTS

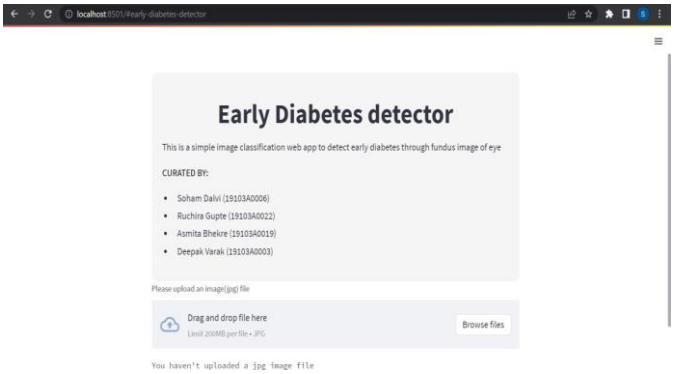


Fig. 7. Website page

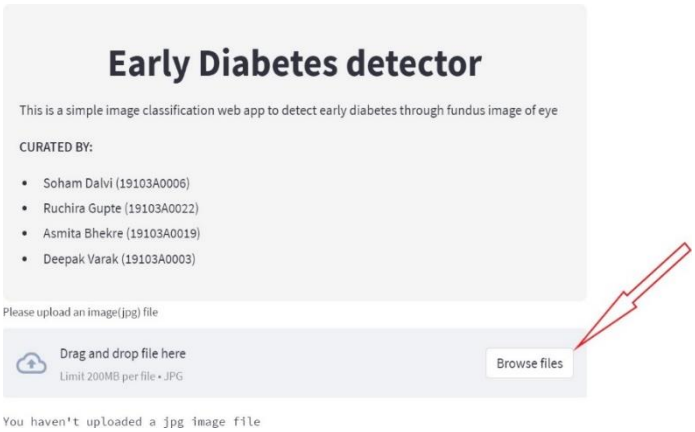


Fig. 8. Select 'Browse files'

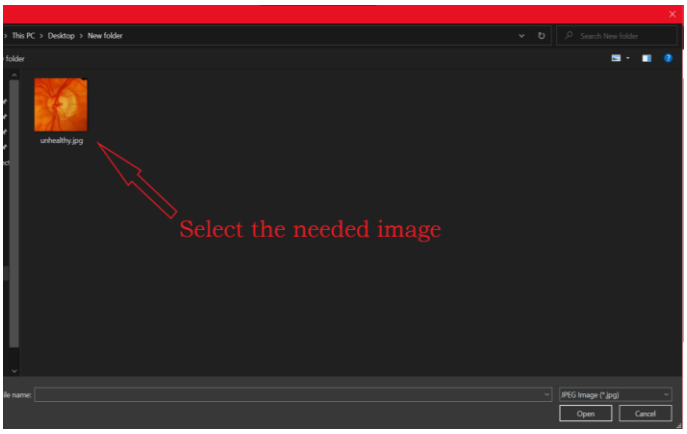


Fig. 9. Select the needed image

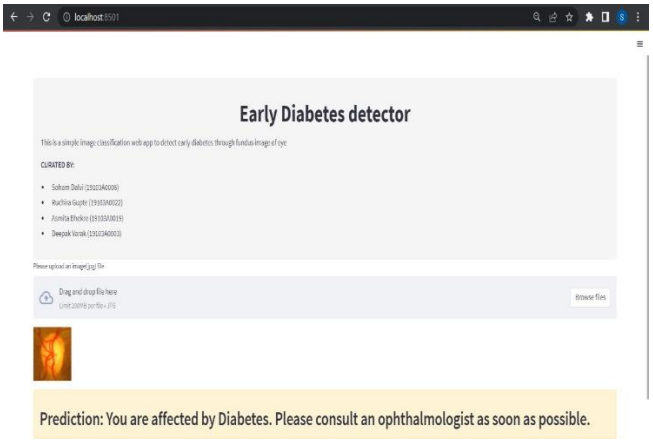


Fig. 10. Image taken from dataset with Diabetes

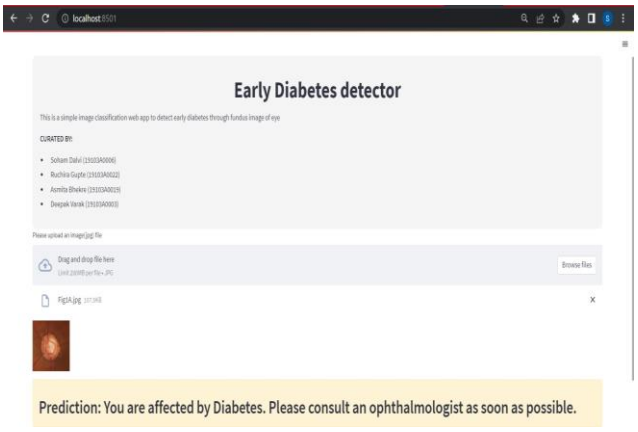


Fig. 11. Image taken from google with Diabetes

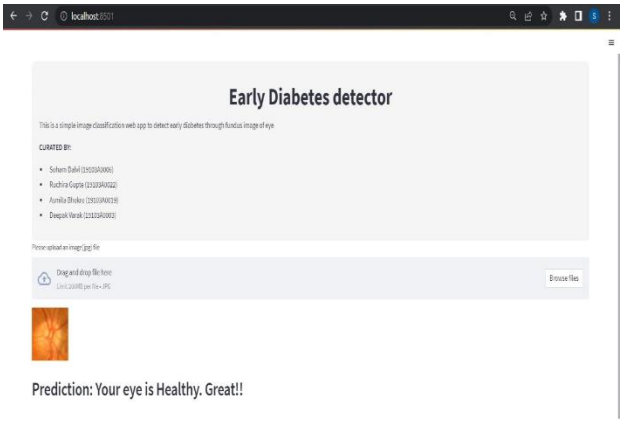


Fig. 12. Image taken from dataset without Diabetes

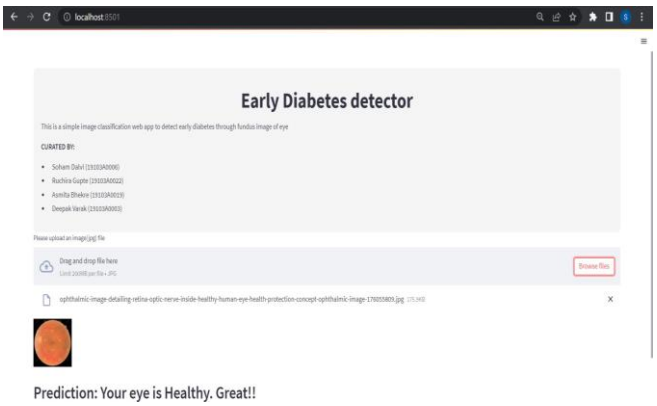


Fig. 13. Image taken from google without Diabetes

XI. CONCLUSION

The perpetration of automated discovery and webbing presents a unique occasion to help a significant portion of vision loss in the population. In recent times, convolutional neural networks(CNNs) have been incorporated into the set of algorithms used for diabetic complaint webbing. CNNs have the eventuality to work the large quantities of images amassed for croaker-interpreted webbing and learn from raw pixels. The high friction and low bias of these models could also enable CNNs to diagnose a wider range of nondiabetic conditions. still, despite achieving state- of- the- art performance with CNNs using double classifiers, model performance decreases with an adding number of classes. While it may feel that further data could ameliorate performance, former exploration in the field has verified that CNNs' capability to tolerate scale variations is limited. Some experts suggest that, in the case of retinal images, further data can not compensate for this essential limitation.

The features learned by CNNs for diabetic retinal image bracket live in the visible portion of the image, as revealed by visualizations. still, the features that distinguish between mild and normal complaint are subtle and delicate to descry indeed for mortal practitioners. Current CNN infrastructures, similar as those in the ImageNet visual database, are optimized for classifying macroscopic features present in the dataset. thus, a new paradigm for diagnosing conditions via CNN models may be needed, similar as a two- stage lesion discovery channel involving point localization, bracket, and segmentation of pathologies. farther preprocessing way may be necessary, along with rebalancing network weights to regard for class imbalances generally seen in medical datasets. unborn pretensions involve perfecting discovery of mild complaint and transitioning tomulti-grade complaint discovery, which is further grueling but could offer significant benefits in precluding vision loss.

A. Limitations Of The System

The dataset used for the design has limitation on the number of fundus image or retina image

User should take the fundus image by themselves we can not give the fundus image.

Because of the limitation of dataset we can not achieve or give you the desire result.

B. Future Scope of the project

Expansion of dataset The current system focuses on prognosticating the fundus image and giving the factual affair that whether you're affected by diabetes or not. Real- time monitoring We can take this design on coming position by adding the jeer pi and camera which is the factual thing of our in future. In future we can designed the model in such a way that by clicking one snap you can get to know your blood sugar position. It'll be a boon to the world of wisdom as it's a non invasive system, affordable and more dependable.

XII. REFERENCES

[1] Abràmoff M. D., Reinhardt J. M., Russell S. R., Folk J. C., Mahajan V. B., Niemeijer M., Quellec G. Automated early detection of diabetic retinopathy. *Ophthalmology,* 2010;117(6):1147–1154. [PMC free article] [PubMed] [Google Scholar]

[2] Antal B., Hajdu A. An ensemble-based system for microaneurysm detection and diabetic retinopathy grading. *IEEE transactions on biomedical engineering,* 2012;59(6):1720– 1726. [PubMed] [Google Scholar]

[3] Chan J. C., Malik V., Jia W., Kadowaki T., Yajnik C. S., Yoon K.-H., Hu F. B. Diabetes in asia: epidemiology, risk factors, and pathophysiology. *JAMA,* 2009;301(20):2129–2140. [PubMed] [Google Scholar]

[4] Congdon N. G., Friedman D. S., Lietman T. Important causes of visual impairment in the world today. *Jama,* 2003;290(15):2057–2060. [PubMed] [Google Scholar]

[5] Decenciere E., Zhang X., Cazuguel G., Lay B., Cochener B., Trone C., Gain P., Ordonez R., Massin P., Erginay A., et al. Feedback on a publicly distributed image database: the messidor database. 2014;33:231–234. [Google Scholar]

[6] Gardner G., Keating D., Williamson T., Elliott A. Automatic detection of diabetic retinopathy using an artificial neural network: a screening tool. *British journal of Ophthalmology.* 1996;80(11):940–944. [PMC free article] [PubMed] [Google Scholar]

[7] Gargeya R, Leng T. Automated identification of diabetic retinopathy using deep learning. *Elsevier.* 2017 [PubMed] [Google Scholar]

[8] Goh J. K. H, Cheung C. Y., Sim S. S., Tan P. C., Tan G. S. W, Wong T. Y. Retinal imaging techniques for diabetic retinopathy screening. *Journal of diabetes science and technology,* 2016;10(2):282–294. [PMC free article] [PubMed] [Google Scholar]

[9] Graham B. Kaggle diabetic retinopathy detection competition report. 2015 [Google Scholar]

[10] Gulshan V., Peng L., Coram M., Stumpe M. C., Wu D., Narayanaswamy A., Venugopalan S., Widner K., Madams T., Cuadros J., et al. Development and validation of a deep learning algorithm for detection of diabetic retinopathy in retinal fundus photographs. *JAMA,* 2016;316(22):2402–2410. [PubMed] [Google Scholar]

[11] Huang L. C., Yu C., Kleinman R., Smith R., Shields R., Yi D., Lam C., Rubin D. Opening the black box: Visualization of deep neural network for detection of disease in retinal fundus photographs. *The Association for Research in Vision and Ophthalmology.* 2017 [Google Scholar]

AET 033

Smart Agro System

Prof. Rakshak Sood
Assistant Professor, Department of Electronics and Computer Science, Vidyalankar Institute of Technology, Mumbai, India.

Anushka Rane
Student, Department of Electronics and Computer Science, Vidyalankar Institute of Technology, Mumbai, India.

Tanvee Jaiswal
Student, Department of Electronics and Computer Science, Vidyalankar Institute of Technology, Mumbai, India.

Shruti Biyani
Student, Department of Electronics and Computer Science, Vidyalankar Institute of Technology, Mumbai, India.

Rithika Kothur
Student, Department of Electronics and Computer Science, Vidyalankar Institute of Technology, Mumbai, India.

Abstract— Since early times agriculture and farming have been important parts of the Indian economy India is heavily reliant on the agriculture industry which also significantly boosts our Economy The amount and quality of the crops are greatly influenced by rainfall and climatic conditions It is essential to watch these variables to manage and enhance the crops' productivity and quality It is urgently necessary to combine new technology with traditional farming methods to assist the agriculture sector There is a need for a smart device for farming and gardening as IOT (Internet of Things) becomes more and more common [2] and everything becomes smart Consequently a novel IOT based system will be useful to address this issue Consequently a new IOT based system will be useful to address this issue IoT makes knowledge more accessible and uses it to inform crucial decisions by separating out the values obtained from instruments such as soil moisture water level sensors [2] water quality etc .Watering is both the most crucial and labor intensive practice in daily farming or gardening activities No matter the weather whether it's too hot and dry or too cloudy and damp you won't be able to control how much water gets to your plants Modern [2] watering equipment could be used effectively when plants need to be watered

Keywords—India, Smart Irrigation, Internet of Things, ESP32, Wi-Fi, Sensors

I. INTRODUCTION

Agriculture is the strength of the Indian Economy. However, water usage for agriculture exceeds annual rainfall. Improving farm yield is essential to meet the rapidly growing demand for food for population growth across the world. By considering and predicting environmental circumstances, farm yield can be increased. Crop quality is based on data collected from fields such as soil moisture, ambient temperature, humidity etc. Farm output can be increased by using advanced equipment and technology [9].

Agriculture is an important sector of the Indian economy as it contributes about 17% to the total GDP and supplies employment to over 60% of the population. The last few decades have seen an impressive development in Indian agriculture. Since independence, the production of food grains has grown, from 51 million tonnes (MT) in 1950–1951 to 250 MT in 2011–2012. During the same time span, the production of oilseeds (the nine major oilseeds) also increased from 5 MT to 28 MT. Agriculture in India has made a mark on the world stage thanks to the development. When it comes to the output of different agrarian products like paddy, wheat, pulses, groundnuts, rapeseeds, fruits, vegetables, sugarcane, tea, jute, cotton, tobacco leaves, etc., India is among the top three countries (GOI, 2008-09). However, on the marketing front, Indian agriculture is still struggling with issues like a lack of market connectivity and integration, as well as producers' lack of access to timely,
accurate information about a variety of issues in agriculture [10].

There are many ways that crops may be impacted by climate change. Warming tends to decrease yields above a certain temperature range because crops grow more quickly and produce less grain. Additionally, greater temperatures hinder plants' ability to absorb and use moisture. When temperatures climb, plants increase transpiration, or the loss of more moisture from their leaves, which speeds up soil evaporation. The overall result is referred to as "evapotranspiration." The overall effect of higher temperatures on water availability is a race between higher evapotranspiration and higher precipitation because global warming is likely to increase rainfall. Higher evapotranspiration typically wins that competition. Developing IoT (Internet of Things) technologies can help to collect copious amounts of environmental and crop recital data. Climate change is a major factor in unpredictable weather and rainfall patterns. As many of the farmers depend on the monsoons which occur for about four months of the year, changes due to this unpredictable nature of weather harm the crop yield, and tend to incur losses. To meet rising demand and reduce output losses, Internet of Things applications in agriculture focus on conventional farming operations. Robots, drones, remote sensors,

computer imaging, along with constantly improving machine learning and analytical tools, are used in agriculture by IoT to watch crops, survey, and map fields, and provide data to farmers for logical farm management plans that will save them time and money [11].

Smart agriculture is a solution to many global agricultural issues, like increasing team productivity, checking results, communicating with other teams and sub-units, as well as controlling market tendencies. Farms all over the globe are quickly considering integrating IoT solutions into their operational processes. By 2023, the global IoT agriculture market is predicted to reach $30 billion (about $92 per person intheUS)



Our goal in this project is to help the farmers with their crop yields by using efficient methods for helping them during the drought season due to deficient rainfall, updating the status of soil parameters and finally helping the farmers figure out which crop is best suited for a particular season.

IoT-based smart agriculture applications could be new levers to support other emerging or common trends in agriculture, such as organic farming, family farming (complex or small spaces, specific cattle and/or cultures, preservation of particular or high-quality varieties, etc.), and enhance highly transparent farming, in addition to conventional, large farming operations [4].

Together, the internet of things and cloud computing have created a promising chance to address the problems brought on by this rising demand on a global scale. The effectiveness and quality of agricultural production, storage, and transportation can be greatly enhanced by utilizing IoT and cloud services and precision farming techniques. In this paper, we outline the design of an IoT-enabled multilayered platform for the agriculture industry. By suggesting a workable human-centric IoT strategy for agriculture with a focus on developing countries, this research supplies significant contributions [5].

To increase energy efficiency and productivity, environmental elements in agricultural projects must be monitored and controlled. Real-time monitoring enables the early identification and remediation of difficult situations. This device is developed to watch environmental conditions such as temperature, soil moisture content, and the humidity of the air and water level of agricultural land for controlling irrigation. The real-time conditions sensed data is sent to the cloud server for storing and decision-making and controlling actions for the future also [6].

The main work falls under the following:

A. Sensor-based Smart Irrigation System

The system typically consists of sensors that measure soil moisture levels, temperature, humidity, sunlight, and other factors that affect plant growth and water requirements. The data collected by these sensors is sent to a controller, which then uses algorithms to decide the amount of water needed and the best timing for irrigation. The controller can also adjust the flow rate and duration of watering based on the data collected by the sensors. Sensor-based smart irrigation systems can help to conserve water by only watering when needed, which can be particularly important in areas where water resources are scarce or where water restrictions are in place. They can also improve plant health by supplying water when and where it is needed, reducing the risk of overwatering or underwatering. Additionally, these systems can be remotely watched and controlled, allowing for easy adjustments and maintenance.

B. Internet of Things

The Internet of Things (IoT) plays a crucial role in the development of smart irrigation systems. IoT-based smart irrigation systems use sensors, connectivity, and cloud computing to collect and analyze data, allowing for efficient and precise irrigation. In IoT-based smart irrigation systems, sensors are used to measure various environmental factors such as soil moisture, temperature, humidity, and rainfall. These sensors are connected to a central control unit that uses wireless or cellular networks to send data to the cloud. In the cloud, data is analyzed and processed to decide the best irrigation schedule and water amount required by plants. The control unit then sends the irrigation instructions to the irrigation system, which applies water to the plants through drip irrigation, sprinklers, or other irrigation methods.

II. LITERATURE SURVEY

Smart agro systems, also known as precision agriculture, are gaining popularity in the agriculture industry due to their ability to improve crop yields, perfect resource

usage, and reduce environmental impact. In this literature survey, we will review several published papers that discuss the concept and implementation of smart agro systems.

Smart Irrigation System using Machine Learning and IoT Bharath D.A. 1, S. Amith Nadig2, Manjunath G.S.3 - This research recommends an automated irrigation system that makes use of ensemble learning and the internet of things. By fusing recent sensor data with weather projections, the proposed method forecasts rainfall. The system uses soil moisture sensors and weather forecast data to perfect irrigation schedules and minimizes water usage. The authors prove the feasibility of their system through experimental results and discuss the potential benefits of using Machine learning-based smart irrigation systems in agriculture [1].

A research paper on smart agriculture using IoT - Ritika Srivastava, Vandana Sharma, Vishal Jaiswal, Sumit Raj- In this paper, the authors propose an IoT-based smart agro system. This paper offers ideas for building a structure that will make it simple and reliable for farmers to work in the fields. Agriculture is one of the key industries where IOTbased research is taking place and new products are being introduced daily to make operations smarter and more efficient towards better output. IOT-based smart farming applications will make it possible for the agricultural sector to increase output while reducing waste [2].

A Survey on the Role of IoT in Agriculture for the Implementation of Smart Farming- Muhammad Shoaib Farooq; Shamyla Riaz; Adnan Abid; Kamran Abid; Muhammad Azhar Naeem - This paper discusses the concept of smart farming and its security, for a better understanding of IoT smart farming security, this study takes into account a variety of IoT agricultural challenges and security requirements. In addition, numerous crucial aspects of IoTbased agriculture, such as technologies, industry trends, and national policies, have also been given to assist various stakeholder groups [3].

IoT Applications in Agriculture - The demand for the growing population can be successfully met with IoT - Savaram Ravindra

This article states that a Smart farming system which is built for monitoring the crop field with the help of sensors (light, humidity, temperature, soil moisture, etc.) and an automated irrigation system can help farmers to monitor or keep a track of the field conditions from anywhere. IoT-based smart farming system is highly efficient when compared with the conventional approach [4].

Abdullah Na, William Isaac -Developing a human-centric agricultural model in the IoT environment- The Internet of Things is a recent development in the telecom and IT industries. Massive automation of the real world is being accomplished through IoT. Each item has embedded sensing, computing, and networking powers in the ideal Internet of Things. All these connected objects, whether they are lighting fixtures, thermostats, household appliances, or wearable accessories, have one thing in common: they all gather data that is generated by or about people in order to provide value-added services [5].

Agricultural environment monitoring system using wireless sensor networks and IoT, June 2018 - Goncalo Marquesa, Rui Pitarmab This article shows a sensor network-related IoT application for agriculture that has been put into practice and tested in a practical setting. The paper describes the experimental setup and early findings of two tests conducted to enhance the iTreeM monitoring system [6].

Smart Farming: The Future of Agriculture - Based on a more precise and resource-efficient strategy, smart farming can produce a more productive and sustainable form of agricultural production. The eternal dream of mankind will eventually come true thanks to new farms. It will provide food for our populace, which could reach 9.8 billion by 2050 [7].

Mr. Nikhil N. Salvithal, SMART IRRIGATION SYSTEM USING IOT, Journal of Engineering, Computing and Architecture - ISSN NO: 1934-7197, Volume: 10 Issue: 4, 2020 - The Indian economy's strongest sector is agriculture. However, water usage for agriculture exceeds annual precipitation. To satisfy the rapidly rising global demand for food due to population growth, farm yield must be improved [9].

Monica M, IoT based control and automation of smart irrigation system: An automated irrigation system using sensors, GSM, Bluetooth and cloud technology, 2017 International Conference on Recent Innovations in Signal processing and Embedded Systems (RISE) - ISBN:978-1- 5090-4761-1, October 2017 - An essential part of our economy, the agricultural sector, is responsible for a sizable portion of both our exports and GDP. With technological development, we can set up an irrigation system that is automated, allowing for efficient water use and a reduction in the farmers' workload [10].

S Nalini Durga, SMART IRRIGATION SYSTEM BASED ON SOIL MOISTURE USING IOT, International Research Journal of Engineering and Technology (IRJET) - ISSN: 2395-0056, Volume: 05 Issue: 06, June 2018- Based on information gathered from the environment, such as soil

moisture, ambient temperature, and humidity, crops are evaluated for quality. Farm output can be increased by using cutting-edge equipment and technology. Large amounts of environmental and agricultural data can be gathered with the aid of developing IoT technologies [11].

In conclusion, the papers discussed in this literature survey prove the potential benefits of using smart agro systems in agriculture, including increased crop yields, reduced resource usage, and more sustainable farming practices. These studies prove the feasibility of implementing smart agro systems using IoT and cloud computing technologies and supply insights into the design and implementation of such systems.

III. PROBLEM STATEMENT

"India's groundwater (GW) levels are critically low, owing to erratic monsoon rains and over-extraction of water for irrigation, with agriculture accounting for 90% of India's G more than 30 million irrigation pumps. These irrigation systems are inefficient with poor water flow control, which over-extracts GW and over-irrigation of fields. This wastes water and reduces crop yields. At the same time, it wastes energy in pumping water, and this leads to higher CO2 emissions. 10 million of these pumps rely on diesel fuel, while the rest are powered by subsidized electricity which is coal-fired, using more than 18% of all electricity generated in India (Indian Bureau of Energy Efficiency). Agriculture sustains 50% of Indian households, and low GW levels threaten livelihoods and food security. With an estimated 330 million people experiencing acute water shortages, water scarcity has a significant effect on people's social welfare and is inextricably linked to extreme poverty and conflict. Improving the irrigation systems' efficiency will reduce pressure on groundwater and energy consumption and carbon emissions. This has prompted the Indian Government to prioritize drought proofing and usage of précised irrigation systems".

A. Conventional Traditional Method

Conventional irrigation methods refer to traditional irrigation techniques used for centuries by farmers to water crops and maintain soil moisture. These methods include surface irrigation, sprinkler irrigation, and subsurface irrigation.

1) Surface Irrigation: Surface irrigation, also known as flood irrigation, is the oldest and most generic form of irrigation. In surface irrigation, water is applied to the field by gravity, spreading it across the surface of the soil. This method is suitable for flat and level fields, and the water can be applied using furrows, borders, or basins. Surface irrigation is a simple and inexpensive method of irrigation, but it can be inefficient due to high evaporation rates, runoff, and uneven distribution.

2) Sprinkler Irrigation: Sprinkler irrigation is a type of irrigation that uses pressurized water to distribute water over the crop. Sprinkler systems are composed of pipes, sprinklers, and valves, used to distribute water evenly over the crop. Sprinkler irrigation is suitable for a variety of crops and soil types, and it can be used on both flat and sloping terrain. The advantages of sprinkler irrigation include reduced water waste, higher water use efficiency, and reduced labour requirements. However, the system requires significant capital investment and maintenance.

3) Subsurface Irrigation: Subsurface irrigation is a form of irrigation that delivers water directly to the plant's roots through buried drip or micro-sprinkler systems. Subsurface irrigation is a highly efficient method of irrigation that reduces water loss due to evaporation, runoff, and deep percolation. The advantages of subsurface irrigation include improved water use efficiency, reduced labour requirements, and increased crop yield. However, the system requires careful management to prevent clogging of the emitters and ensure even distribution of water.

Conventional irrigation methods have been used for centuries by farmers to water crops and maintain soil moisture. While these methods are effective, they can be inefficient and wasteful, resulting in reduced crop yield and increased water usage. The choice of the proper irrigation method depends on several factors, including the soil type, crop type, topography, and water availability. As water resources become scarcer, farmers are increasingly adopting more efficient and sustainable irrigation methods, such as smart irrigation systems, which utilize advanced technologies to optimize water usage and increase crop yield.

B. Problems in Traditional System

Conventional irrigation methods refer to the traditional methods of irrigating crops such as flood irrigation, sprinkler irrigation, and furrow irrigation. While these methods have been used for many years, they have several drawbacks that limit their efficiency and sustainability.

1) Water wastage: Conventional irrigation methods can result in significant water wastage. Flood irrigation, for example, involves flooding the field with water, which can lead to water runoff and soil erosion. Sprinkler irrigation can result in water loss due to evaporation, wind drift, and uneven distribution.

2) Soil erosion: Conventional irrigation methods can result in soil erosion, particularly in areas with sloping terrain. Flood irrigation can lead to soil erosion due to the force of water, while furrow irrigation can cause soil erosion due to the concentration of water in the furrows.
3) Salinization: Conventional irrigation methods can result in the salinization of the soil. When water is applied to the soil, some of it evaporates, leaving behind salts that accumulate in the soil over time. This can lead to reduced soil fertility and crop yields.
4) Energy consumption: Conventional irrigation methods can require significant energy to pump and distribute water. This can result in increased energy costs and greenhouse gas emissions.
5) Limited control: Conventional irrigation methods provide limited control over the amount and timing of water application. This can result in over-watering, under-watering, or uneven distribution of water, which can reduce crop yields and quality.

Overall, conventional irrigation methods have several drawbacks that limit their efficiency and sustainability. As a result, there is a need for more advanced and sustainable irrigation methods, such as smart irrigation systems, that can optimize water usage while reducing environmental impact.

C. Smart Irrigation System

Smart irrigation is an advanced irrigation system that uses technology and real-time data to optimize the use of water in agriculture. Smart irrigation systems can help farmers to monitor soil moisture, weather conditions, and other factors to determine when, where, and how much water to apply to crops. In this note, we will discuss the pros and cons of smart irrigation.

Pros:

Water Conservation: Smart irrigation systems can significantly reduce water usage by delivering water only when it is needed. By monitoring the soil moisture levels, these systems can prevent overwatering, which is a significant cause of water waste in conventional irrigation methods.

Improved Crop Yield: Smart irrigation systems can improve crop yield by providing crops with the right amount of water at the right time. This can help to prevent water stress, nutrient deficiency, and other problems that can adversely affect crop growth and development.

Cost Savings: Smart irrigation systems can help farmers to save money on water bills, energy costs, and labor costs. By reducing water waste and optimizing water usage, these systems can lower overall irrigation costs.

Remote Monitoring: Smart irrigation systems can be monitored and controlled remotely, allowing farmers to manage their irrigation systems from anywhere. This can save time and effort and improve irrigation efficiency.

Cons:

Initial Investment: The cost of installing a smart irrigation system can be high, which may be a barrier for small-scale farmers.

Maintenance: Smart irrigation systems require regular maintenance, including monitoring and calibration of sensors, an inspection of valves and pipes, and cleaning of filters.

Technical Expertise: Smart irrigation systems require technical expertise to set up and maintain. Farmers may require training and support to use these systems effectively. Data Management: Smart irrigation systems generate a significant amount of data, which can be overwhelming for farmers who are not familiar with data management.

IV. PROPOSED SYSTEM

In this system, the moisture sensor (Potentiometer in the prototype) senses the moisture level of the soil and the Photodiode senses the intensity of the incident light. The moisture sensor senses the amount of water content in the soil and gives the values in form of resistance values. The pump is turned ON when the moisture level falls below a given threshold and the plants will be supplied with water. This threshold can be changed and customized according to the the type of plant used and how much water that plant needs. The system has been divided mainly into two subproblems, one being when there is an ample amount of sunlight available to let the water evaporate and one being when there isn’t an ample amount of sunlight, probably nighttime. When the Photodiode senses that there isn't enough sunlight then it does not power on the motor /pump even when there isn't an ample amount of moisture in the soil whereas when there is an ample amount of sunlight available the soil moisture sensor(Potentiometer here) senses the current level of moisture content in the soil and when the moisture content of the soil reaches below a custom threshold then it automatically switches on the pump with the help of ESP32 and irrigates the plant until the desired moisture level isn't reached. The overall activity is reported to the user by mobile app.

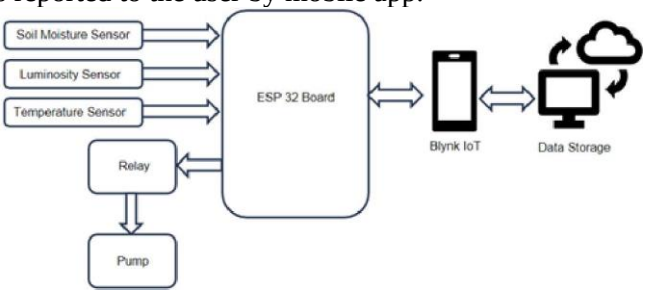


Fig. 1. Block Diagram

Once the motor pump is running, the automated condition below will operate.

1) User can switch OFF the motor if he desires by a click on the web page- The moisture sensors measure the moisture level (water content) of the different plants. If the moisture level goes below the desired and limited level, the moisture sensor sends the signal to the ESP32 which triggers the Water Pump to turn ON and supply the water to respective plant.

2) Once the soil moisture sensor reaches the necessary threshold value, the motor pump will immediately be turned OFF.

3) If the weather condition is such that it started raining, then the ESP32 will shut down the motor pump till it rains, and after that it checks whether the soil moisture sensor has reached the threshold value or not. The motor pump will stay off if it crosses the threshold value; otherwise, it will restart automatically. This serves to conserve electricity and water resources.

4) The automation is achieved by turning the motor on and off using the threshold values embedded in the code. The status for the same is alerted to the users through messages using ESP32.

$$Soil\ Moisture = \frac{Water\ fraction}{Volume}$$

$$y = \frac{m}{x} + c$$

Where,

y = soil moisture level
x = rise in temperature
c = constant
m = slope

$$y = \frac{85}{x} + c$$

5) Additionally, if the power is interrupted, and the engine is turned off. The user won't need to worry about manually restarting the motor pump because it will restart itself when a power source is available.

V. REQUIREMENTS

A. Hardware

1) ESP 32 Development Board - ESP32 Development board is based on the ESP WROOM32 WIFI + BLE Module. It is a compact, simple system development board that is simply placed into a solderless breadboard and is powered by the most recent ESP-WROOM-32 module. It includes the micro-USB connector, LDO regulator, reset and boot mode buttons, USB-UART bridge, and all the essential support circuitry for the ESPWROOM-32. The developer has access to all crucial GPIOs.

2) Relay Module - Relays are electrical switches that can be used to manage higher voltage systems and equipment. An electromagnet is often used as the mechanism in module relays. Typically, DC is used as the relay module input voltage. Although it is essentially within the limit levels that the relay is designed for, the electrical loathed that a relay will manage can be either AC or DC. For easy access, the relay module information is typically printed on the device's surface. This covers the switch voltage, input voltage rating, and current limit.

3) Soil Moisture Sensor - A sensor is used to determine the volumetric content of water in the soil. As the soil moisture is straight, the gravimetric dimension needs to be removed, and dried, as well as sample weighting. Capacitance is primarily used by this sensor to measure the soil's moisture content (dielectric permittivity). This sensor can function by being inserted into the ground, and the status of the water content in the soil can be provided as a percentage.

4) Luminosity Sensor – BH1750 - A digital ambient light sensor IC for the I2C bus, the BH1750FVI is a digital light sensor. The Display and keypad backlight power of a mobile phone can be adjusted using ambient light data obtained by this IC. Wide-range detection at high resolution is doable.

5) Temperature Sensor – DHT11 - A basic, extremely affordable digital temperature and humidity sensor is the DHT11. It measures the humidity in the air using a thermistor and a capacitive humidity sensor, and it outputs a digital signal on the data pin (no analogue input pins needed). Although reasonably easy to use, data collection requires precise timing.

6) 12 V Water Pump - Small pumps are known as DC water pumps are run by a battery, dc power source, or solar panel. Their main functions are to pressurize, circulate, and emulsify liquids. They are especially helpful in areas with limited access to water.

B. Software

1) Arduino IDE (Integrated Development Environment) - The Arduino Integrated Development Environment - or Arduino Software (IDE) It has a menu system, a toolbar with buttons for common functions, a message area, a text console, and a text editor for writing code. To upload programs and communicate with them, it connects to the Arduino hardware.

2) Blynk IoT (Internet of Things) - Blynk is an Internet-ofThings platform for iOS or Android smartphones that allows users to remotely use devices like Arduino, Raspberry Pi, and Node MCU. With this application, you can compile and supply the right address on the various widgets to construct a graphical interface or human-machine interface (HMI). For use with the Internet of Things, Blynk was created. It has several amazing features, like remote hardware control, sensor data display, data storage, data visualization, and many more.

VI. IMPLEMENTATION

In this part, we will discuss how all the modules are incorporated with each other.

A. Integrating the soil moisture, luminosity, and temperature sensor with the ESP32 board.

The soil moisture sensor we used measures the moisture level of the soil. We have categorized the minimum and maximum values for this sensor with 500 being the maximum moisture content in the soil and 4000 being the threshold value above which the pump will be turned ON and the plant will be supplied with water. The temperature sensor DHT11 senses the temperature of the surroundings and accordingly when the temperature is high the pump will be turned ON to compensate for the ater that has been evaporated due to the elevated temperature. This will be triggered if there is an exponential change in the recorded temperatures. We have set the values in the range of 0-50 degree Celsius where if the temperature is closer to the maximum value the pump will automatically turn ON. The luminosity sensor senses the amount of sunlight the plant is receiving and so we set the maximum and minimum values for the sunlight received, which ranges from 1-65535lx. When the value is closer to the minimum, the pump will not be turned ON, as the evaporation rate will be low, thus the plant does not need to be watered. When the value is closer to the maximum value the pump will be turned ON. All these values will be displayed on the LCD screen that is integrated to display the output. The ESP32 board is powered by an adapter, and we have used Arduino IDE for coding and integrating these modules. A relay has been integrated which turns the pump on for 10 to 20 seconds when the moisture value falls below the set threshold value. The same message is displayed on the Blynk IoT android app where the user can check the values remotely and operate the pump manually in case of emergency. This is done using the Bluetooth module integrated in the system.

B. Integrating the motor with the system.

The motor we used is a 12V Water pump that will supply water to the plants when the system is turned on. The motor is integrated with the ESP32 board via the 4-channel relay. The inputs taken in from the various sensors are processed by the processor and so a signal is sent to the motor via the relay. This acts as the input signal for the motor. When the processor sends the ON signal, the motor turns ON and supplies the plants with water. The pump will be on for a fixed period that has been set.

C. Integrating with Blynk IoT

Blynk IOT is an online service app used to connect the ESP232 to the mobile device using Bluetooth/ WI-FI. The ESP232 board is integrated with the Blynk IOT app by connecting the Blynk App account with the board. compared to other existing systems. This system can be deployed in places with scarcity of water. In this project a prototype includes sensing element node and data storage. The sensing element node is deployed on the field for sensing the soil parameters such as temperature, moisture, luminosity and humidity. Thus the “Smart Irrigation system based on soil moisture using ESP32” has been designed and tested successfully. It has been developed by integrated features of all the hardware components used. The system has been tested to function automatically. Thus, the entire system's functionality has been tested thoroughly and is said to function successfully.

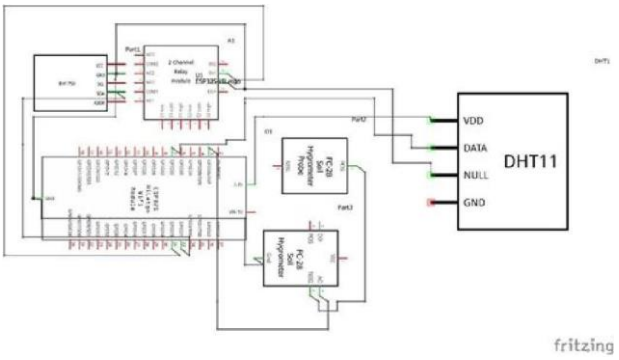
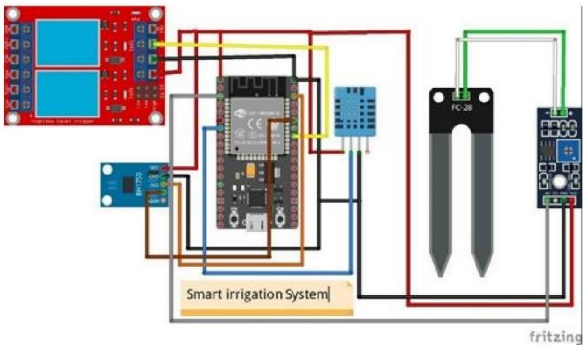
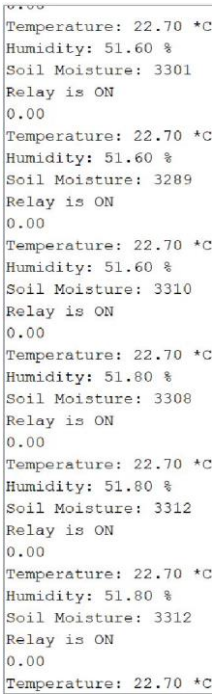


Fig. 2. Circuit Diagram: (a); (b).



VII. RESULTS



(a)

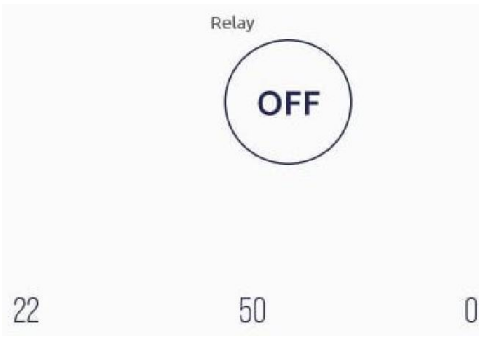




Fig. 3. Output: (a); (b).

VIII. CONCLUSION

With less time, less work, and greater profitability, this Internet of Things-based smart irrigation monitoring and controlling system makes it quite simple to boost crop productivity during any season. The main aim of this system is to make it more innovative, convenient and efficient

1) Integration with Artificial Intelligence (AI) and Machine Learning (ML): Smart irrigation systems can be integrated with AI and ML algorithms to predict crop water requirements, identify water stress, and optimize irrigation schedules. By analyzing data from various sources, including weather forecasts, soil moisture sensors, and crop growth models, smart irrigation systems can make precise decisions on when, where, and how much water to apply to crops.
2) Precision Agriculture: Smart irrigation systems can be integrated with other precision agriculture technologies, such as drones, satellite imagery, and GPS, to provide a comprehensive picture of crop health and water requirements. This can help farmers to identify problem areas and apply water and nutrients precisely where they are needed.
3) Mobile Applications: Smart irrigation systems can be integrated with mobile applications that allow farmers to monitor and control their irrigation systems from their smartphones. This can provide farmers with greater flexibility and convenience, enabling them to manage their irrigation systems from anywhere.

IX. FUTURE SCOPE

Smart agro systems have a vast scope in the future of agriculture. As the world population continues to grow, the demand for food will increase, and the availability of water resources will become limited. Smart agro systems can help to optimize water usage and increase crop productivity, thereby ensuring food security and promoting sustainable farming practices. Here are some of the future scopes of smart agro systems:

ACKNOWLEDGMENTS

Primarily, we would like to thank our project supervisor Prof. Rakshak Sood (Department of Electronics and Computer Science) for his invaluable guidance, support, and encouragement throughout the project. His expertise, insights, and constructive feedback have been instrumental in shaping our project and helping us to overcome the challenges we faced.

We would also like to extend our appreciation to the faculty members and staff of our department for providing us with the necessary resources, facilities, and equipment to carry out our project.

Our heartfelt thanks go to the participants who were involved in the study and provided us with the data that formed the basis of our research. Without their cooperation and support, this project would not have been possible.

Lastly, we would like to thank our families and friends for their unwavering support and encouragement throughout our academic journey. Their love, understanding, and motivation have been a constant

source of inspiration and strength for us. In conclusion, we are deeply indebted to all those who have contributed to this project, and we hope that our work will make a meaningful contribution to the field of the Internet of Things.

REFERENCES

[1] Smart Irrigation System using Machine Learning and IoT Bharath D.A. 1, S. Amith Nadig 2, Manjunath G.S.3 https://www.irjet.net/archives/V9/i6/IRJET-V9I6376.pdf.

[2] A research paper on smart agriculture using iot – Ritika Srivastava, Vandana Sharma,Vishal Jaiswal, Sumit Raj https://www.irjet.net/archives/V7/i7/IRJET-V7I7479.pdf.

[3] A Survey on the Role of IoT in Agriculture for the Implementation of Smart Farming- Muhammad Shoaib Farooq; Shamyla Riaz; Adnan Abid; Kamran Abid; Muhammad Azhar Naeem https://ieeexplore.ieee.org/abstract/document/8883163

[4] An article - IoT Applications in Agriculture, January 2018, [online] Available: https://www.iotforall.com/iot-applications-in-agriculture/.

[5] Abdullah Na, William Isaac -Developing a human-centric agricultural model in the IoT environment https://ieeexplore.ieee.org/document/7562740

[6] Agricultural environment monitoring system using wireless sensor networks and IoT, June 2018 - Goncalo Marquesa, Rui Pitarmab https://www.researchgate.net/publication/326047883 Agricultural environment_monitoring_system_using_wireless_sensor_networks_and_IoT

[7] An article Smart Farming: The Future of Agriculture - https://www.iotforall.com/smart-farming-future-of-agriculture

[8] Quy, V.K.; Hau, N.V.; Anh, D.V.; Quy, N.M.; Ban, N.T.; Lanza, S.; Randazzo, G.; Muzirafuti, A. IoT-Enabled Smart Agriculture: Architecture, Applications, and Challenges. Appl. Sci. 2022, 12, 3396. https://doi.org/10.3390/ app12073396

[9] Mr. Nikhil N. Salvithal, SMART IRRIGATION SYSTEM USING IOT, Journal of Engineering, Computing and Architecture - ISSN NO: 1934-7197, Volume: 10 Issue: 4, 2020

[10] Monica M, IoT based control and automation of smart irrigation system: An automated irrigation system using sensors, GSM, Bluetooth and cloud technology, 2017 International Conference on Recent Innovations in Signal processing and Embedded Systems (RISE) - ISBN:978-1-5090-4761- 1, October 2017

[11] S Nalini Durga, SMART IRRIGATION SYSTEM BASED ON SOIL MOISTURE USING IOT, International Research Journal of Engineering and Technology (IRJET) - ISSN: 2395-0056, Volume: 05 Issue: 06, June 2018

AET 034

Pesticide Sprinkling Drone

Prof. Uma Jaishankar
Assistant Professor, Department of Electronics and Computer Science, Vidyalankar Institute of Technology, Mumbai, India.

Harsh Singh
Student, Department of Electronics and Computer Science, Vidyalankar Institute of Technology, Mumbai, India.

Parth Thakur
Student, Department of Electronics and Computer Science, Vidyalankar Institute of Technology, Mumbai, India.

Sumant Puranik
Student, Department of Electronics and Computer Science, Vidyalankar Institute of Technology, Mumbai, India.

Amit Choudhary
Student, Department of Electronics and Computer Science, Vidyalankar Institute of Technology, Mumbai, India.

Abstract— A pesticide sprinkling drone is an unmanned aerial vehicle (UAV) that is equipped with a pesticide spraying mechanism. The drone can be used to spray pesticides on crops, orchards, or in any other agricultural land. The use of a pesticide sprinkling drone can help farmers to save time, reduce labor costs, and increase efficiency in crop protection. The drone is equipped with a tank that holds pesticide and a spraying mechanism that releases the pesticide in a controlled manner. The drone is also equipped with sensors that can detect the crop density and adjust to the spraying rate accordingly. The drone can be controlled remotely by a farmer or an agricultural worker using a smartphone or a computer. The use of pesticide sprinkling drone has several advantages over traditional methods of crop protection. The drone can cover a large area in a short amount of time and can reach places that are difficult to access with traditional spraying methods. The drone can also reduce the amount of pesticide needed to protect crops, as it can apply to the pesticide in a more targeted and controlled manner.

I. INTRODUCTION

Pesticide Sprinkling Drones are unmanned aerial vehicles (UAVs) that are designed to spray pesticides or other chemicals onto crops or vegetation. These drones have been developed to address some of the challenges that are associated with traditional pesticide application methods, such as manual spraying and ground-based equipment.

One of the key advantages of using pesticide sprinkling drones is their ability to cover large areas quickly & efficiently. This is especially important for farmers who have large fields / multiple fields spread over a large area. Using drones can help to save time and labor costs while ensuring a more even and consistent application of the pesticides.
Another advantage of using pesticide sprinkling drones is their ability to access hard to reach areas that may be difficult or dangerous for humans to reach. This includes steep hillsides, rough terrain, or areas with limited accessibility due to water, mud, or any other obstacles.

Furthermore, the use of pesticide sprinkling drones can also reduce the amount of pesticides required for a given area. Drones can be programmed to apply pesticides in a precise and targeted manner, which can result in less waste and better environmental outcomes. Additionally since the drones are airborne, there is less soil compaction and damage to the crops, which can help to maintain soil health and promote crop growth.

However, there are also some potential drawbacks to using pesticide sprinkling drones. One concern is the safety of the drones themselves, as well as the safety of people and animals in the surrounding areas. There is also the possibility of drones malfunctioning or being hacked, which could resultin unintended consequences.

In summary, pesticide sprinkling drones have the potential to revolutionize the way pesticides are applied in agriculture. While there are some concerns and challenges that need to be addressed, the benefits of using this technology are significant, and it is likely that we will see more widespread adoption of pesticide sprinkling drones in the future.

II. LITERATURE SURVEY

Pesticide Sprinkling Drone systems are gaining popularity in the agriculture industry due to their ability to increase efficiency and accuracy, as well as reduced labor costs and potential exposure of humans to the chemicals being used to improve crop yields and reduce environmental impact. In this literature survey, we will review several published papers that discuss the concept and implementation of this systems.
Scientist Yallappa (2017) improved an six arm drone with 6 BLDC motors and two LiPo batteries of 6 cells-

8000 mAh. Their research included a performance assessment of spray liquid discharge and pressure, spray liquid depletion, and to droplet size and density determination. By means of their project, they eventually created a drone which can hold 5.5 L of liquid and also has a 16-minute endurance period.

Scientist Dongyan (2015) successfully investigated swath width and droplet distribution uniformity over aerial spraying systems such as the M-18B and Thrush 510G. The two of the agricultural planes are flowered respectively at 5m and 4m high, and by this experiment they concluded the disparity in swath width of M-18B and Thrush 510G in flight height.

Experienced Prof. B. Balaji (2018) created a hexacopter UAV for pesticide spraying and also useful for crop and environmental surveillance using Raspberry Pi and the coding of Python programming language. Their UAV also has a lot of variety of sensors, including DH11, LDR.

Prof. Kurkute also in year 2018 used basic cost-efficient equipment to work with UAV quadcopter and its spraying system. Spraying with both liquid as well as solid material is done using the universal sprayer method. During their analysis, they compared various agricultural controllers as well and came to the conclusion that the quadcopter system with the Atmega644PA is most suitable due to its successful implementation.

In 2015 Huang developed a low-volume sprayer which can be used in unmanned helicopters. The helicopter has a 3 m main rotor diameter and a payload capacity of 22.7 kg. It used to take minimum of a gallon of gas every 45 minutes. This research paved the way for the development of UAV aerial application systems for crop production with a higher goal rate and a larger VMD droplet scale.

Shilpa Kedari has suggested a low-cost, lightweight four arm drone framework. The quadcopter (QC) is also known as Unmanned Aerial Vehicle (UAV). This quadcopter is mainly compact and can be used for both indoor and outdoor crops. The quadcopter is an unmanned flight which uses an android smartphone to spray pesticides. The contact between the quadcopter and the android smartphone is achieved in real time by using a Bluetooth device. This method is used to reduce agricultural field problems while still increasing agricultural yield simultaneously.

Prof. Sadhana improved on the above approaches and created the quadcopter UAV and shower module, that can be used to spray pesticides in agriculture fields so as to increase efficiency and protect materials. The total load for this project is 1 kg and is used to spray low altitude pesticide quadruple copter lift. The Arduino UNO ATmega328 and Brushless Direct Current, Electronic Speed Control (ESC), MPU-6050, which combines a MEMS accelerometer and a MEMS gyro into a single chip, Radio receiver, LIPO battery, and pesticidespraying module controls this quadcopter.

III. PROBLEM STATEMENT

"Up to the date, the pesticides are spraying by the conventional methods by using the handpumps on the back or by manually by throwing using hands. So these methods are very time consuming and dangerous for the health issues. Because there is continuously contact of the human with the pesticides and this very dangerous things for health. And also sometimes it is not possible to reach to the each and every crop sapling for being pesticide. So this may lead to spreading a disease which can be observed due to insufficient supply of the pesticides and this may cause to the decrease in the yield. ".

A. Conventional Traditional Method

Pesticide sprinkling drones are unmanned aerial vehicles (UAVs) equipped with spraying equipment that can be used for agricultural purposes. There are various techniques and technologies used in pesticide sprinkling drones to enhance their functionality and performance. Some of these techniques are:

1) GPS and GIS Technology: GPS and GIS technology are used to guide the drones and ensure precise spraying of pesticides. The GPS system helps in locating the exact position of the drone and the GIS technology provides information about the location, topography, and soil conditions of the farmland.

2) Light Detection and Ranging (LiDAR) Technology: LiDAR technology is used to create a 3D map of the farmland, which helps in identifying the areas that require more or less pesticide spraying. This technology also helps in avoiding obstacles and ensuring safe and efficient operation of the drone.

3) Computer Vision Technology: Computer vision technology is used to identify the crops and differentiate them from weeds, enabling the drone to spray the right amount of pesticide on the crops. This technology also helps in identifying diseased plants and providing targeted treatment.

4) Automatic Spray System: The automatic spray system is used to regulate the amount of pesticide sprayed on the crops. This system ensures even spraying of the pesticide and prevents over-spraying or under-spraying.

5) Swarming Technology: Swarming technology is

used to coordinate the movement of multiple drones in a synchronized manner. This technology enables the drones to cover a larger area and spray pesticides more efficiently.

6) Remote Control: Remote control systems are used to operate the drones from a safe distance. This enables the operator to monitor the drone's movements and make necessary adjustments.

These are some of the techniques and technologies used in pesticide sprinkling drones with advancements in technology, new techniques are being developed to enhance the functionality and efficiency of these drones in agriculture.

IV. PROPOSED SYSTEM

A. FLOW CHART OF THE PROPOSED SYSTEM:

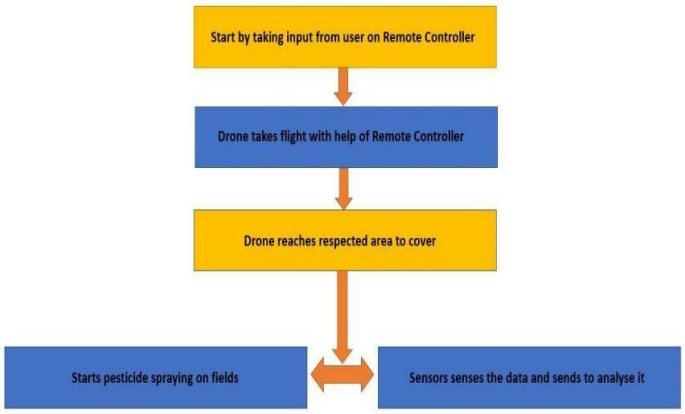


Fig. 1. Flow Chart

B. BLOCK DIAGRAM OF PROPOSED SYSTEM:

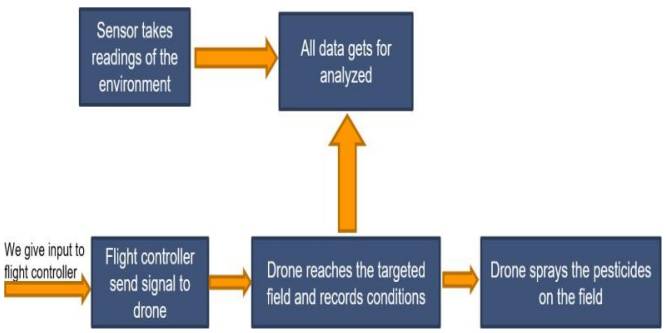


Fig. 6.2 Block Diagram

Here is the block diagram of our proposed system. We will be using a FS-CT6B Remote Controller to fly our drone. When we will give input from remote controller to drone it will start flying. We will take the drone over the respected field area. Once the drone reached the respected area, the sensors present on drone i.e. temperature sensor, humidity sensor senses the parameters. These parameters are then uploaded on Thing speak. There it gets analyzed and further gets under observation. This data which is analyzed will be used for further times to inspect affects of weather on pests. On the other side, drone starts spraying pesticide on the farm. We can set a specific height of a drone so that the pesticide will be sprayed only on the required area and will not harm the others. This will help the farmers to monitor various effects of weather on crops as well as pests. Which will help them in taking better care of there crops and producing more profit from it.

C. SET UP OF THE PROPOSED SYSTEM:



V. REQUIREMENTS

A. Hardware

1) Frame: The frame plays very important role in the drone for supporting all the other components. It is very very important to take the weight of the drone frame in consideration because if weight is higher then there can be difficulties in the lifting of the drone. By taking all the parameters in consideration, we have decided to use light weight pvc pipes for fabricating the drone. As these pipes does not undergo deformation easily.
2) Motors: Brushless DC Motors don't possess brushes, and they have a permanent magnet. Their movements can be controlled via an electronic controller as well as speed feedback mechanism. These motors are energy saving as compared to the brushed dc motors. For our application, we used the 1000 Kv rating motor which gives us approximately 980 gms thrust.
3) ESC: It stands for electronic speed controller and it is used to vary the speed of servo motor, its direction and also used for applying the brakes. For our project we are using the 30A rating ESC, we

decided this as per motors, battery and propeller specifications.

4) Propeller: As per the frame size used and motor ratings, the propeller should be selected. In this project scenario our frame size is about 480 mm. So the propeller we used are of size about 8", 9", 10". But we finalized 9" size propeller.
5) Battery: For our project, and as per the motor ratings we are using 6500 mAh battery, cause this battery can give us a better flight time to fulfil the work proposed.
6) Flight Controller: The flight controller is brain of drone as it helps to drive the drone by taking stability, speed, gyro and acceleration in consideration. The flight controller should be easier to mount and handled. For this purpose we select the KK 2.1.5 controller for our project. The main features of these KK is, it is easier for calibration. It has inbuilt firmware as well.
7) Radio Controller: Firstly, The transmitter has to be calibrated with the flight controller and with the help of the receiver. After the calibration is done, the transmitter is linked with the drone, and as per command of the transmitter the drone will work. DHT 11 (Temperature and humidity sensor): DHT 11 sensor is mounted on a drone and it is used to take the temperature and humidity reading and send to the microcontroller. Pests gets multiplied in a particular range of humidity and temperature, hence, these parameters will help the farmer to decide whether to spray or not to spray the pesticides.
8) NodeMCU microcontroller: Wifi enabled microcontroller used to send data to the blynk app. Cheaper, lighter, smaller and reliable are the characteristics of this microcontroller.
9) DC pump: This Pump is used to draw out pesticide from the bottle fitted below the drone.

B. Software

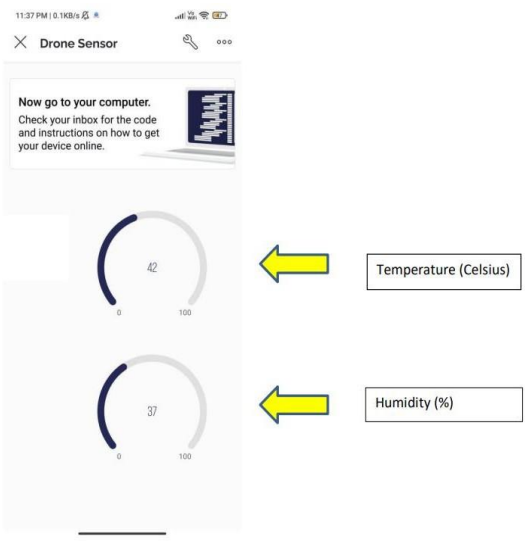
1) Arduino CC: Software used to program the nodemcu to collect sensor data and send it to the blynk app. Version 19.0.0 of this software is used in the project.
2) Blynk app: Mobile application used to create an interface for monitoring data sent from the microcontroller, which can be viewed by the farmerso that he can take a decision.

VI. IMPLEMENTATION

The methodology for pesticide sprinkling using drones typically involves the following steps:

1. Site assessment: Conduct a thorough assessment of area to be treated, and including the size of the area, topography, vegetation, and potential hazards such as power lines or buildings.
2. Select appropriate equipment: Choose a drone which is suitable for the area to be treated and has the necessary features for effective pesticide application, such as a sprayer system, GPS, and a camera.
3. Plan the flight path: Develop a flight plan that takes into account the size and shape of the area to be treated, wind conditions, and any obstacles.
4. Calibrate the sprayer system: Calibrate the sprayer system to ensure that the correct amount of pesticide is being applied per unit area.
5. Launch the drone: Launch the drone from a safe and suitable location and begin the pre-programmed flight.
6. Monitor the flight: Monitor the drone and its progress throughout the flight, making adjustments as needed to ensure that the application is being carried out effectively.
7. Land the drone: Once the flight is complete, safely land the drone and retrieve any data collected during the flight.
8. Clean and maintain the equipment: Clean and maintain the drone and sprayer system, ensuring that all components are functioning properly for the next use.
9. It is important to note that the use of pesticides can have harmful effects on the environment and human health, and should be used responsibly and in accordance with local regulations and best practices.

VII. RESULTS



(a)

VIII. CONCLUSION

Drones have already vastly altered in the agricultural industry and will continue to grow in the coming years in various fields. While drone use is becoming more useful to farmers, there still is a way to go before they become part of every farmer's equipment roster.

Regulations around drone use need to be made and revised in many countries and more research is needed to be done on their effectiveness at certain tasks. There are many ways drones can be useful to farmers, bu,t it is important to understand their limitations and functions before investing in expensive equipment.
This project majorly describes a design of a drone mounted for spraying mechanism for Agricultural purpose and for spraying disinfectants on fields. This method of spraying pesticides on agricultural fields reduces the number of labors, time, cost and risk involved to the person involved mainly farmers in spraying the liquids.

IX. FUTURE SCOPE

Pesticide Sprinkling Drone systems have a vast scope in the future of agriculture. Here are some of the future scopes of this systems:

1) We can make this as an automatic system in future where drone will fly without any human interference.
2) Also we can add more sensors and parameters and we can make it as a surveillance drone as well.
3) This drone can be used for safety of the field and crops as well where it will need a camera.

ACKNOWLEDGMENTS

Primarily, we would like to thank our project supervisor Prof. Uma Jaishankar (Department of Electronics and Computer Science) for his invaluable guidance, support, and encouragement throughout the project. Her expertise, insights, and constructive feedback have been instrumental in shaping our project and helping us to overcome the challenges we faced.
We would also like to extend our appreciation to the faculty members and staff of our department for providing us with the necessary resources, facilities, and equipment to carry out our project.

Our heartfelt thanks go to the participants who were involved in the study and provided us with the data that formed the basis of our research. Without their cooperation and support, this project would not have been possible.

Lastly, we would like to thank our families and friends for their unwavering support and encouragement throughout our academic journey. Their love, understanding, and motivation have been a constant source of inspiration and strength for us. In conclusion, we are deeply indebted to all those who have contributed to this project, and we hope that our work will make a meaningful contribution to the field of the Internet of Things.

REFERENCES

[1] https://www.researchgate.net/publication/341875111_ Design_and_Development_of_a_Drone_for_Spraying_Pesticides_Fertilizers_and_Disinfectants

[2] https://www.researchgate.net/publication/330102968_Effect_of_Temperature_and_Relative_ Humidity_on_the_Population_Dynamics_of_Some_Insect_Pests_of_ Maize

[3] https://tnau.ac.in/kvk-cuddalore/drone-project/

[4] https://www.climate-chance.org/en/best-pratices/drones-for-precision-agriculture-smart-digital-solutions-for-improving-rice-and-pineapple- productivity-in-benin/

[5] https://agricoop.nic.in/en/agriculturereforms-1

Videos Referred:

[1] https://youtu.be/LtC9uH35bnU

[2] https://youtu.be/m8UGVhztqCc

[3] https://youtu.be/OWaXIK9sHeE

[4] https://youtu.be/ADYQHaWldAs

[5] https://youtu.be/6QdVzvzmGTc

AET 035

Web Based V-Ideas

Dr. Girish Gidaye
Department of Electronics and Computer Science
Vidyalankar Institute of Technology
Mumbai, India
girish.gidaye@vit.edu.in

Akshay Salunkhe
Department of Electronics and Computer Science
Vidyalankar Institute of Technology
Mumbai, India
akshay.salunkhe@vit.edu.in

Omkar Pol
Department of Electronics and Computer Science
Vidyalankar Institute of Technology
Mumbai, India
omkar.pol@vit.edu.in

Ganesh Kumbhar
Department of Electronics and Computer Science
Vidyalankar Institute of Technology
Mumbai, India
ganesh.kumbhar@vit.edu.in

Sankalp Gambhir
Department of Electronics and Computer Science
Vidyalankar Institute of Technology
Mumbai, India
sankalp.gambhir@vit.edu.in

Abstract— Project management systems are essential tools for colleges and universities, enabling project managers and teams to plan, organize, and execute projects efficiently and effectively. These systems provide a centralized platform for team members to collaborate and communicate, track project progress, assign tasks, manage resources, and ensure timely delivery of deliverables. College project management systems have unique features that cater to their specific project management needs, such as academic research, student-led initiatives, and campus events. These systems enhance productivity, streamline project processes, and improve collaboration among teams, making them essential for managing projects in colleges and universities. The objective of this project is to develop an online platform that enables students to access information related to final year projects of Vidyalankar Institute of Technology for the last 5 years. Final year projects are power pack of ideas, but very few can access information about those projects. Students must either contact the project mentor/guide or the team members who worked on those projects to acquire information. So, with the help of our online platform called "Web-based V-Ideas", students will be able to access those projects so they could inspire new ideas or make the existing ones more efficient.

Keywords—project management, web based V-Ideas, projects.

I. INTRODUCTION AND MOTIVATION

Project management is an essential process for any organization, including colleges and universities. With a growing number of academic and administrative projects to manage, it can be challenging for colleges to keep track of their projects without a project management system in place. This is where a project management system designed specifically for colleges comes into play.

A project management system for colleges is a software tool that helps project managers and teams to plan, organize, and execute projects efficiently and effectively. The system provides a centralized platform for team members to collaborate and communicate, track project progress, assign tasks, manage resources, and ensure timely delivery of deliverables.

Colleges and universities have unique project management needs, such as managing academic research projects, organizing student-led initiatives, and coordinating campus events. A project management system designed specifically for colleges can help meet these needs by providing features such as:

1. Academic project management: The system can help manage academic research projects by providing tools for managing timelines, milestones, and research data.
2. Student-led project management: The system can help organize student-led initiatives by providing tools for managing project proposals, budgets, and timelines.
3. Campus event management: The system can help coordinate campus events by providing tools for managing event schedules, budgets, and vendor contracts.
4. Collaboration and communication: The system provides a centralized platform for team members to collaborate and communicate on project-related tasks, share documents, and track progress.
5. Tracking and monitoring: The project manager can track progress, milestones, and deadlines for each project in the system.

Overall, a project management system designed specifically for colleges can help streamline project processes, enhance productivity, and improve collaboration among teams. It is an essential tool for colleges and universities looking to manage their projects more efficiently and effectively.

Students of Vidyalankar Institute of Technology make 100+ final year projects and over 500+ Mini Projects every year and these projects are powerpack of ideas. But they are only available in the hard copy form which

is accessible to very few students. So, to make each project available to every student, we have come up with V-Ideas.

V-Ideas is an interactive website made using languages like HTML (Hyper Text Markup Language), CSS (Cascading Style Sheets), NodeJS, ReactJs, JavaScript and Bootstrap. In order to store all the project related information, MongoDB is used for creating a database. V-Ideas focuses on two parties, students, professors who are not mentors and the project guides/mentors.

For students and non-mentor professors, the website is an open source which means they don't have to log in to the website to access the information. They can search and sort the information based on Departments (CMPN, IT, EXTC, ETRX, BIOM etc.), the year of project completion, the mentors and much more.

Whereas for projects guides, they must log in using there VIT email-id so that they can upload information related to Final year projects from the current year.

In the case of project guides, the input is their information, and the output is an automatically generated project report based on the information provided by them. V-Ideas open-source will be accessible to all students even if he/she is not in the engineering field.

But mentors/project guides of only Vidyalankar Institute of Technology will have the permission to upload information regarding to Final year projects of Vidyalankar Institute of Technology. V-Ideas will serve as a database for upcoming projects.

II. WORKING

A. For students or someone exploring projects

For members other than the project guides or mentors, this online platform is open source.

An open-source website refers to a website whose source code is freely available to the public, allowing users to view, modify, and distribute the code as they see fit. Open source websites are typically developed by a community of developers who work collaboratively to create and improve the website's functionality and features.

Open source websites provide a range of benefits, including increased flexibility, lower costs, and a more transparent development process. With open-source software, users can modify the code to suit their specific needs, making it an attractive option for businesses, organizations, and individuals looking to build a website.

This means they don't have to log in or make an account of their own to view the information related to the Final year projects of the last 5 years.

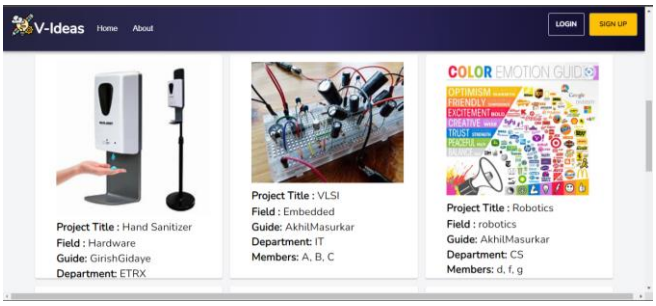


Fig. 1. Open Source online platform, Wed-based V-Ideas

B. *For project guides and mentors.*

For the project guides/mentors, it is mandatory to create an account so that they can upload new information. But if they wanted to just view the information, they don't need to log in. Basically, on the front page all the details related to the projects would be visible.

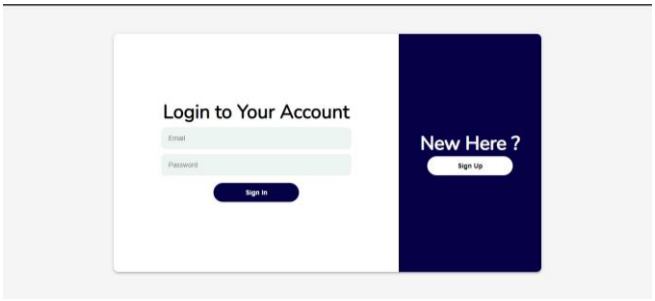


Fig. 2. Login page in the Wed-based V-Ideas.

The button in the top left corner called as "Admin Login" would enable project guides to log in. In the case of project guides, the input is their information, and the output is an automatically generated project report based on the information provided by them. Open-source version of Web-based V-Ideas will be accessible to all students even if he/she is not in the engineering field.

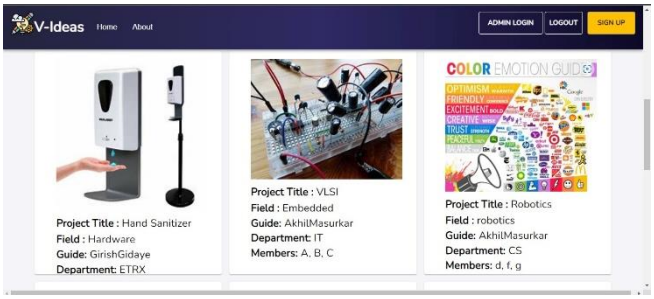


Fig. 3. Admin Login in the Wed-based V-Ideas.

But mentors'/project guides of only Vidyalankar Institute of Technology will have the permission to upload information or details regarding to Final year projects of Vidyalankar Institute of Technology. And this is how Web-based V-Ideas will serve as a database for upcoming projects.

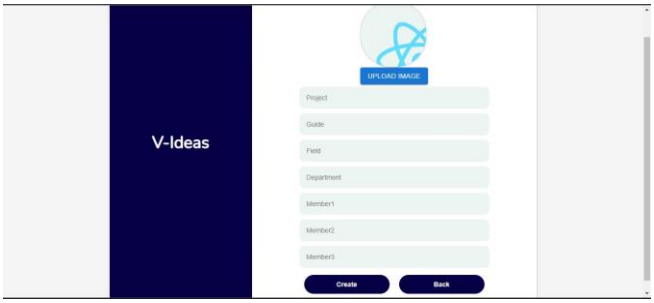


Fig. 4. Form to be filled only by admins.

III. PROGRAMMING LANGUAGES USED

Programming languages are an essential part of modern computing, allowing developers to create software applications, websites, and other digital solutions that power the modern world. Programming languages provide the syntax and rules needed to write code that a computer can understand and execute.

There are numerous programming languages, each with its own syntax, structure, and features. Some of the most widely used programming languages include Java, Python, C++, and JavaScript. Each language has its own strengths and weaknesses, making it suitable for different types of programming tasks. Below is the list of languages used in this project.

A. HTML

HTML, or Hypertext Markup Language, is a fundamental building block of the internet. It is a markup language used to create the structure and content of web pages. HTML works in conjunction with other web technologies, such as CSS and JavaScript, to create a visually appealing and interactive website.

HTML uses tags to identify elements on a web page, such as headings, paragraphs, and images. These tags define the structure of the page and provide context for the content. For example, a heading tag might identify the title of a blog post or article, while a paragraph tag would identify the body of the text.

B. CSS

Cascading Style Sheets, or CSS, is a styling language used to control the visual presentation of HTML and other markup languages. CSS works alongside HTML and other web technologies to create visually appealing and responsive web pages.

CSS allows developers to control the appearance of elements on a web page, such as font size, color, spacing, and layout. It does this by creating rules that target specific elements and define how they should be styled. For example, a CSS rule might specify that all headings on a web page should be a certain size and color.

C. Javascript

JavaScript is a high-level programming language that is used for creating interactive web pages and applications. JavaScript is a versatile language that can be used on both the client and server-side of web development. It is a vital tool for building interactive user interfaces and creating dynamic functionality that enhances the user experience.

D. NodeJS

Node.js is a server-side JavaScript runtime environment that enables developers to build scalable and high-performance web applications. Node.js provides a range of tools and libraries that allow developers to create powerful web servers and APIs that can handle a large volume of traffic.

E. ReactJS

React.js is a popular JavaScript library that is used for building user interfaces. It enables developers to create responsive and interactive UI components, which can be easily integrated into web applications. React.js is widely used in modern web development, particularly in single-page applications (SPAs) and mobile applications. React.js has become the go-to choice for many developers who want to create fast and dynamic web applications.

IV. IDE'S USED

Integrated Development Environments, or IDEs, are powerful tools used by programmers to develop software applications. IDEs provide a comprehensive environment for software development, combining a range of tools and features that streamline the coding process and make it easier for developers to create high-quality code.

IDEs typically include a code editor, compiler, debugger, and a range of other tools that help developers write, test, and deploy code. IDEs are designed to simplify the coding process by providing features such as syntax highlighting, code completion, and code analysis, which help developers identify and fix errors in their code quickly and efficiently.

A. MongoDB

MongoDB is a popular NoSQL document database that has revolutionized the way developers store, manage, and retrieve data. Unlike traditional relational databases, MongoDB uses a document-oriented data model that makes it easy to work with complex and unstructured data.

One of the key advantages of MongoDB is its flexibility. Because it is a document database, MongoDB allows developers to store data in a JSON-like format that can be easily understood and manipulated. This makes it

possible to store and retrieve data in a variety of formats, including text, images, videos, and more.

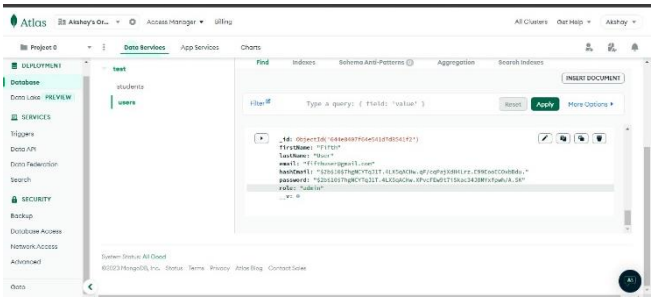


Fig. 5. Mentors and Guides being converted into admins.

V. Result Analysis

A. Sign-up page

The following (fig 6.1) is a SignUp Page of our website. The SignUp Page on our website is where students and Project Guides can sign up by providing their email address and creating a password for future logins. This page serves as the initial step in the registration process and allows users to create an account that grants them access to various features and functionalities of our website. By entering their email address and password, users can create a unique profile that enables them to access their account anytime and anywhere. Overall, the SignUp Page plays a crucial role in onboarding new users to our website and providing them with a personalized and secure experience.

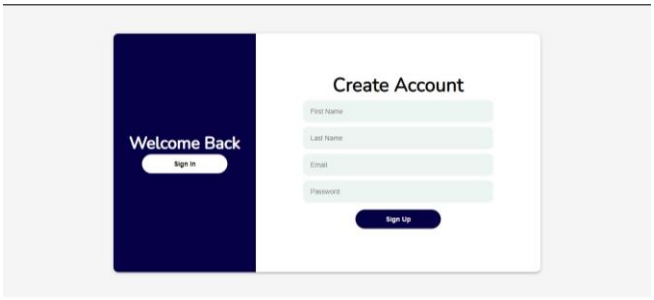


Fig. 6. The Sign-up page.

B. Log in page

Fig. 2 shows the login page of V-Ideas provides a simple and convenient way for users to access their accounts. Users can enter their login credentials, such as their email address and password, to sign in to their account. The login form typically includes two fields: one for the email address and another for the password. Users can enter their email address in the first field and their password in the second field. Once the user has entered their login credentials, they can click on the "Sign In" button to access their account. It is important to note that users must have a registered account on our website in order to log in. If the user has not yet created an account, they can do so by visiting the SignUp Page and following the registration process. In conclusion, the login form or login page of our website is a user-friendly way for users to access their accounts. By entering their email address and password, users can sign into their account and access the full range of features and services on our website.

C. Conditions for password

Strong passwords are crucial for protecting our personal information and digital assets from hackers and cybercriminals. In today's digital age, where most of our sensitive information is stored online, having a weak password can put us at risk of identity theft, financial fraud, and other malicious activities. To create an account on V-Ideas, users must agree to several password conditions, which include the following:

Condition 1: Password should be of at least 8 characters: This means that the password must be at least 8 characters long. This condition ensures that the password is strong enough to protect the user's account from unauthorized access.

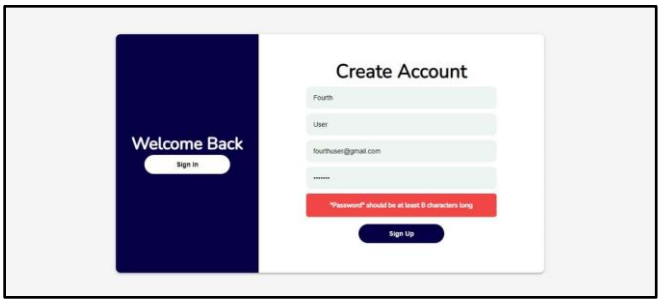


Fig. 7. Setting up a password, condition-1.

Condition 2: Password should contain at least 1 number: This means that the password must contain at least one numeric digit (0-9). This condition ensures that the password is not easily guessable and adds an additional layer of security.

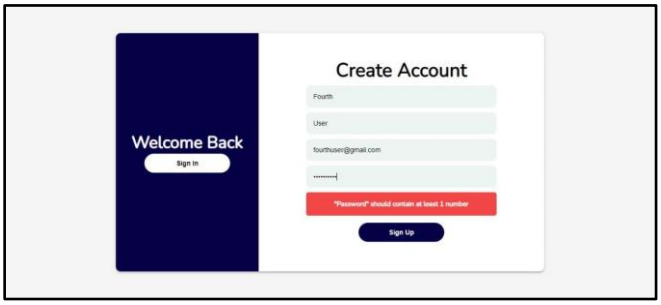


Fig. 8. Setting up a password, condition-2.

Condition 3: Password should contain at least one symbol: This means that the password must contain at least one special character such as @, #, $, etc. This condition ensures that the password is strong and difficult to crack.

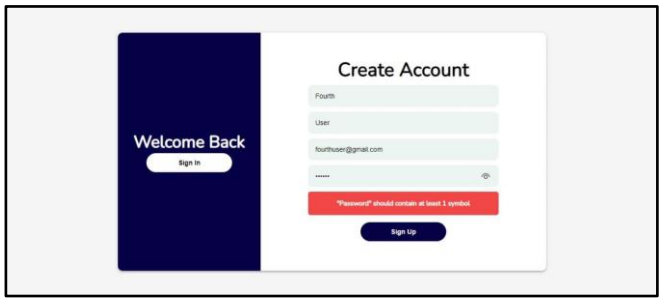


Fig. 9. Setting up a password, condition-3.

By agreeing to these password conditions, users can create a secure account that is less vulnerable to hacking attempts and other security threats. It is important that users follow these conditions and create a strong password to ensure the security of their account. In conclusion, the password conditions on your website are designed to ensure the security of user accounts and protect them from unauthorized access. By agreeing to these conditions and creating a strong password, users can access the full range of features and services on V-Ideas.

D. Home Page

The following is the Home Page of V-Ideas. Once a student is clicked on the website link, they can access the homepage and use the various filters such as Department, Field, and Faculty to narrow down their search for projects. By selecting a specific Department, for example, the student can view only the projects related to that department. Similarly, by selecting a specific Field or Faculty, they can further refine their search. This can help students find projects that align with their interests and academic goals.

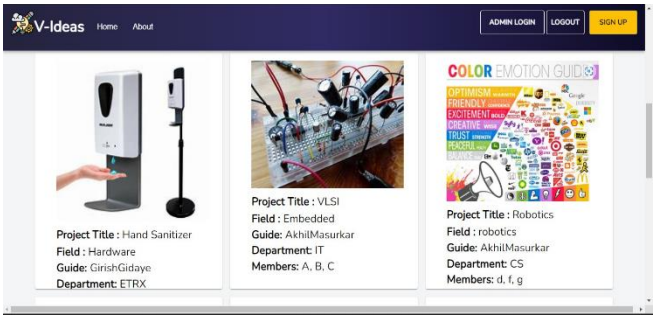


Fig. 10. Home Page of Web-based V-Ideas

E. Guide/Mentor information input form

Fig.4 shows our Guide Form where project guides can upload short information about their projects, including an image of the project, project name, guide name, field, department, and member/student names involved in the project. We encourage our guides to provide clear and concise information about their projects using proper grammar. This will help visitors to understand the project's purpose, objectives, and outcomes more effectively. As a guide, please ensure that you include all necessary details about the project, such as the department and field it belongs to, as well as the names of all the members/students involved. Additionally, uploading an image of the project can provide a visual representation of the project, making it more appealing and easier to understand.

F. Private Login form for project guides and mentors

As a guide or admin, once you have logged into V-Ideas, you will be able to access the V-Ideas website homepage, which features a private ADMIN LOGIN option specifically for guides and admins. This login option is intended solely for the purpose of allowing guides and admins to edit the project information as needed. It is important to note that students do not have permission to modify any of the project information that has been filled in by their respective guides, faculty members, or admins. This ensures that the project information remains accurate and up-to-date, and that any changes or updates are made only by those individuals who have been granted the necessary authorization to do so.

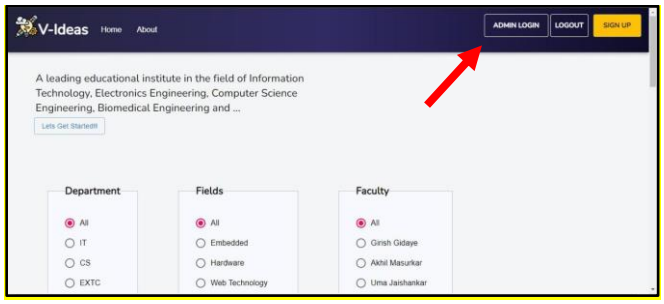


Fig. 11. Private login for Project guides or mentors.

TABLE I. TABLE TYPE STYLES

Table Head	**Table Column Head**		
	Table column subhead	***Subhead***	***Subhead***
copy	More table copy[a]		

[a] Sample of a Table footnote. (*Table footnote*)

Fig. 12. Example of a figure caption. (*figure caption*)

Figure Labels: Use 8 point Times New Roman for Figure labels. Use words rather than symbols or abbreviations when writing Figure axis labels to avoid confusing the reader. As an example, write the quantity "Magnetization", or "Magnetization, M", not just "M". If including units in the label, present them within parentheses. Do not label axes only with units. In the example, write "Magnetization (A/m)" or "Magnetization {A[m(1)]}", not just "A/m". Do not label axes with a ratio of quantities and units. For example, write "Temperature (K)", not "Temperature/K".

REFERENCES

[1] G. Eason, B. Noble, and I. N. Sneddon, "On certain integrals of Lipschitz-Hankel type involving products of Bessel functions," Phil. Trans. Roy. Soc. London, vol. A247, pp. 529–551, April 1955. *(references)*

[2] J. Clerk Maxwell, A Treatise on Electricity and Magnetism, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68–73.

[3] I. S. Jacobs and C. P. Bean, "Fine particles, thin films and exchange anisotropy," in Magnetism, vol. III, G. T. Rado and H. Suhl, Eds. New York: Academic, 1963, pp. 271–350.

[4] K. Elissa, "Title of paper if known," unpublished.

[5] R. Nicole, "Title of paper with only first word capitalized," J. Name Stand. Abbrev., in press.

[6] Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, "Electron spectroscopy studies on magneto-optical media and plastic substrate interface," IEEE Transl. J. Magn. Japan, vol. 2, pp. 740–741, August 1987 [Digests 9th Annual Conf. Magnetics Japan, p. 301, 1982].

[7] M. Young, The Technical Writer's Handbook. Mill Valley, CA: University Science, 1989.

AET 036

S-MART

Gaurav Sanjay Kumar
Department of Electronics Engineering
Vidyalankar Institute of Technology
Mumbai, India
gaurav.kumar@vit.edu.in

Ketan Kamble
Department of Electronics Engineering
Vidyalankar Institute of Technology
Mumbai, India
ketan.kamble@vit.edu.in

Prof. Pravin Annadate
Department of Electronics Engineering
Vidyalankar Institute of Technology
Mumbai, India
Pravin.annadate@vit.edu.in

Abstract— This research paper presents the to develop an online platform which enables customers to access product prices from local as well as online and compare it on one platform. Local shopkeepers and standalone shops can digitize their inventory Management and do a POS (point of sale or point of purchase) . By using SMART local shop vendors will be able to automate their inventory management, their billing as well as it will help them to sell their products to nearby customers by increasing their online presence and comparing the prices to online marketplaces. Customers will get the lowest price for the product. To buy anything we start comparing prices for products to the different online marketplace but we don't have to compare the price with the local shopkeeper and he last the sales as he is not having a bandwidth for marketing and technology support so we have come up with a platform S, MART which will be helping the shopkeeper to manage their inventory at a place, now about the stock condition and digitizes their inventory as well as it will help the shopkeeper to get a digitized storefront, as well it will help the customer to get the place price for that particular . which was not the case before as well as the customer will also save their time and get the best piece for the same. So SMART is a web based application where business owners will be able to manage their inventory and get the digital storefront and point of sale software as well as do the bookkeeping & customers will get the best price for the product.

Keywords—point of sale , invemtory management

I. INTRODUCTION

SMART is a revolutionary platform that aims to bridge the gap between local shopkeepers and online marketplaces. In today's world, when we want to buy something, we often compare prices across various e-commerce platforms. However, we rarely have the opportunity to compare prices with local shopkeepers, who often lose out on sales due to a lack of marketing and technological support. To address this issue, we have developed SMART, a comprehensive web-based application that empowers shopkeepers to manage their inventory effectively in one centralized location. They can now digitize their inventory and keep track of stock conditions, ensuring they never run out of products or face overstocking issues. This newfound efficiency enables them to offer a wider range of products and improve customer satisfaction. But that is not all! S, MART also provides shopkeepers with a digitized storefront, allowing them to highlight their products online. This means that customers can now explore the inventory of local shops and compare prices alongside those of online marketplaces. With S, MART, shopkeepers can compete on a level playing field, providing customers with a wider choice and better prices. For customers, SMART offers an incredible opportunity. They no longer need to spend time visiting multiple stores or scouring different websites to find the best prices. Instead, they can conveniently use the SMART platform to compare prices and make informed purchasing decisions. By connecting directly with local shopkeepers, customers can access products quickly and even save on shipping costs. S, MART goes beyond just price comparison. It also provides seamless point-of-sale software for shopkeepers and even assists with bookkeeping, simplifying their day-to-day operations. The platform is designed to benefit both shopkeepers and customers, fostering a stronger connection between local businesses and their communities. With S, MART, we aim to revolutionize the way people shop by merging the convenience of online marketplaces with the personalized service of local shops. It is a win-win situation for everyone involved. So, join us on this exciting journey and experience a new era of shopping with SMART! In today's dynamic e-commerce landscape, numerous online marketplaces compete for our attention, offering a vast array of products at varying prices. It has become second nature for consumers to compare prices across these platforms, ensuring they get the best deal. However, amidst this digital revolution, local shopkeepers often struggle to keep pace due to limited marketing resources and technological support. As a result, they miss potential sales opportunities. To bridge this gap and empower local shopkeepers, we proudly present SMART – a groundbreaking web-based application that transforms the way you shop. SMART offers a comprehensive platform where shopkeepers can manage their inventory efficiently, while also providing them with a digital storefront and point-of-sale software. By digitizing their inventory and streamlining

their operations, shopkeepers can significantly enhance their competitiveness in today's market.

II. LITERATURE SURVEY

"Inventory Management and Local Market Integration with Online Storefront Introduction: The following literature survey aims to provide a comprehensive analysis of the existing research and studies related to inventory management systems with local market integration and online storefronts. This survey explores the current state of knowledge in this area, identifying key concepts, challenges, advancements, and practical implications. By examining relevant literature, we can gain valuable insights into the importance of such systems, their impact on businesses, and the potential benefits they offer. 2.0.1 Inventory Management Systems: • Inventory management systems are critical for efficient operations and customer satisfaction in businesses of all sizes. Literature on inventory management highlights the significance of real-time inventory tracking, demand forecasting, and optimization techniques to minimize costs and avoid stockouts or overstocking situations. The integration of digital systems and automated processes is widely recognized as crucial for enhancing inventory management practices. • Several studies have explored the benefits of inventory management systems, such as improved inventory accuracy, reduced carrying costs, and better demand planning. Advanced technologies like RFID, barcode scanning, and cloud-based inventory platforms have revolutionized the way businesses manage inventory. Additionally, research has highlighted the importance of integrating inventory management systems with other business functions, such as sales, purchasing, and order fulfillment, to achieve seamless operations. 2.0.2 Local Market Integration: • The integration of local marketplaces with online platforms has gained significant attention in recent years. Researchers have explored the challenges faced by small and medium-sized businesses in adapting to the digital era, where online marketplaces dominate. Studies emphasize the need for local businesses to embrace technology and leverage digital tools to compete effectively. • Local market integration offers numerous opportunities for businesses to extend their customer reach, maintain a competitive edge, and foster stronger connections with the local community. Research has highlighted the benefits of local market integration, including increased customer engagement, improved brand visibility, and the ability to provide personalized customer experiences. 12 2.0.3 Online Storefronts: • The concept of online storefronts or digital marketplaces has been extensively examined in the literature. Researchers emphasize the importance of personalized and customizable storefronts that reflect the brand identity of businesses. Studies explore the impact of online storefronts on customer engagement, conversion rates, and overall sales performance. • The design and functionality of online storefronts play a crucial role in attracting and retaining customers. User-friendly interfaces, intuitive navigation, and visually appealing layouts are key factors that contribute to a positive shopping experience. Furthermore, secure payment gateways, customer reviews, and product recommendations are essential features that enhance customer trust and satisfaction. 2.0.4 Benefits and Challenges: • The literature recognizes several benefits associated with inventory management systems integrated with local marketplaces and online storefronts. These benefits include enhanced inventory control, increased visibility for local businesses, improved customer access to products, and the potential for cost savings through streamlined operations. By effectively managing inventory and integrating with online platforms, businesses can reduce stockouts, enhance customer satisfaction, and optimize their supply chain processes. However, challenges also exist. Literature highlights technological barriers, data management complexities, and the need for businesses to adapt their processes and strategies to effectively utilize these systems. Integration with multiple sales channels, synchronization of inventory data, and ensuring accurate product information across platforms are some of the challenges that businesses may face. Therefore, the successful implementation of such systems requires careful planning, training, and ongoing support. 2.0.5 Case Studies and Success Stories: • Numerous case studies and success stories highlight the positive impact of integrating inventory management systems with local marketplaces and online storefronts. These examples highlight how businesses have experienced increased sales, improved customer satisfaction, and expanded market reach. For instance, case studies demonstrate how local retailers leveraged digital platforms to extend their reach beyond their physical locations, attract new customers, and compete effectively.

III. METHODOLOGY

3.1 Block Diagram

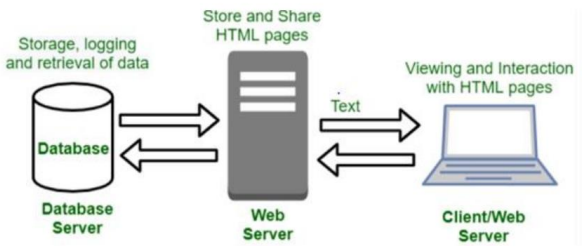


Fig 1. Website Block Diagram

3.1.1 Working

For members other than the project guides or mentors, this online platform is open source. What this means is they do not have to log in or make an account of their own to view the information related to the Final year projects of the last 5 years. But for the project guides/mentors, it is mandatory to create an account so that they can upload the latest information. But if they wanted to just view the information, they do not need to log in. On the front page all the details related to the projects would be visible. The button in the top left corner called “as "" would enable project guides to log in. In the case of project guides, the input is their information, and the output is an automatically generated project report based on the information provided by them. V-Ideas open-source will be accessible to all students even if he/she is not in the engineering field. But mentors’/project guides of only Vidyalankar Institute of Technology will have the permission to upload information or details regarding to Final year projects of Vidyalankar Institute of Technology. V-Ideas will serve as a database for upcoming projects.

3.1.2 Programming Languages Used

1. Programming Language:

PHP

- PHP (Hypertext Preprocessor) is a server-side scripting language widely used for web development. It is designed to generate dynamic web pages and interact with databases, making it an ideal choice for building web applications with inventory management and online storefront functionalities. o PHP is known for its simplicity and ease of use, making it accessible for developers of varying skill levels.
- It has a large community and an extensive ecosystem of frameworks, libraries, and resources, which provide support and accelerate development.
- PHP has excellent database integration capabilities, allowing seamless communication with database management systems like MySQL. This enables efficient storage, retrieval, and manipulation of inventory data.

2. Web Framework: Laravel

- Laravel is a PHP web framework that follows the Model-View-Controller (MVC) architectural pattern, which helps in organizing code and separating concerns.
- Laravel provides a range of features and tools that simplify and speed up web development. These features include routing, database ORM (Object-Relational Mapping), authentication, caching, and more.
- The routing system in Laravel allows developers to define clean and expressive URLs for different routes in the application. This enables easy navigation and enhances the overall user experience.
- Laravel's built-in ORM, called Eloquent, simplifies database operations by providing an intuitive and expressive syntax for querying and manipulating data. It eliminates the need to write complex SQL queries manually.
- Laravel includes a powerful authentication system with pre-built functionality for user registration, login, and password reset. This makes it easier to implement secure access control for shopkeepers and customers.
- Additionally, Laravel's caching system allows for storing frequently accessed data in memory, reducing the number of database queries, and improving the performance of the application.

3. Database Management System: MySQL

- MySQL is a popular open-source relational database management system known for its reliability, performance, and ease of use. o It is widely used in web applications due to its compatibility with PHP and its ability to manage substantial amounts of data efficiently.
- MySQL supports advanced features such as transactions, stored procedures, and triggers, which enable developers to implement complex data management logic within the inventory management system.
- It has strong community support and a wealth of documentation available, making it easier to find resources, troubleshooting tips, and solutions to common database-related challenges.
- MySQL integrates seamlessly with PHP through the use of PHP extensions and libraries, allowing developers to execute SQL queries, fetch results, and handle database transactions effectively.
- With its scalability and reliability, MySQL provides a robust foundation for storing and managing inventory data, customer information, and transaction details within the inventory management system.

4. Front-end Development: HTML, CSS, JavaScript

- HTML (Hypertext Markup Language) is the standard markup language used for creating the structure and content of web pages. It defines the elements and their layout on a web page.
- CSS (Cascading Style Sheets) is responsible for adding visual styles and presentation to HTML

elements. It controls the colors, fonts, layouts, and overall look and feel of the web page.

- JavaScript is a versatile programming language that adds interactivity and dynamic behavior to web pages. It enables the implementation of client-side functionality, such as form validation, data manipulation, and event handling.

5. Bootstrap:

- Bootstrap is a popular front-end framework that provides a collection of pre-built CSS and JavaScript components.
- It offers a responsive and mobile-first design approach, ensuring that web pages adapt well to different screen sizes and devices.
- Bootstrap simplifies the process of building a visually appealing and user-friendly interface by providing ready-to-use UI components, such as navigation bars, buttons, forms, modals, and grids.
- By leveraging Bootstrap, developers can save time and effort in designing and styling the user interface, allowing them to focus more on the functionality and core features of the inventory management system.

6. Local Market Integration: API Integration

- Many local marketplaces provide APIs (Application Programming Interfaces) that allow developers to integrate their systems with these platforms.
- APIs function as a bridge between the inventory management system and the local marketplaces, enabling seamless data exchange and interaction.
- By integrating with local marketplaces through APIs, businesses can synchronize their inventory data, automate order management, retrieve product information, and update stock levels in real-time.
- API integration facilitates a streamlined workflow, reducing manual effort and minimizing errors in data synchronization between the inventory management system and the online marketplaces.
- It also enables businesses to tap into the customer base and sales potential of the local marketplaces, expanding their reach and increasing their online visibility.

7. Additional Tools and Libraries: jQuery

- jQuery is a lightweight JavaScript library that simplifies DOM (Document Object Model) manipulation and provides utilities for front-end development.
- It offers concise syntax and cross-browser compatibility, making it easier to write JavaScript code and manage common tasks such as event handling, animations, and AJAX requests.
- jQuery simplifies interaction with HTML elements, allowing developers to dynamically update the user interface based on user actions or server responses

• Git:

- Git is a distributed version control system widely used in software development projects.
- It allows multiple developers to collaborate on the project, keeping track of changes, merging code, and resolving conflicts.
- Git provides a history of changes, making it easier to revert to previous versions of the codebase if needed.
- By utilizing Git, developers can work efficiently, maintain code integrity, and facilitate seamless collaboration.

• Docker:

- Docker is a containerization platform that allows applications and their dependencies to be packaged as containers.
- Containers provide a consistent and isolated environment for running applications, ensuring that they work reliably across different systems.
- Docker simplifies the deployment and scalability of the inventory management system by providing a standardized container format.
- It allows for easy distribution of the application and provides a more efficient utilization of system resources.

By utilizing this tech stack, you can build an inventory management system with local market integration and an online storefront that leverages the power of PHP, Laravel, MySQL, HTML, CSS, JavaScript, Bootstrap, API integration, jQuery, Git, and Docker. These technologies collectively provide a solid foundation for developing a robust and scalable solution to meet the needs

3.5 Output

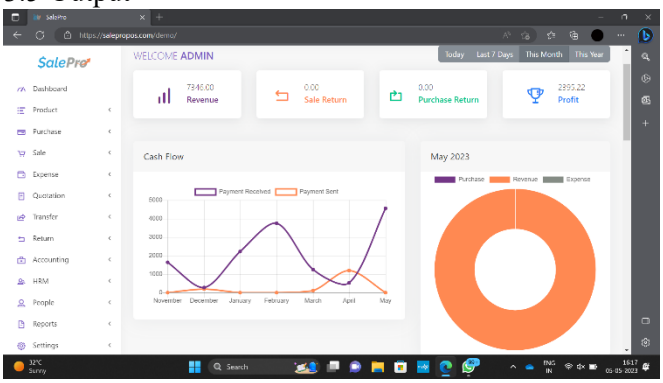


Fig.3.5.1 Dashboard

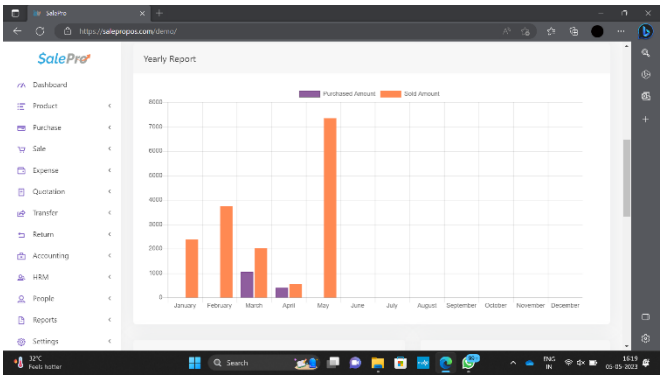


Fig.3.5.2 Yearly Report

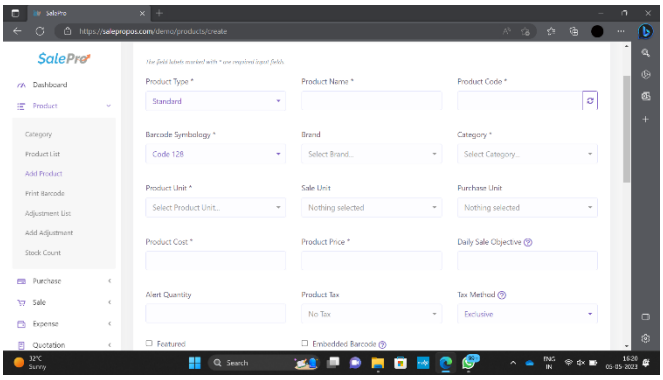


Fig.3.5.6 Product

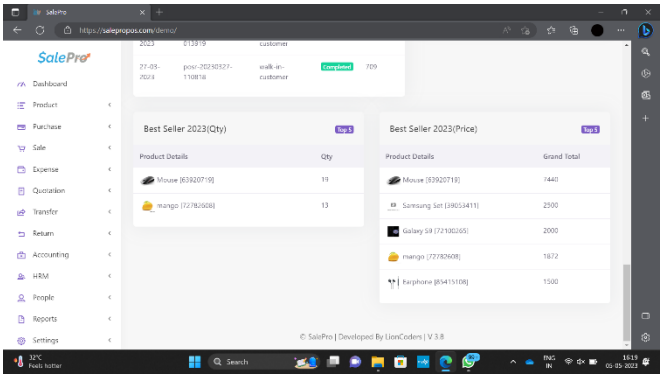


Fig.3.5.3 Best Seller Analysis Chart

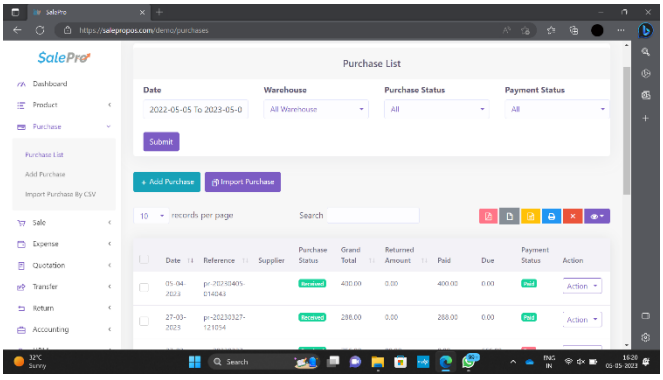


Fig.3.5.7 Purpose List

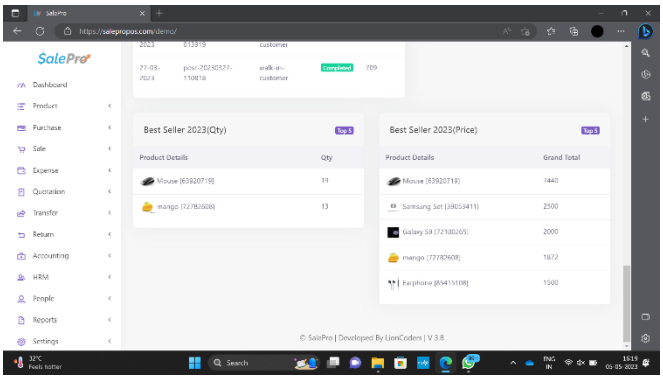


Fig.3.5.4 Seller Analysis

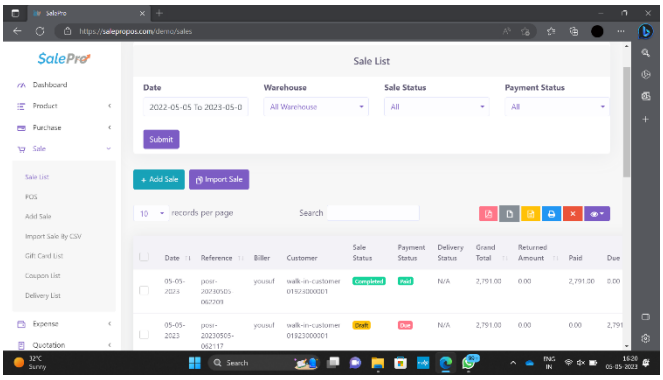


Fig.3.5.8 Sales List

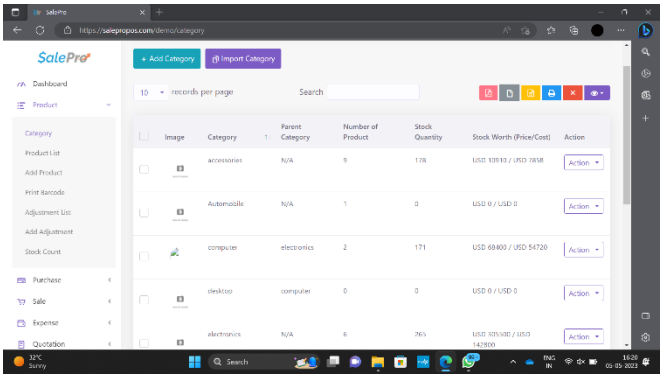


Fig.3.5.5 Product console

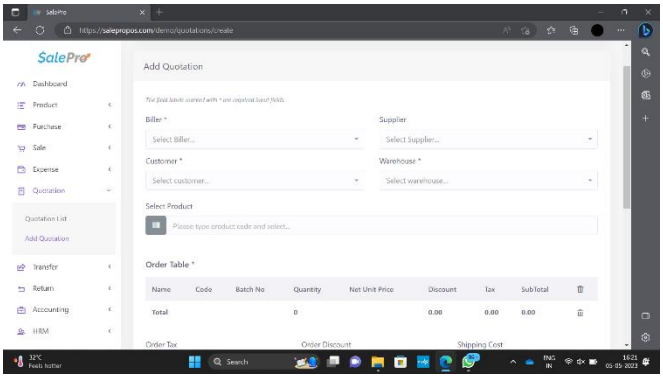


Fig.3.5.9 Qoutation

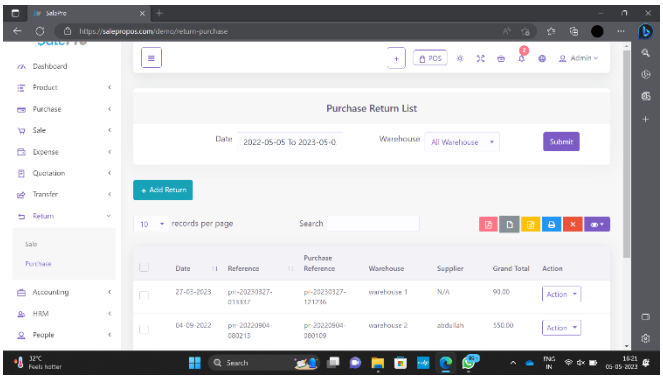


Fig.3.5.10 Return Policy

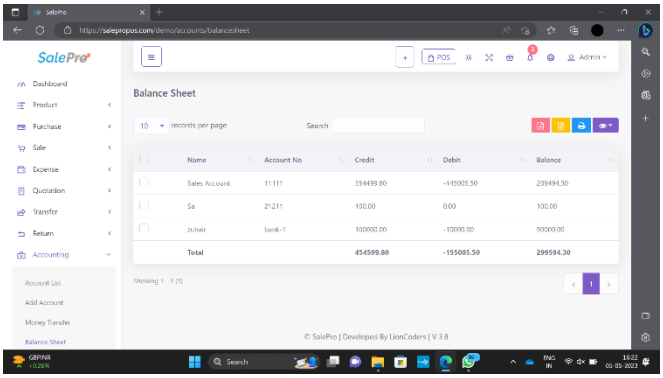


Fig.3.5.11 Balance sheet

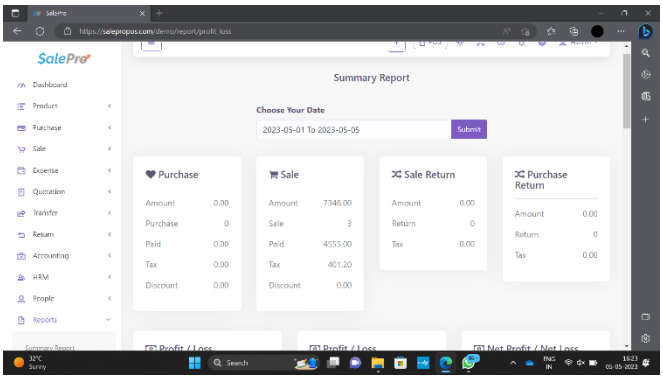


Fig.3.5.12 Summary Report

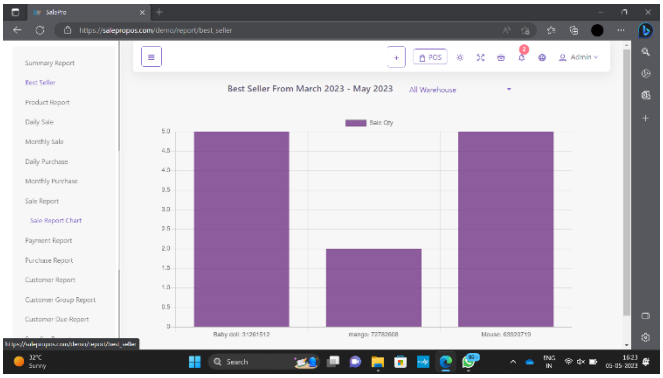


Fig.3.5.13 yearly Summery report

IV. CONCLUSION AND FUTURE SCOPE

In conclusion, building an inventory management system with local market integration and an online storefront requires careful consideration of the tech stack and methodologies to ensure a successful implementation. Throughout this blog, we have explored the suggested tech stack and discussed the importance of each component in the development process. By utilizing PHP as the programming language, developers can benefit from its simplicity, extensive database integration support, and large community. Laravel, as the chosen web framework, offers a range of features and tools that streamline development, including routing, database ORM, authentication, and caching. MySQL serves as a reliable and scalable database management system, facilitating efficient data storage and retrieval. On the front-end, HTML, CSS, and JavaScript form the core technologies, providing structure, styling, and interactivity to the user interface. Bootstrap enhances front-end development with its pre-built CSS and JavaScript components, ensuring responsiveness and a visually appealing design. Local market integration is achieved through API integration, allowing seamless data exchange and synchronization between the inventory management system and local marketplaces. This integration enables businesses to automate processes, manage orders, and update product information in real-time, expanding their reach and visibility. Additional tools and libraries such as jQuery, Git, and Docker further enhance the development process. jQuery simplifies front-end development by providing utilities for DOM manipulation and managing common tasks. Git facilitates version control and collaboration, ensuring code integrity and enabling easy revert to previous versions. Docker simplifies deployment and scalability by providing containerization, enabling consistent and efficient application distribution. In summary, the suggested tech stack of PHP, Laravel, MySQL, HTML, CSS, JavaScript, Bootstrap, API integration, jQuery, Git, and Docker offers a robust and scalable foundation for building an inventory management system with local market integration and an online storefront. By leveraging these technologies, businesses can streamline their inventory management processes, synchronize data across platforms, and tap into the sales potential of local marketplaces. Remember, the choice of technologies should be aligned with the project's requirements, scalability needs, and the development team's expertise. With careful planning, a well-executed tech stack, and adherence to best practices, businesses can achieve an efficient and successful inventory management system that seamlessly integrates with local marketplaces and provides a user-friendly online store.

REFERENCES

[1] J Mazzei, "Responsive Web Design[J]", Business NH Magazine, vol. 9, no. 6, pp. 22-23, 2012.

[2] Ethan Marcotte, Responsive Web Design [EB/OL], [online] Available: http://www.alistapart.com/ articles/ responsive-Webdesign/2010-05-25.

[3] Implementing Responsive design, New riders Berkley, pp. 60-100, 2012.

[4] C R Venkatesh, Infographic: Responsive Web Design [J/OL], 08 2012, [online] Available: http://www.Artofdeveloping.com/2012/09/infographic-responsive Webdesign.html.

[5] S Mohorovi ci c, "Implementing Responsive Web Design for Enhanced Web Presence[C]", Information & Communication Technology Electronics & Microelectronics (MIPRO) 2013 36th International Convention on IEEE, pp. 1206- 1210, 2013.

[6] M Chowdhary, Responsive Web Design Will Be Expected on All Devices[J/OL], 09 2012, [online] Available: http://multichannelmerchant.com/crosschannel/responsiveWebdesign-will-beexpecte d-on-all-devices-15092012/

AET 037

Vriddhiyaan- Smart Shopping Cart using Raspberry Pi systems

Prof. Pravin Annadate
Assistant Professor, DAO, EXCS,
Vidyalankar Institute of Technology
Mumbai, India
pravin.annadate@vit.edu.in

Prof. Akshata Bhat
Assistant Professor, , EXCS,
Vidyalankar Institute of Technology
Mumbai, India
Akshata.bhat@vit.edu.in

Atulkumar Gaud
Student , EXCS,
Vidyalankar Institute of Technology
Mumbai, India
atul.gaud@vit.edu.in

Anushka Mukherjee
Student , EXCS,
Vidyalankar Institute of Technology
Mumbai, India
anushka.mukherjee@vit.edu.in

Gautam Patil
Student , EXCS,
Vidyalankar Institute of Technology
Mumbai, India
gautam.patil@vit.edu.in

Manas Shinde
Student , EXCS,
Vidyalankar Institute of Technology
Mumbai, India
manas.shinde@vit.edu.in

Abstract— Shopping: In supermarkets, groceries cannot be imagined without big lines and wasting time at the billing counter, especially in a city like Mumbai. Increasing the billing counters would help but there are limitations to that [1]. So VRIDDHIYAAN is a cheap, easily installable solution to this issue.

VRIDDHIYAAN is a project which will enhance the user experience by automating the detection of products It will use the technologies of Computer Vision and Algorithms to ensure the correct process of the addition and subtraction of products. There would be sensors to detect the objects. The project aims to exhibit the final amount on display and to track the expense while shopping. This cart will keep track of all the products and their prices and will generate a paperless bill. All this information will be displayed on the screen.

Keywords— shopping, queue, wait time, digital bill, paperless bill, shopping mall, retail, billing.

I. INTRODUCTION (*HEADING 1*)

According to ICSC the average wait time in shopping marts in the United States is at least 135 minutes. One of the main reasons why youngsters these days are focussing on online shopping is to avoid long lines and wasting their precious time. However, supermarkets like D Mart are still popular amongst the people of India for their discounted items. According to a survey done by Ch. Hymavathi and Abhilash Nissankara Rao regarding queues and queue times in Guntur city, Andhra Pradesh, in rush hours, billing counters can get very crowded. As crowded as a line of 30 shopping carts within 8 minutes [5]. This may put tremendous pressure also on retail workers. Hence it would be better if the consumers could bill themselves so that the billing time could be reduced greatly [1] . In the United States, an initiative such as so has been taken however it is on a small scale that is only in one mall in Los Angeles called Amazon Dash Cart. However, the same solution cannot be added in India due to reasons like lack of capital and non-adaptability of other forms of payment in the former one. So here is VRIDDHIYAAN, our very own cart. It's an easy and adaptable solution in the form of a cart in which the consumers can bill themselves and will get a paperless bill on their screen while they are putting their groceries in the cart.

II. METHODOLOGY

A. **Overview**

It is a project which will enhance the user experience by automating the detection of products. The main part of the project is a camera which will be used to detect objects. It will use the technologies of Computer Vision and Algorithms to process the addition and subtraction of products.

Consumers can board products given up to sensor range limitations. This will be sensed by the IR sensor and will be displayed on the GLCD screen. The project aims to exhibit the final amount on display and to track the expense while shopping. This cart will keep track of all the products and their prices and will generate a paperless bill. All this information will be displayed on the screen.

1. Using IR 2 sensors, it will sense and add/subtract the product.
2. It will scan the given barcode on the product.
3. The second part of the project is to make a database to compare it with the input taken by the software part.
4. Hence Working is explained in three parts:
    1. Software
    2. Database
    3. Hardware

B. Software

To write code, PyCharm IDE is used as it is compatible software for Python containing a variety of modules and is easy to handle.

OpenCV stands for Open-Source Computer Vision (Library). It is the most widely used, well-known, and well-documented Computer Vision library. It is open source, which implies that no license is required to use the software. OpenCV-Python is a Python wrapper for the original C++ implementation of OpenCV. NumPy, a highly efficient library for numerical computations with MATLAB-style syntax, is used by OpenCV-Python. All array structures in OpenCV are converted to and from NumPy arrays. The first module utilized is OpenCV (CV2), which offers a collection of routines for capturing a barcode picture in milliseconds. To collect picture data, this module includes methods such as motion detection, resizing, blurring, rotating, dilation, threshold, and color changes.

Pyzbar is the second module that will be used to decode the barcode, which is the image acquired by the OpenCV module. A function called 'decode' contains the code for extracting data from the input and comparing it to the database.

The functions listed above were those of the modules found in the actual code. Half of the function will be performed by modules such as detecting the object using the camera, taking the image, and feeding it to the next section of code. Following this piece of code, the following block of code will be executed. The Pyzbar module will send you data in the form of an ID. The ID will be checked against the database. The data retrieved from the database is printed or shown on the screen. According to the progress made thus far, the detection of barcodes through the camera is achievable, as is the section where data is obtained from the image.

C. *Database*

PostgreSQL is used as the primary data store or data warehouse for many webs, mobile, geospatial, and analytics applications. PostgreSQL can store structured and unstructured data in a single product. To create the database, MySQL/PostgreSQL software is used. It is compatible with our project requirement of database creation.

MySQL/PostgreSQL is an open-source relational database management system. As with other relational databases, it stores data in tables made up of rows and columns. Users can define, manipulate, control, and query data using structure query language, more commonly known as SQL.

As of now, we created the database which consists of Product ID, Name, Type, In stock, Price, Weight, Discount, and Tax. When the store purchases the products, it gets stored in the database, then the id of the required product is compared, and the data of that product is fetched by code and displayed on the screen. A database is created consisting of the above-mentioned columns. This information will be saved in a cloud of the store for purposes of retrieval and using the same for making the paperless bill.

In this, the data that is saved will be shown as soon as the product is scanned through the camera.

C. Hardware

The hardware that can be used for this product should be up to date. In this, we would have the hardware components.

As mentioned in the following: -

Primarily we should focus on the detection of the objects. Since we are using the computer. vision or open CV, we are using cameras for detecting objects. The addition and subtraction of the objects shall be done in the codes themselves. So, for the detection of the objects, we shall use the cameras of the model Raspberry Pi 3 Model B+ Camera Module. The reason for adopting this is the following:

1. The high definition 5MP camera delivers outstanding photos but can also shoot video, ideal for drones or CCTV projects. The lightweight camera module allows for it to be used in more practical roles, such as a hidden camera or even a camera for a Pi phone.
2. The board itself is tiny, at around 25mm x 23mm x 8mm. It also weighs just over 3g, making it perfect for mobile or other applications where size and weight are important. It connects to Raspberry Pi by way of a short flexible ribbon cable. The camera connects to the BCM2835 processor on the Pi via the CSI bus, a higher bandwidth link that carries pixel data from the camera back to the processor. This bus travels along the ribbon cable that attaches the camera board to the Pi.

The GLCD commands are used to control a Graphical Liquid Crystal Display (GLCD) based on the number of GLCD chipsets. These are often 128x64 pixel displays but the size can vary. GLCD devices draw graphical elements by enabling or disabling pixels.

A GLCD is an upgrade from the popular 16x2 LCDs, but the GLCD allows full graphical control of the display.

An infrared sensor (IR sensor) is a radiation-sensitive optoelectronic component with spectral sensitivity in the infrared wavelength range of 780 nm to 50 µm. IR sensors are now widely used in motion detectors, which are used in building services to switch on lamps or in alarm systems to detect unwelcome guests. In a defined angle range, the sensor elements detect the heat radiation (infrared radiation) that changes over time and space due to the movement of people. Such infrared sensors only must meet relatively low requirements and are low-cost mass-produced items. Infratech does not supply such products, Infratech develops, produces, and sells pyroelectric detectors.

Specification and Features:

- The operating voltage is 5VDC.
- I/O pins – 3.3Volts & 5Volts
- Mounting hole

- The range is up to 20 centimetres.
- The supply current is 20milli Amperes.

A light-emitting diode (LED) is a semiconductor device that emits light when an electric current flows through it. When current passes through an LED, the electrons recombine with holes emitting light in the process. Specification and Features: -Long life. The components of an LED and the way that they generate light significantly extend the lifespan of these bulbs.

III. STEPS FOR THE PROJECT AND THE FLOWCHARTS

Considering the above-mentioned components, the work is as follows,

Step1: After assembling the machine on the cart, when the product is kept inside sensor 1 will sense the movement occurring inside the cart.

Step2: After sensing the movement by sensor 1 then the camera detects the barcode.

Step3: After detection of the barcode, sensor 2 will sense the movement passed through the barcode.

Step4: After passing all three cases in sequence as mentioned in the algorithm it will fetch the data from the given database.

Step5: After this, if the product matches the data available in the database, then it will add the product.

Step6: If the user wants to eliminate the product, he/she will have to pass all three cases in sequence through descending order so the product will get eliminated.

Step7: The product will get added until and unless it doesn't intersect the range of the sensor 2.

Step8: The final product which is inside the cart will be displayed on GLCD.

Step9: After the user proceeds to check out, the final bill will be displayed on GLCD.

Step10: It depends on the user how the user wants to pay the bill either online or by cash giving the bill number on the cash counter.

Understandably, the possibility of human error can be reduced greatly as the entire process is automated. However, for cost-effective purposes, we have the other method that we are using as the semi-automated method.

In the automated versions, the entire process of ensuring the addition and subtraction would be taken care of using Open CV and 2 camera modules. However, adding two cameras to one module would not be possible unless and until there would be an Arducam Raspberry Pi Multi-Camera Adapter or we would have to add in USB-based webcams. And root mean square do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

IV. FIGURES AND RESULTS

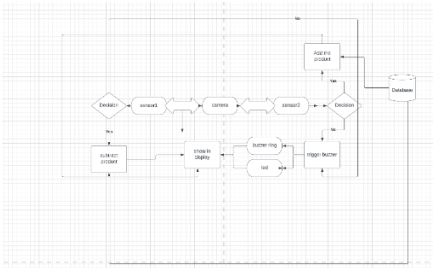


Fig 1. Electronics Block Diagram

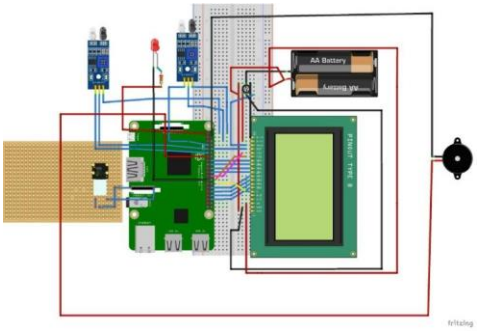


Fig 2. Circuit diagram

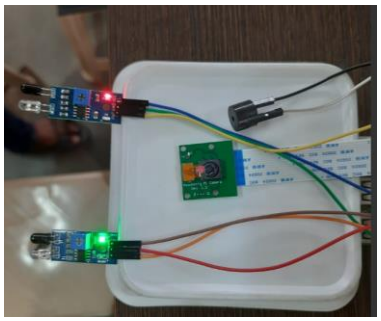


Fig 3. Arrangement of sensors and camera

```
import cv2 as cv
import numpy as np
from matplotlib import pyplot as plt


def motionDetection():
    cap = cv.VideoCapture(0)
    ret, frame1 = cap.read()
    ret, frame2 = cap.read()

    while cap.isOpened():
        diff = cv.absdiff(frame1, frame2)
        diff_gray = cv.cvtColor(diff, cv.COLOR_BGR2GRAY)
        blur = cv.GaussianBlur(diff_gray, (5, 5), 0)
        _, thresh = cv.threshold(blur, 20, 255, cv.THRESH_BINARY)
        dilated = cv.dilate(thresh, None, iterations=3)
        contours, _ = cv.findContours(
            dilated, cv.RETR_TREE, cv.CHAIN_APPROX_SIMPLE)

        for contour in contours:
            (x, y, w, h) = cv.boundingRect(contour)
            if cv.contourArea(contour) < 900:
                continue
            cv.rectangle(frame1, (x, y), (x + w, y + h), (0, 255, 0), 2)
            cv.putText(frame1, "Status: {}".format('Movement'), (10, 20), cv.FONT_HERSHEY_SIMPLEX,
                       1, (255, 0, 0), 3)

        # cv.drawContours(frame1, contours, -1, (0, 255, 0), 2)
```

Fig 4. Motion detection

Data Output | Explain | Messages | Notifications

	product_id integer	product_name [PK] character varying (30)	product_type character varying (30)	product_instock integer	product_price integer	product_weight_gms character varying (10)	product_discount character varying (10)	product_tax character varying (10)	product_total character varying (10)
1	123456789	Tata salt	groceries	5	50	500	10%	5%	Undecided
2	124354334	Colgate	groceries	2	30	100	5%	[null]	Undecided
3	576883254	Miranda	Beverages	50	70	1lt	5%	[null]	Undecided
4	645889677	Maggi	groceries	70	15	50	0%	[null]	Undecided
5	9457821145	Double eclairs	groceries	500	1	5%	Undecided	[null]	Undecided

Fig 5. An example of a database

The interfacing of the software and the database is relatively easy if the Raspberry Pi is well-compatible with the camera. The IR sensor module can detect the

motion of the object well enough given the object is in the range of 20 centimeters as shown in the illustration above in fig 4. However, interfacing with the camera can only be done if all the components are compatible with each other and then the data can be pulled from the database as shown above in fig 5.

V. CONCLUSION

With lesser efforts taken by consumers and shopping cart workers, Vriddhiyaan becomes an easier way to deal with long lines and shopping wait times.
One of the biggest aims of VRIDDHIYAAN is to ease up the shopping experience of the average user.
With the available systems in shopping malls, the consumer must pick and choose the items they want and wait in long queues to pay for the same.
However, with VRIDDHIYAAN, the shopping experience will be very easy as the bill is generated as and when the consumer puts products in the cart.

ACKNOWLEDGMENT (Heading 5)

We take this opportunity to express our profound gratitude and deep regards to our guides Prof. Pravin Annadate and Prof. Akshata Bhat for their guidance, monitoring, and constant encouragement throughout the course of this project work.

We also take this opportunity to express deep gratitude to Prof. Arun Chavan, HOD of E.X.C.S. Dept. for his cordial support, valuable information, and guidance, which helped us complete this task through various stages.

Lastly, we are obliged to staff members of Vidyalankar Institute of Technology, for the valuable information provided by them in their respective fields. We are grateful for their cooperation during the period of our project work.

REFERENCES

[1] A Study on Customer Satisfaction towards D Mart Retail Outlet in Karwar City by Akshay Kumar G Bhat MBA 3rd Semester Student K.L. E's Institute of Management Studies & Research and Rajendra Prasad Associate Professor &Dean Academics K.L. E's Institute of Management Studies & Research BVB Campus, Vidyanagar Hubli, Karnataka - 580 031 https://www.sdmimd.ac.in/incon_cd_2020/papers/MR111.pdf

[2] Bain and company article on Indian shopping behaviour https://www.bain.com/insights/how-india-shops-online-2021/

[3] Automated shopping trolley system using Raspberry Pi by Ravindra Jogekar, Ruchita Ghodeswar, Payal Kadu

[4] Priyadarshini J L College of Engineering, Nagpur, India http://ijrcs.org/wp-content/uploads/201802064.pdf

[5] Queuing Time and Shopping Time of D-Mart Customers with Special Referenced Guntur City, Andhra Pradesh by Ch. Hemavati, Abhilash NissankaraRaohttps://www.ijrte.org/wpcontent/uploads/papers/v8i1/A1450058119.pdf

[6] Smart Cart with Automatic Billing, Product Information, Product Recommendation Using RFID & Zigbee with Anti-Theft by Ankush Yewatkar Faiz Inamdar, Raj Singh, Ayushya, and Amol Bandekar DOI:10.1016/j.procs.2016.03.107

[7] Smart Shopping Cart using Machine Vision along with Machine Learning by Rakshit Shetty, Darshana Pawar, Rishika Poojari, Ritvik Patel, Dr Jyoti Mali https://www.researchgate.net/publication/359352285_Smart_Shopping_Cart_using_Machine_Vision_along_with_Machine_Learning

AET 038

Advanced Vehicle Synchronization

Pritesh Lendale
B.E. Student, Electronics Engineering
Vidyalankar Institute of Technology Mumbai, India
pritesh.lendale@vit.edu.in

Sudhanshu Mulye
B.E. Student, Electronics Engineering
Vidyalankar Institute of Technology Mumbai, India
sudhanshu.mulye@vit.edu.in

Siva Kumar Yadav
B.E. Student, Electronics Engineering
Vidyalankar Institute of Technology Mumbai, India
sivakumar.yadav@vit.edu.in

Pooja Kumthekar
B.E. Student, Electronics Engineering
Vidyalankar Institute of Technology Mumbai, India
pooja.kumthekar@vit.edu.in

Abstract— Advanced vehicle synchronization refers to the coordination of multiple vehicles, either autonomously or through human input, to improve traffic flow, reduce congestion, and increase safety on the road. This involves the development of intelligent transportation systems that enable vehicles to communicate with each other and with road infrastructure in real-time, and to make decisions based on shared information and data. Advanced vehicle synchronization holds promise for improving the efficiency and safety of transportation, reducing fuel consumption and emissions, and enhancing the overall mobility experience for drivers and passengers alike.

This project aims to develop an advanced vehicle synchronization system that enables remote control of a vehicle using an ESP32 microcontroller and various sensors. The system is designed to be modular and expandable, allowing for the integration of additional features such as GPS and AI in the future.

The system uses an IR sensor and ultrasonic sensor to detect obstacles and adjust the vehicle's speed and direction accordingly. A web interface is provided for users to control the vehicle's speed and direction, and real-time feedback is provided to ensure safe and efficient operation.

The system is implemented using the ESP32 microcontroller and various libraries such as 'ESPAsync WebServer' and 'WebSocket'. The system was successfully tested in various scenarios, demonstrating its reliability and robustness.

Overall, the advanced vehicle synchronization system developed in this project provides a solid foundation for further exploration and development in the field of IoT-enabled vehicle control and monitoring.

I. INTRODUCTION (HEADING 1)

As traffic congestion continues to worsen in our cities, there is a growing need for innovative solutions that can improve traffic flow and reduce travel time. Advanced vehicle synchronization is a promising approach that involves the coordination of multiple vehicles to create a more efficient and dynamic traffic system.

For this final year college project, we will explore the potential of advanced vehicle synchronization and develop a proof-of-concept system that demonstrates its benefits using the components: ESP32, motor driver, DC motor, Arduino Uno, and IR sensor.

Our project will focus on the development of a system that allows vehicles to communicate with each other and with roadside infrastructure, such as traffic signals, in real-time. This communication will allow for the sharing of data, such as traffic conditions and vehicle speeds, which can be used to optimize traffic flow and reduce congestion.

Our project will involve the use of emerging technologies such as IoT and embedded systems. We will design and implement a system that can collect and analyze data from multiple sources, make intelligent decisions based on that data, and communicate those decisions to drivers and other vehicles on the road.

The goal of our project is to demonstrate the potential of advanced vehicle synchronization to improve traffic flow, reduce travel time, and increase safety on the road. By developing a proof-of-concept system, we aim to provide a foundation for future research and development in this exciting and rapidly evolving field.

II. AIM AND OBJECTIVE

A. AIM

The aim of this project is to develop a comprehensive and advanced vehicle synchronization system that enables remote control of a vehicle using an ESP32 microcontroller and various sensors, with the potential for future integration of AI and other advanced technologies. The system should be designed with modularity, scalability, and robustness in mind, allowing for easy integration of additional features and reliable operation in various scenarios.

B. OBJECTIVE

- To research and analyze existing technologies and solutions for remote vehicle control and monitoring and identify areas for improvement and innovation.
- To design and develop a modular and scalable system architecture that can accommodate future integration of advanced features such as GPS and AI.
- To develop algorithms and logic for obstacle detection and avoidance using an IR sensor and ultrasonic sensor, with the aim of ensuring safe and efficient operation.
- To implement a web interface for remote control of the vehicle's speed and direction, providing real-time feedback to users and enabling seamless control of the vehicle.
- To test and validate the system's performance and reliability in various scenarios and optimize the system for improved efficiency and effectiveness.
- To explore the potential for future development and integration of advanced technologies such as AI and machine learning and assess the feasibility and potential benefits of such integration.

III. PROBLEM STATEMENT

Advanced vehicle synchronization is a promising approach that involves the coordination of multiple vehicles to create a more efficient and dynamic traffic system. This technology can be used to coordinate the movement of vehicles at intersections, for example, to ensure that vehicles arrive at the intersection at the optimal time to avoid stopping and starting, which can slow down traffic and increase emissions. Advanced vehicle synchronization has the potential to revolutionize transportation by increasing efficiency, reducing emissions, and improving safety on our roads.

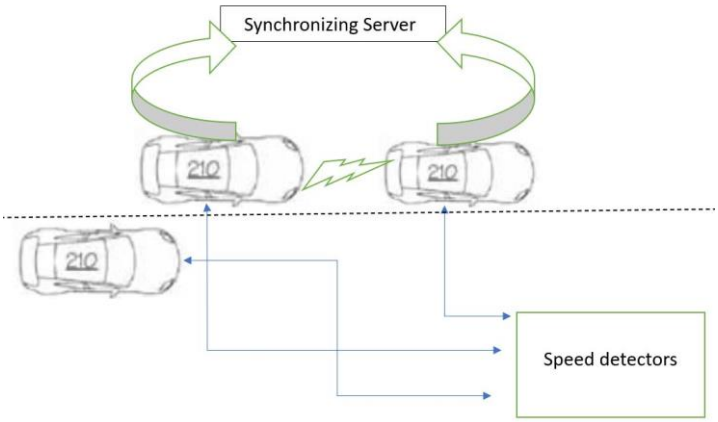
IV. SCOPE

The scope of our final year college project on advanced vehicle synchronization is to design and develop a proof-of-concept system using ESP32, motor driver, DC motor, Arduino Uno, and IR sensor that demonstrates the benefits of a connected vehicle system. The project will involve the following key objectives:

- Design and develop a system for collecting and analyzing data from multiple sources, including IR sensors and vehicle sensors.
- Implement algorithms that can process this data in real-time and make intelligent decisions based on the current traffic conditions.
- Develop a communication system that allows vehicles to share data with each other and with roadside infrastructure, such as traffic signals.
- Implement a motor control system that allows vehicles to adjust their speed and distance from other vehicles based on the received data.

Evaluate the effectiveness of the system in reducing traffic congestion, improving traffic flow, and increasing safety on the road.

V. PROPOSED SYSTEM



VI. METHODOLOGY

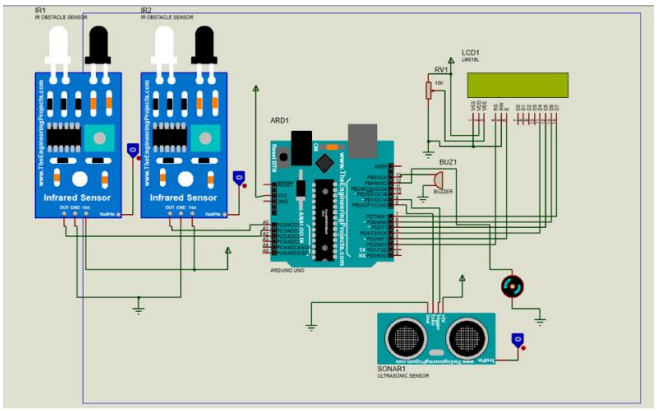
Advanced vehicle synchronization methodology involves several different technologies and approaches that work together to coordinate the movement of multiple vehicles.

Some of the key methods used in advanced vehicle synchronization include:

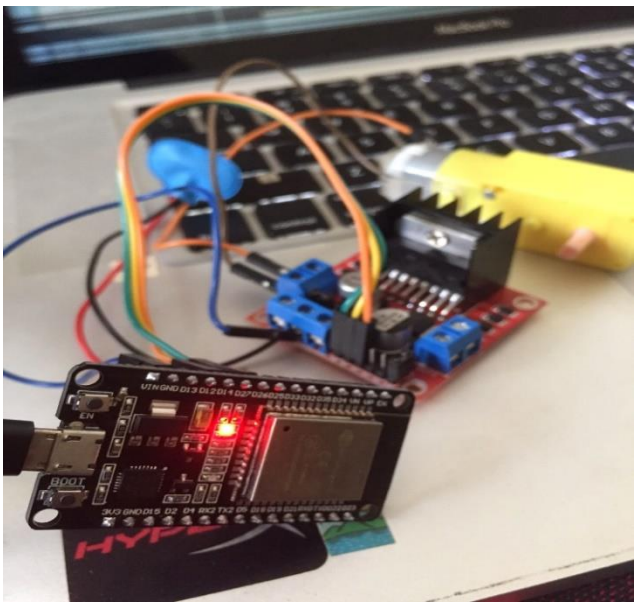
- Connected vehicle technology: This technology uses sensors and communication systems to allow vehicles to communicate with each other and with infrastructure in real-time. This allows vehicles to share information about traffic conditions, road hazards, and other factors that could impact their movement.
- Traffic signal coordination: This involves using connected vehicle technology to optimize traffic signal timing at intersections, allowing vehicles to travel through without stopping or with minimal delay.
- Lane management: Advanced vehicle synchronization can also be used to manage lanes on highways, allowing vehicles to travel at higher speeds while maintaining safe following distances.
- Routing and scheduling optimization: This involves using algorithms to optimize the routes and schedules of vehicles, taking into account factors such as traffic conditions, weather, and vehicle availability.

VII. DESIGN AND IMPLEMENTATION

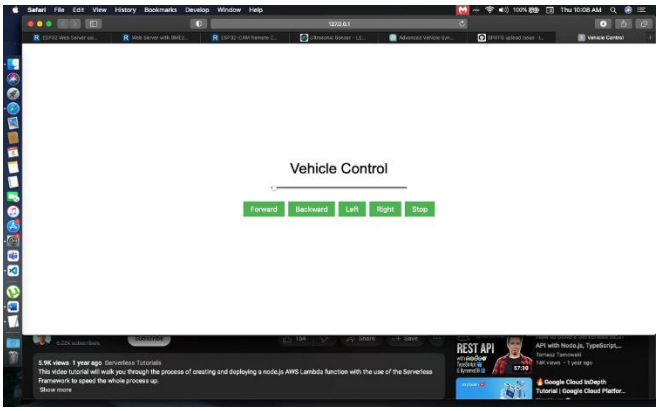
- Simulation



- Hardware Components



- Web Interface



Block Diagrams

Data Flow Diagram

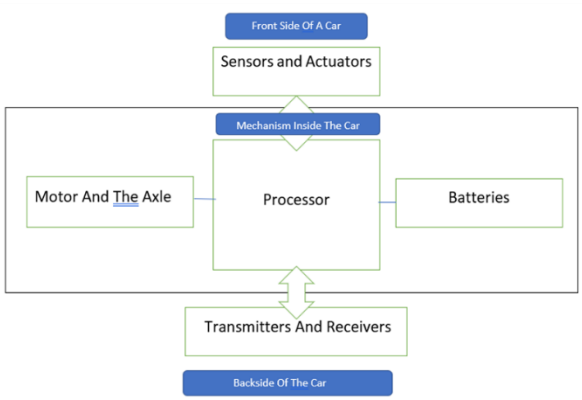
A Data Flow Diagram (DFD) is a graphical representation of the "flow" of data through an Information System.

A data flow diagram can also be used for the visualization of Data Processing. It is common practice for a designer to draw a context-level DFD first which shows the interaction between the system and outside entities. This context level DFD is then "exploded" to show more detail of the system being modeled.

A DFD represents the flow of data through a system. Data flow diagrams are commonly used during problem analysis. It views a system as a function that transforms the input into desired output. A DFD shows movement of data through the different transformations or processes in the system.

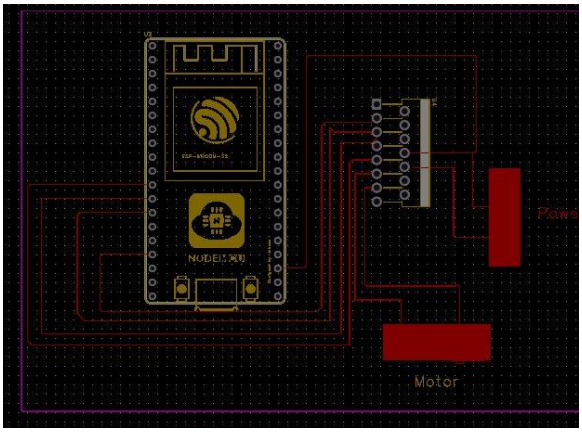
DFDs can be used to provide the end user with a physical idea of where the data they input ultimately influences the structure of the whole system from order to dispatch to restock. How any system is developed can be determined through a dataflow diagram. The appropriate register is saved in the database and maintained by appropriate authorities.

VIII. PROCESS MODEL



IX. HARDWARE REQUIREMENTS

- PCB Design



- **PROJECT CATEGORY:**
- **Languages used:**

Front End: HTML, CSS.
Back End: PLATFORM IDE

X. FUTURE SCOPE

The advanced vehicle synchronization system developed in this project provides a solid foundation for further development and exploration in the field of IoT-enabled vehicle control and monitoring. One possible future development is to integrate the system with GPS technology, allowing for precise tracking and navigation of the vehicle. Additionally, incorporating AI into the system could provide even more advanced control and monitoring capabilities.

For instance, the system could be trained to recognize and respond to specific voice commands, making it even easier for users to control the vehicle. Furthermore, AI could be used to analyze data collected by the system to identify patterns and insights that could improve the efficiency and safety of the vehicle. The machine learning algorithms could be trained to improve the system's obstacle detection and avoidance capabilities, thus continuously refining its algorithms to improve accuracy and reliability.

Another potential area of future work is to incorporate Li-Fi technology to transmit data, which promises to play a vital role in human life. This technology can provide higher bandwidth, security, and reliability than traditional Wi-Fi technology. Moreover, it could also enable better communication between the vehicle and surrounding infrastructure, enhancing the overall safety and efficiency of the vehicle.

XI. REFERENCES

- https://www.reichelt.com/magazin/en/guide/basic-equipment-for-the-electronics-laboratory-workstation/

Vetrivendhan. Balaji, “A System for Accident Detection and Estimation of Automotive Accidents Using Zigbee”, Department of Electronics & Instrumentation Engineering St Peter’s University, Avadi, Chennai, India, Vol. 6, Issue No. 3.

- N. Suganya, E. Vinothini, “Accident Alert and Event Localization”, Department of Pervasive Computing Technologies, Kings College of Engineering Punalkulam, Tamilnadu, Vol. 3, Issue 8, February 2014.
- Yaser S. A. Shaheen, Hussam M. I. Alkafrawi, Tarek R. S. Al Aga, Ismail M. Elkafrawi and Massoud A. Omar Imaeeg, “Arduino Mega Based Smart Traffic Control System”, Department of Electrical and Electronics Engineering, Faculty of Engineering, Benghazi University, Libya, Asian Journal of Advanced Research and Reports.
- Afreen Fathima, Samreen Jameel, Pathan Ahmed khan, “ACCIDENT DETECTION AND ALERTING SYSTEM”, UG Scholar, Department of CSE, ISL Engineering College, Hyderabad, Volume.
- R. Raffik, M. Michael Jones, T. Murugajothi, B. Kannadasan, “INTELLIGENT ACCIDENT DETECTION AND SMART ALERT SYSTEM FOR VEHICLES”, Department of Electronics and Communication Engineering, PSNA College of Engineering and Technology, Dindigul, Tamilnadu, India – 624622, Vol. 6 No. 3 December 2021.
- Meickammal Rajapriya R, B.Hemalatha, “REAL TIME IMPLEMENTATION OF VEHICLE SAFETY MONITORING USING LABVIEW”, Department of Electronics and Communication, BIST, BIHER, Bharat University, Chennai, Volume 116 No. 20 2017, 501-506.
- Sravan Akuthota, Sai Krishna N, Rakesh, D. Deva Hema, “Vehicle Collision Safety Detection System”, International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249-8958 (Online), Volume-8 Issue-1, October 2018.
- Muntaser Momani, “Collision Avoiding System (CAS)”, Al-Balqa, 11140 P.O. Box 425530 Amman, Jordan, Contemporary Engineering Sciences, Vol. 5, 2012, no. 7, 341 – 354. Vol No. 950.

R.Arulmozhi, A.G.Deviga, N.Ezhilarashi, P.Jayanthirani, Mrs.P.Sudha, “RFID AND ZIGBEE BASED TRAFFIC CONTROL SYSTEM FOR CONGESTION CONTROL, AMBULANCE CLEARANCE AND STOLEN VEHICLE DETECTION”, ELECTRONICS AND COMMUNICATION ENGINEERING BHARATHIYAR INSTITUTE OF ENGINEERING FOR WOMEN, DEVIYAKURICHI, Vol. 3, Special Issue 2, March 2016.

- Woon-Sung Lee, Ji-Yong Lee, Sang-Soo Park, “A NEW APPROACH TO FORWARD COLLISION AVOIDANCE”, Graduate School of Automotive Engineering, Kookmin University, Seoul, Korea.
- “The Use of Forward Collision Avoidance Systems to Prevent and Mitigate Rear-End Crashes.” Special Investigation Report NTSB/SIR-15-01. Washington, DC. National Transportation Safety Board. 2015.
- Pranali Revankar, Kalpit Raut, Mamata Kudikala, “Vehicle to vehicle communication using zigbee”, Department of Electronics & Telecommunication

Engineering, Rajiv Gandhi Institute of Technology, Andheri (w), Mumbai-53, International Journal of Scientific & Engineering Research Volume 9, Issue 2, February-2018 ISSN 2229-5518.

- Mrs. Ligi K. Post Graduate Scholar, "Vehicle Density Estimation using GPS and Zigbee Networks to Control Traffic Signals", Department of Electrical and Electronics Engineering, Vel Tech Dr.RR & Dr.SR Technical University, Chennai, Vol. 3 Issue 3, March – 2014.
- V. Anupriya, B. Lissy Roy, V. Dheepthi, Farhat M asood, "Smart Accident Notification and Collision Avoidance System", UG Scholar /ECE Sri Ramakrishna Engineering Coimbatore, Tamilnadu, India, ISSN: 2278-0181 Vol. 4 Issue 04, April-2015.

Faisal Riaz, Muaz A. Niazi, "Road collisions avoidance using vehicular cyber-physical systems", Department of Computer Sciences-COMSATS, Islamabad, Pakistan, Complex Adapt Syst Model (2016) 4:15 DOI 10.1186/s 40294-016-0025-8.

- G. KARTHIKEYAN, N. GOPI, A. KISSHOR, S. NIRMAL KUMAR, D. S. VENKATARAMANAN, "CONTROLLING OF TRAFFIC SIGNALS AND VEHICLES AT ROAD JUNCTION USING ZIGBEE", Department of Electrical and Electronics, Narasu's Sarathy Institute of Technology, Salem, ISSN: 2347-6982 Volume-3, Issue-5, May-2015.
- Priyam A. Parikh, Keyur D. Joshi, Saurin Sheth, "Color Guided Vehicle – An Intelligent Material Handling Mechatronic System", Mechatronics Engineering Department, G.H. Patel College of Engineering and Technology, Vallabh Vidyanagar, Anand, Gujarat, India, Vol Dec 18-20, 2013.
- Mbachu, C. B, Onuora, O. N, "A VEHICULAR ACCIDENT DETECTION AND AVOIDANCE SYSTEM FOR PROTECTING PASSENGERS AND VEHICLES", Department of Electrical and Electronic Engineering, Anambra State University Anambra State, Uli NIGERIA, Vol. 2 No. 2, 2014 ISSN 2056-5860.
- M. Srilatha, N. Vamshi, R. Aniruth, P. Narendar, Ch. Hareesh, "Automatic Accident Avoidance and Detection System using LabVIEW", Department of ECE, Vardhaman College of Engineering, India, ISSN 2278-3091 Volume 9, No.4, July – August 2020.
- Jinhui Han, Yong Ma, Bo Zhou, Fan Fan, Kun Liang, and Yu Fang, "A Robust Infrared Small Target Detection Algorithm Based on Human Visual System", IEEE GEOSCIENCE AND REMOTE SENSING LETTERS, VOL. 11, NO. 12, DECEMBER 2014.

AET 039

Smart Walking Stick for Blind & Elderly People

Srushti Bomble
Department of Electronics Engineering
Vidyalankar Institute of Technology
(Affiliated to University of Mumbai)
Wadala (East), India
srushtibomble@gmail.com

Hardik Nabar
Department of Electronics Engineering
Vidyalankar Institute of Technology
(Affiliated to University of Mumbai)
Wadala (East), India
srushtibomble@gmail.com

Rutuja Chavan
Department of Electronics Engineering
Vidyalankar Institute of Technology
(Affiliated to University of Mumbai)
Wadala (East), India
sanac5217@gmail.com

Sahil Shirke
Department of Electronics Engineering
Vidyalankar Institute of Technology
(Affiliated to University of Mumbai)
Wadala (East), India
sahilvilasshirke@gmail.com

Abstract— Technologies are rapidly evolving, allowing people to live healthier and simpler lives. Sightless people are unable to carry out their everyday activities, such as walking down the street, visiting friends or relatives, or doing some other mundane tasks. As a result, the smart stick is a stick that can assist a person in walking safely without fear of colliding with another person or solid objects are proposed as a solution to this major issue. The smart walking stick helps blind and elderly people to perform navigation and to do their work easily and comfortably. In normal sticks, the detection of the obstacle is not done, and normal sticks are not efficient for visually impaired persons. Because the person does not know what type of things or what type of objects come in front of him or her. The person cannot recognize what is the size of that object and how far is he/she from the object. The system is very useful for people who are visually impaired and often need help from others.

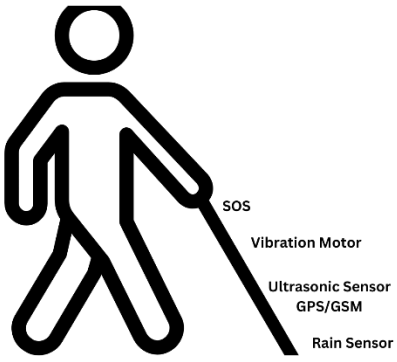
Keywords— GSM, GPS, Ultrasonic sensors, Smart Stick.

I. INTRODUCTION

According to the WHO, about 30 million people are estimated to be permanently blind worldwide. Visually impaired people find difficulties detecting obstacles in front of them, during walking in the street, which makes it dangerous.[2] The number of visually impaired people are expected to grow in the future due to various reasons. As a result, there is a need for a cost effective system that can be used by blind people in order to walk easily and comfortably. The main problem with blind and elderly people is how to navigate their way to wherever they want to go. Such people need assistance from others with good eyesight. As described by WHO, 10% of the visually impaired have no functional eyesight at all to help them move around without assistance and safely. This study proposes a new technique for designing a smart stick to help visually impaired people that will provide them navigation. Mobility for blind and elderly people is a problem as they have to face many difficulties in their day-to-day life. Most commonly, a stick is used by blind and elderly people as a support for their body to stand and walk. [1] These people are totally dependent on others. They cannot even walk on their own. The smart stick comes as a proposed solution to enable them to identify the world around them. We have designed and built a **"Smart Walking Stick for Blind and Elderly People"** device which will help blind and elderly people to walk with ease independently.

II. PROPOSED DESIGN

Aim is to provide a low-cost smart stick to the blind and partially sighted people.



When the system is switched on, it starts with well-wishing to the user. After a delay of one second the ultrasonic sensor transmits the high frequency wave of 40 kHz to check the obstacle in front and at the same time it starts the timer to calculate the time elapsed and waits for echo signal to receive at receiver within the time limit. And if object is detected at less than 1 meter, a voice command is provided "Obstacle at LEFT/

RIGHT/FRONT "to back step along with vibration alert. And send message to the concerned person.
The operations of these sensors are discussed briefly in the following subsections.

A. *Obstacle Detection*

While walking if any obstacle like human, tree or wall appears in front of him then the Ultrasonic sensor which is continuously transmitting high frequency sound waves are echoed back after striking the obstacle and are collected across receiver. These received waves are sent to the processor in the form of electrical impulse for processing.

B. *Water Detection*

In order to have precaution against the wet surface a Water sensor is located at the base of stick. When the Water sensor comes in contact of the wet surface its resistance changes and produced electrical signal which trigger the processor.

III. Comparative Technologies

A. Seeing AI

"Seeing AI", by Microsoft, aims at solving this problem by using an app which sends pictures to the cloud for processing. It could detect objects and had more features like text recognition which could read books, pages etc.

B. Orcam MyEye2

OrCam devices such as OrCam MyEye2 are portable, artificial vision devices that allow visually impaired people to understand text and identify objects through audio feedback, describing what they are unable to see.

C. Wearable Object Detection System for the Blind

They use RFID to deliver data to user about the items which were tagged to help the blind. But this involved someone going through the objects, attaching RFID tags to everything and updating the database.

D. SWSVIP-Smart Walking for the Visually Impaired *People using Low Latency Communication*

A system which uses new algorithms for low latency communication of the information from the ultrasonic sensor, GPS, RFID etc. This information can be used to inform emergency contacts if there is any inconvenience.

E. Effective Fast Response Smart Stick For Blind People

They used ultrasonic, infrared and water sensors to detect any objects 4 meters away quickly it focused on detecting staircases distance of objects and water puddles.

IV. Features

The proposed smart walking stick offers many features compared to the conventional walking sticks available in the market:

- If the elder person falls accidentally, an automatic message will be sent to a family member about person's.
- Obstacle detection angle of up to 180 degrees.
- The most important feature will be push button situated on the STICK, whenever the blind person stuck or in emergency, his location will be sent to the predefine person.
- While walking, there may be water on the surface of the road, it can detect water.
- There's audio feedback through speaker, when the object is detected at LEFT, FRONT, RIGHT.
- Any obstacles are detected vibration will start in order to warn the user.

V. Hardware implementation

Arduino Nano

Arduino can control the environment by receiving input signals (Digital/Analog) and can affect its surroundings by controlling lights, relays and other devices. The microcontroller on the board is programmed using Arduino software.

HCSR04 Ultrasonic Sensor

Generating, detecting & processing ultrasonic signals. Ultrasonic is the production of sound waves above the frequency of human hearing and can be used in a variety of applications such as, sonic rulers, proximity detectors, movement detectors, liquid level measurement. Ultrasonic Ranging Module

Vibration Motor

A vibrator motor is included to enhance the overall feedback for the person who receives the warning against obstacles closeness in different formats of vibrations.

Push Button

A push-button (also spelled pushbutton) or simply button is a simple switch mechanism for controlling some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal.

NEO-6M GPS

The NEO-6M GPS module is a well-performing complete GPS receiver with a built-in 25 x 25 x 4mm ceramic antenna, which provides a strong satellite search capability. With the power and signal indicators, you can monitor the status of the module.

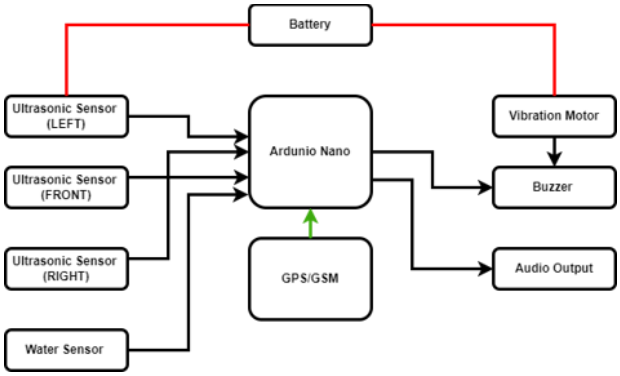
SIM900A GSM

SIM900A GSM Module is the smallest and cheapest module for GPRS/GSM communication. It is common with Arduino and microcontroller in most of embedded application. The module offers GPRS/GSM technology for communication with the uses of a mobile sim.

Rain Sensor

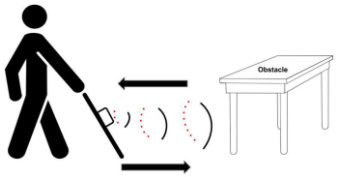
A sensor that is used to notice the water drops or rainfall is known as a rain sensor. This kind of sensor works like a switch. This sensor includes two parts like sensing pad and a sensor module. Whenever rain falls on the surface of a sensing pad then the sensor module reads the data from the sensor pad to process and convert it into an analog or digital output. So the output generated by this sensor is analog (AO) and digital (DO).

VI. Block Diagram



VII. Methodology

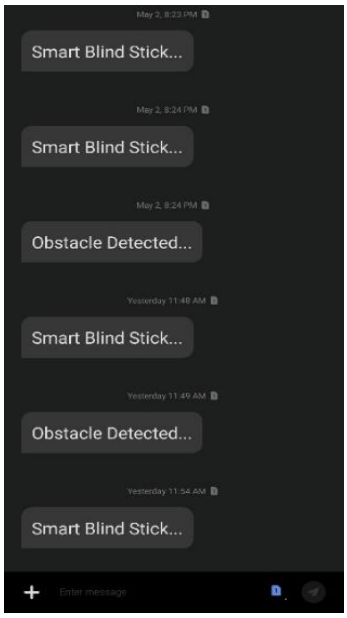
The methodology was planned to develop a smart electronic stick having different features which were absent in a conventional stick. Technology enhancement over the conventional method is significant so that blind and elderly people make their lives better by providing them a feeling of safety, security and comfort as much as possible whenever and wherever they are.



The main objective of this project is to help blind and elderly people to walk with ease and to be warned whenever their walking path is obstructed with other objects, people or other similar odds. There are 3 Ultrasonic sensors LEFT, RIGHT, FRONT. As a warning signal, a vibration motor is connected in the circuit, as the object is detected it alerts the user and gives audio feedback.GPS module is used and GSM module for sending message to the concerned person so he will be notified about the user condition.Thus, this is very helpful for both blind and elderly people in terms of safe travelling.

VIII. Result





IX. Future Work

The future work can be the performance of stick can be improved by adding extra health monitoring features. We can add diabetes monitoring feature in stick as it is one of most arising problem in elderly persons. Future

work will be focused on enhancing the performance of the system and reducing the load on the user by adding the camera to guide the blind exactly. Images acquired by using web camera and smart cameras helps in identification of objects as well as scan the entire instances for the presence of number of objects in the path of the blind determining long range target objects.

X. CONCLUSION

The smart walking stick, constructed with at most accuracy, will help the blind and elderly people to move from one place to another without others' help. This could also be considered a crude way of giving the blind a sense of vision. This stick reduces the dependency of visually impaired people on other family members, friends and guide dogs while walking around. The advantage of the system lies in the fact that it can prove to be a low-cost solution to millions of blind people worldwide. It is necessary that visually impaired people get access to an efficient and comfortable object in order to live their daily life comfortably. In a developing country like India, there is a need for a cost-effective solution so that most of the people can have an effective product.

REFERENCES

[1] Ayat Nada,Samia Mashelly, Mahmoud A. Fakhr, and Ahmed F.Seddik,"Effective Fast Response Smart Stick for Blind People".

[2] Amit Kumar Thakur , Rajesh Singh , Anita Gehlot, "Smart Blind Stick For Obstacle Detection and Navigation System".

[3] K.S.Manikanta , T. S. S. Phani, A.Pravin, "Implementation and Design of Smart Blind Stick for Obstacle Detection and Navigation System" .

[4] D.Sathya,S.Nithyaroopa, P.Betty, G.Santhoshni, S.Sabharinath, M.J.Ahanaa,"Smart walking stick for blind person".

[5] Shalini Singh,Dr. Balwinder Singh,"Intelligent Walking Stick for Elderly and Blind People".

[6] M. Asad Hussain,M. Ghazanfar Ullah,Atif Fareed,Basit Sohail,"The Smartcane for Blind People An Electronically Smart Stick to Aid Mobility" .

[7] Lakshmi Boppana,Vishal Jain, Ravi Kishore,"Smart Stick for Elderly".

[8] Amira. A. Elsonbaty, "Smart Blind Stick Design and Implementation".

[9] Pratik N K, Poornesh V, Shashikant, Shreedhar Kudva ,Saritha A N, "SMART BLIND STICK".

AET 040

OxySen Pond

Prof. Manoj Suryawanshi
Department of Electronics and Computer Science
Vidyalankar Institute of Technology
Mumbai, India.
manoj.suryawanshi@vit.edu.in

Rutwij Mulye
Department of Electronics and Computer Science
Vidyalankar Institute of Technology
Mumbai, India.
rutwij.mulye@vit.edu.in

Vishwas Singh Bist
Department of Electronics and Computer Science
Vidyalankar Institute of Technology
Mumbai, India.
vishwas.bist@vit.edu.in

Aayush Berde
Department of Electronics and Computer Science
Vidyalankar Institute of Technology
Mumbai, India.
aayush.berde@vit.edu.in

Anmol Singh
Department of Electronics and Computer Science
Vidyalankar Institute of Technology
Mumbai, India.
anmol.singh@vit.edu.in

***Abstract*— Dissolved oxygen - oxygen molecules dissolved in water - is a key indicator of water quality. Like the air we breathe, the survival of aquatic life depends on sufficient levels of dissolved oxygen in the water. When water drops below the level necessary to support life, it causes a significant decrease in water quality, often referred to as low dissolved oxygen (DO). Dissolved oxygen in water is a key parameter for maintaining healthy aquatic life. Different aquatic animals require different concentrations of dissolved oxygen to survive. Dissolved oxygen is usually measured in mg/L or ppm (parts per million). The OxySen Pond (Oxygen Sensing Pond) is a real-time dissolved oxygen monitoring system that covers fish ponds as large as 10 hectares. It consists of 4 nodes, 1 of which is the master node and the remaining 3 are slave nodes. All these slave nodes communicate with the master node, then the master node uses a GSM module to upload public data to the MQTT (Message Queuing Telemetry Transport) cloud, thereby monitoring real-time data remotely and providing precise and accurate recommendations.**

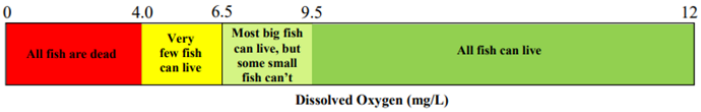
Keywords— Dissolved Oxygen, OxySen Pond, Mesh networking, MQTT, ESP32, GSM Module

I. INTRODUCTION

The oxygen that makes aquatic life possible does not form bubbles, nor does the oxygen that is part of the H2O water molecule. It is a single O2 molecule that is dissolved in water and invisible to our eyes. Many species of aquatic macroinvertebrates depend on oxygen-rich water. Without enough oxygen, they can disappear. Even a small change in dissolved oxygen concentration can affect the composition of aquatic communities.

According to the Utah State University [1], the natural factors that affect dissolved oxygen are as listed below: -

Aquatic Life - Animals that live in water use



dissolved oxygen. Bacteria get oxygen when they break down material. Dissolved oxygen levels decrease in aquatic environments that contain a lot of dead and decaying material.

Altitude - Oxygen content increases with altitude. Because currents take most of their oxygen from the atmosphere, high altitude currents will have less oxygen.

Salinity (salinity) - salt water holds less oxygen than fresh water.

Temperature - cold water holds more dissolved oxygen than warm water.

Turbulence - more turbulence creates more opportunities for oxygen to enter the flow.

Unlike air, which usually contains about 21 percent oxygen, water contains only a small amount of dissolved oxygen. In water, it is usually expressed in milligrams per liter (mg/l), or parts per million (ppm). At sea level, typical DO concentrations in 100% saturated freshwater can vary from 7.56 mg/L (or 7.56 parts oxygen in 1,000,000 parts water) at 30° Celsius to 14.62 mg/L at 0° Celsius. The amount of dissolved oxygen that a body of water can hold is a function of atmospheric pressure, water temperature, and the number of other dissolved substances in the water. At sea level, fresh water can absorb more oxygen than water at higher altitudes due to the higher atmospheric pressure near sea level.

Fish and other animals that live in the water need oxygen to survive. Natural lakes and rivers often cannot contain too much oxygen. On the other hand, if the oxygen level in the water is too low, fish and other animals can suffocate. For example, oxygen will not be able to enter the water if it is covered with ice, so fish often die until the end of winter. The probability of winter fish kills is even higher if the fish lives in a

polluted or overcrowded (over productive) system. In polluted systems, overabundance of animals, plants and bacteria causes rapid oxygen consumption, sometimes causing fish to suffocate. However, large-scale industrial development, heavy use of fertilizers and dumping of human waste can quickly pollute water and starve it of oxygen thus, leading to lesser number of aquatic lives. Each type of fish living in the water requires a different amount of dissolved oxygen to live. For example, Northern Pike cannot survive in about 6 milligrams of dissolved oxygen per liter of water (6 mg/L). Even the strongest fish can suffocate and die if dissolved oxygen levels decrease to about 3-4 mg/L. So, it becomes a critical parameter for the survival of fishes.

Dissolved oxygen is measured directly in the water using a calibrated dissolved oxygen sensor. This sensor can measure dissolved oxygen in water directly as mg/L or as a percent dissolved oxygen (%DO). Cold water has higher mg/L of dissolved oxygen and higher %DO while warmer, polluted water has lower mg/L and %DO. Healthy water should generally have dissolved oxygen concentrations above 6.5-8 mg/L and between 80-120 % [2].

Our goal in this project is to improve and increase the life span of the aquatic life living in the pond that would suffocate due to the deficiency or insufficient amount of dissolved oxygen present in the water due to inappropriate and inefficient method used to add the dissolved oxygen thus resulting in low water quality for the fishes to survive in.

IoT-based oxygen sensing pond applications could be new levers to support other emerging or common trends in fish farming, and enhance highly transparent pond water, thus helping the pond owners to maintain the optimum life of the aquatic animals and therefore relieving the dependency on environment, weather conditions and any naturally occurring phenomena leading to less count of the aquatic life in the pond with the help of the data in the cloud which will be used for analyzing and performing required actions thus, boosting and encouraging such pond owners to continue fish farming.

Together, the internet of things and dissolved oxygen sensing will create a promising chance to address the problems brought on by this rising demand on a global scale. The effectiveness and quality of aquatic life can be greatly enhanced by utilizing IoT and cloud services (MQTT) and precision sensing techniques. In this paper, we outline the design of an IoT-enabled real time dissolved oxygen monitoring system. By suggesting a workable eco-centric IoT strategy for fish farming with a focus on developing countries, this research supplies significant contribution. The main work falls under the following:

A. Sensor-based Oxygen Sensing Pond

The proposed system consists of 4 nodes out of which 1 is the Master node and the other 3 are the slave nodes arranged in a rectangular arrangement in order to monitor a large pond (up to 10 acres). The ESP32 is the main controller of the whole project which acts as a brain of all the nodes which have their own DO sensor that is used to measure concentration of dissolved oxygen. All the dissolved oxygen level data are collected by the DO sensor attached to this ESP32 chip of the Master as well as Slave nodes and then are shared collectively with the Master Node with the help of Mesh Network using RFM95 which is a local area network topology in which the infrastructure nodes connect directly, dynamically, and non-hierarchically to as many other nodes as possible and cooperate with one another to efficiently route data to and from clients.

B. Internet of Things

The Internet of Things (IoT) plays a crucial role in the development of OxySen Pond. IoT-based oxygen sensing system uses sensors, cloud connectivity, and a message protocol service to collect and analyse data, allowing for efficient and precise sensing. In this IoT-based smart sensing system, all 4 DO sensors measures concentration of dissolved oxygen in mg/L or ppm and are collectively shared/published to the MQTT cloud using GSM module for cloud connectivity, storage, and future analysis of the amount of dissolved oxygen required in a particular weather, temperature, or some different aspect of requirement.

II. Literature Survey

[3] describes the development of a low-cost dissolved oxygen measurement system for aquaculture ponds. The system uses a commercially available oxygen sensor and a microcontroller to monitor and record dissolved oxygen levels. The authors found that the sensor was accurate and reliable and could be used to monitor dissolved oxygen levels in real time. In [4], the development of an intelligent dissolved oxygen monitoring system for fishponds based on wireless sensor networks is described. The system uses multiple sensors to monitor dissolved oxygen levels in different locations in the pond and transmits the data wirelessly to a central computer for analysis. The authors in [5] describe the design and fabrication of a microfluidic chip for dissolved oxygen sensing in a fish pond. The chip uses a fluorescence-based oxygen sensor and can be placed in the pond to monitor dissolved oxygen levels. The authors found that the system was accurate and reliable and could be used to monitor dissolved oxygen levels in real-time. Whereas [6] described design information on three types of nodes in a wireless sensor network in detail. Tree topology for WSN is adopted to decrease the packet loss rate and improve the reliability of data transmission. Allowing sensor nodes to sleep and reorganizing the data frames are the two approaches used to achieve energy-saving. The WSN unit consists of a number of WSN sensor nodes, some routing nodes and one gateway node. The gateway node automatically creates the wireless network and administrates it

according to default or manual configurations. The gateway node is responsible for not only accepting data from sensor nodes but also transmitting them to the monitoring computer in the monitoring centre for further processing using the GPRS module. In [7], the fishpond monitoring system is designed based on stm32 and Zigbee wireless transmission technology. This study uses Zigbee to build up a sensor network to monitor multi-fishponds. The data acquisition unit consists of a temperature sensor and a dissolved oxygen sensor. The sensor data is transferred from the data acquisition unit to the stm32 master controller.

III. PROPOSED SYSTEM

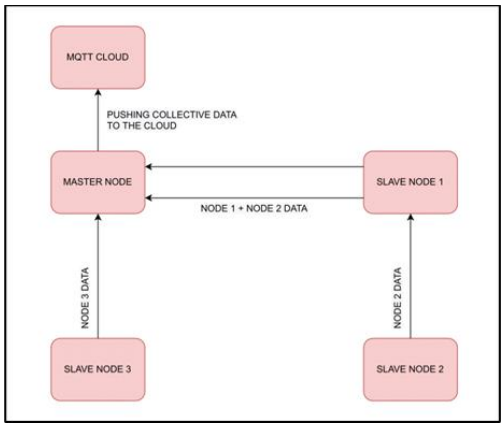


Fig. 1. Block Diagram

Fig.1. illustrates the overall block diagram of the proposed system i.e., the OxySen Pond which is a real-time dissolved oxygen monitoring system with the main objective of optimizing the use of dissolved oxygen thus reducing the wastage or inefficient use in today's existing systems. This system consists of 4 nodes spread in a rectangular arrangement in order to monitor a large pond. Out of these 4 nodes, 3 serve as the Slave nodes and the remaining one serves as the Master node. The nodes are completely powered through solar panels and backed up with a battery, each node has its own MCU and DO sensor and additionally, they have a LoRa module for mesh networking (communication between nodes). Master Node has an additional GSM Module which collects the data from all the slave nodes and pushes it to the MQTT cloud for data storage and future analysis.

The block diagram and its brief description of the Master and Slave nodes are classified below: -

A. *Master Node:*

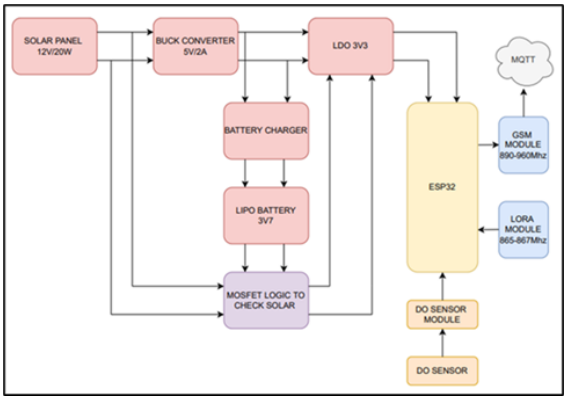


Fig. 2. Block Diagram of Master Node

The block diagram of Master Mode is shown in the above figure. It consists of a Solar panel of 12V/20W which
works as a source of the entire system. Next comes the Buck converter (5V/2A) which is used to step down the DC input voltage (12V) and provides the DC output voltage (5V) to the Battery charger required to charge the LIPO battery of 3.7V. The same DC output voltage is given as an input to the LDO (Low Dropout Regulators), which are used to provide a regulated output voltage of 3.3V which is then fed to ESP32 MCU, the heart of this system.

Furthermore, a DO sensor and a module are connected to the ESP32 to control and which is used to sense and measure the amount of DO (Dissolved Oxygen) in the water. Next, we have a LORA Module that is a secure, regulatory-certified, Arm® Mbed™ programmable, low-power RF module, providing long-range, low-bit rate IoT data connectivity to sensors and actuators. At last, it has a GSM module which is used to publish/upload the data collected on the MQTT cloud which is a lightweight, publish-subscribe, machine-to-machine network protocol for Message queue/Message queuing service and is designed for connections with remote locations that have devices with resource constraints or limited

B. Slave Node:

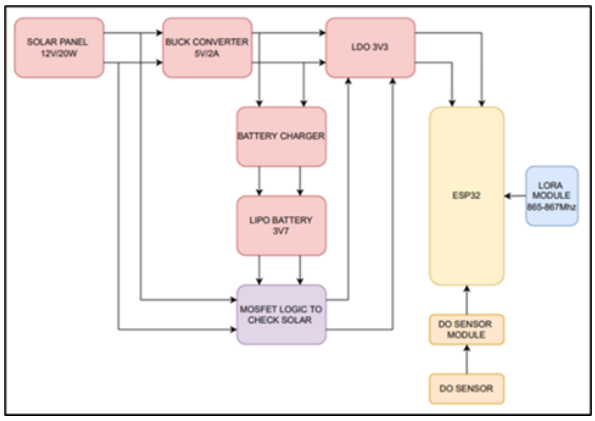


Fig. 3. Block Diagram of Slave Node

Fig 3. shows the block diagram of the Slave Node. The working of the Slave node is similar to that of the Master Node and the only difference here is, that it does not have a GSM module to publish the data on the MQTT cloud. The data collected by all the Slave nodes is given to the Master Node and then it collectively shares/uploads the data on the cloud.

IV. REQUIREMENTS

A. Hardware:

1) ESP 32 Development Board - ESP32 Development board is based on the ESP WROOM32 WIFI + BLE Module. It is a compact, simple system development board that is simply placed into a solderless breadboard and is powered by the most recent ESP-WROOM-32 module. It includes the micro-USB connector, LDO regulator, reset and boot mode buttons, USB-UART bridge, and all the essential support circuitry for the ESP- WROOM-32. The developer has access to all crucial GPIOs.
2) Solar Panel 12V/20W - Solar panels capture sunlight as a source of radiant energy, which is converted into electric energy in the form of direct current (DC) electricity.
3) LIPO Battery 3.7V/10000mAh – A Lithium Polymer battery is a rechargeable battery of lithium-ion technology using a polymer electrolyte instead of a liquid electrolyte.
4) LDO 3.3V - A low-dropout regulator is a DC linear voltage regulator that can regulate the output voltage even when the supply voltage is very close to the output voltage.
5) Dissolved Oxygen Sensor - It is used to measure dissolved oxygen concentration in water based on the quenching of luminescence in the presence of oxygen.
6) GSM Module - A GSM modem or GSM module is a device that uses GSM mobile telephone technology to provide a wireless data link to a network.
7) Printed Circuit Board (PCB) - A PCB is used to mechanically support and electrically connect electronic components using conductive pathways, tracks or signal traces etched from copper sheets laminated onto a non-conductive substrate.
8) Discrete Components like TH and SMD - TH: Through-hole is a manufacturing scheme in which leads on the components are inserted through holes drilled in PCBs and soldered to pads on the opposite side.

SMD: Surface Mount is a method in which the electrical components are mounted directly onto the surface of a printed circuit board (PCB).

B. Software:

1) Arduino IDE (Integrated Development Environment) - The Arduino Integrated Development Environment - or Arduino Software (IDE) It has a menu system, a toolbar with buttons for common functions, a message area, a text console, and a text editor for writing code. To upload programs and communicate with them, it connects to the Arduino hardware.
2) Altium Designer - Altium Designer (AD) is a PCB and electronic design automation software package for printed circuit boards. It is developed by Australian software company Altium Limited. Altium Designer's suite encompasses four main functional areas, including schematic capture, 3D PCB design, field-programmable gate array (FPGA) development and release/data management. It integrates with several component distributors for access to the manufacturer's data.

V. SIMULATION RESULTS

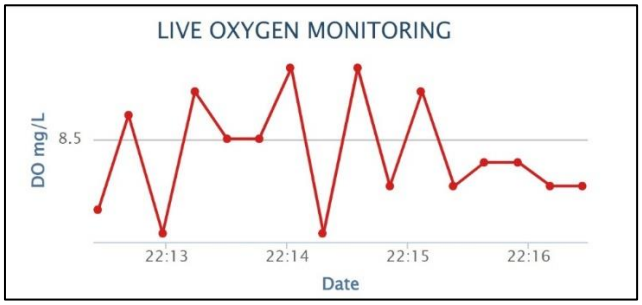


Fig. 4. Live Oxygen Monitoring in MQTT Server

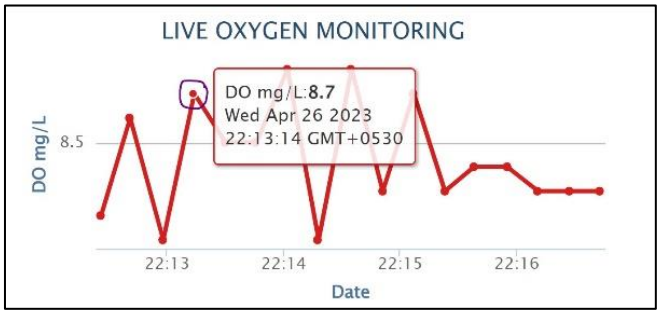


Fig. 5. DO Concentration at 22:13

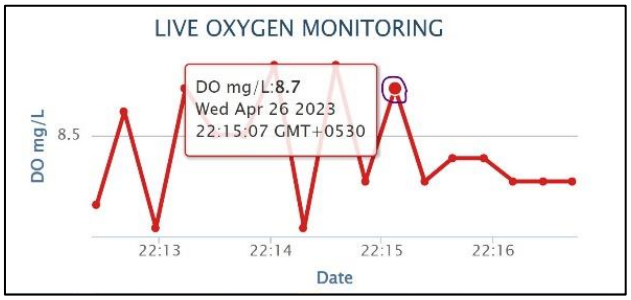


Fig. 6. DO Concentration at 22:15

The Fig.4., Fig.5., & Fig.6. show the live Dissolved Oxygen (DO) concentration monitoring of the water in mg/L in the MQTT server at different time stamps which are uploaded/published using the GSM module that is further connected to the heart of this system i.e., with the ESP32 module of the Master node. The Master node has the collective readings of the entire pond as a result of

mesh networking which connects nodes directly, dynamically, and non-hierarchically to all the 3 Slave nodes which possess their own DO concentration readings that cooperate with one another to efficiently route data to the Master Node using LORA Module providing long range, low-bit rate IoT data connectivity.

VI. Conclusion And Future Scope

With less time, less work, and greater profitability, this Embedded System integrated with the Internet of Things-based oxygen sensing and monitoring system makes it quite simple to increase the rate of survival of aquatic life by accurate sensing of the dissolved oxygen present in the water. The main aim of this system is to make it more innovative, convenient, and efficient compared to other existing systems. This system can be deployed in remote locations that devices with resource constraints or limited networks. In this project, a prototype includes sensing element nodes and data storage. The sensing element nodes are deployed on the field for sensing the dissolved oxygen seamlessly. Thus the "OxySen Pond based on sensing DO using ESP32" has been designed and tested successfully. It has been developed by integrating features of all the hardware components used. The system has been tested to function automatically. Thus, the functionality of the entire system has been tested thoroughly and it is said to function successfully.

Dissolved oxygen sensing has a wide range of potential applications in various industries such as environmental monitoring, aquaculture, food and beverage processing, pharmaceuticals, and wastewater treatment. The future scope of dissolved oxygen sensing is promising as the demand for real-time monitoring and control of dissolved oxygen levels continues to increase in various industries. Some of the potential developments in dissolved oxygen sensing include:

1) Miniaturization: With the development of nanotechnology, it is possible to create miniature sensors that can be implanted directly into living organisms to monitor their oxygen levels.
2) Improved Sensitivity: Further improvements in sensor technology will enable sensors to detect dissolved oxygen levels in even more challenging environments and at lower concentrations.
3) Integration with Other Sensors: Sensors that can detect multiple parameters, including dissolved oxygen, pH, temperature, and conductivity, will provide a more comprehensive picture of the water quality.
4) Live Monitoring: With the help of IoT and cloud connectivity, we can also provide live monitoring of the existing pond which will not only sense and measure but also control the quantity DO concentration in the water to the owner of the pond which will help him monitor effortlessly thus, improving the survival rate of aquatic life and the overall water quality which will be coign of vantage for fish farming.

Acknowledgment

Primarily, we would like to thank our project supervisor Prof. Manoj Suryawanshi (Department of Electronics and Computer Science) for his invaluable guidance, support, and encouragement throughout the project. His expertise, insights, and constructive feedback have been instrumental in shaping our project and helping us to overcome the challenges we faced.

We would also like to extend our appreciation to the faculty members and staff of our department for providing us with the necessary resources, facilities, and equipment to carry out our project.

Our heartfelt thanks go to the participants who were involved in the study and provided us with the data that formed the basis of our research. Without their cooperation and support, this project would not have been possible. Lastly, we would like to thank our families and friends for their unwavering support and encouragement throughout our academic journey. Their love, understanding, and motivation have been a constant source of inspiration and strength for us. In conclusion, we are deeply indebted to all those who have contributed to this project, and we hope that our work will make a meaningful contribution to the field of Embedded Systems and the Internet of Things.

References

[1] Utah State University, "Dissolved Oxygen," 2017. [Online]. Available: https://extension.usu.edu/waterquality/pages_for_brian/dissolvedoxygen.
[2] Government of Northwest Territories, "Dissolved Oxygen (DO)," April 2012. [Online]. Available: https://www.ecc.gov.nt.ca/sites/ecc/files/dissolved_oxygen.pdf.
[3] M. B. Timmons and T. E. Peterson, "A low-cost dissolved oxygen measurement system for aquaculture ponds," Aquacultural Engineering, vol. 9, no. 3, pp. 191-203, 1990.
[4] X. Chen, J. Xiong and H. Liu, "An intelligent dissolved oxygen monitoring system for fishponds based on wireless sensor networks," Sensors, vol. 15, no. 7, pp. 16865-16880., 2015.
[5] J.-H. Zhang, Y.-T. Li and W. Zhang, "Design and fabrication of a microfluidic chip for dissolved oxygen sensing in a fish pond," Sensors, vol. 12, no. 10, pp. 13270-13281, 2012.
[6] B. Shi, V. Sreeram, D. Zhao, S. Duan and J. Jiang, "A wireless sensor network-based monitoring system for freshwater fishpond aquaculture," Biosystems Engineering, vol. 172, pp. 57-66, 2018.
[7] X. Xie and W. Jiang, "Intelligent Fishpond Monitoring System Based on STM32 and Zigbee," Journal of Sensors, vol. 13, no. 6, pp. 495-502, 2016.

AET 041

Unmanned Aerial Vehicle

Vaibhav Suresh Shenoy
Department of Electronics Enginering
Vidyalankar Institute of Technology,
Mumbai, India
vaibhav.shenoy@vit.edu.in

Mandar Jaiwant Kulkarni
Department of Electronics Enginering
Vidyalankar Institute of Technology,
Mumbai, India
mandar.kulkarni1@vit.edu.in

Hemant Suresh Bhoir
Department of Electronics Enginering
Vidyalankar Institute of Technology,
Mumbai, India
hemant.bhoir@vit.edu.in

Chirag Vijay Jadhav
Department of Electronics Enginering
Vidyalankar Institute of Technology,
Mumbai, India
chirag.jadhav@vit.edu.in

Dr. Girish Gidaye
Department of Electronics Enginering
Vidyalankar Institute of Technology,
Mumbai, India
girish.gidaye@vit.edu.in

Abstract— Our study aims to encourage the conception of using drones or UAVs for the cargo drop medium. In this report, we're aiming to present a remote- controlled rotary- winged drone or UAV and apply the cargo drop medium. Our unmanned upstanding vehicle uses the idea of a cargo drop medium, which includes carrying a particular cargo and releasing it, especially in places inapproachable to mortal beings. The cargo drop medium uses one servo motor. Hence, the servo motor used is controlled by one radio channel of the remote regulator. This cargo drop medium can be controlled with the remote regulator used. The medium used is designed and created by blender software and published using 3D printing. Hence, the implicit use of drones to carry out an operation like product delivery using the proposed cargo drop medium is successfully examined.

Keywords—UAVs, cargo drop medium, servo motor

I. INTRODUCTION

An unmanned upstanding vehicle (UAV), also known as a “drone” is an aircraft without any airman, crew or passengers on board. They were developed through the 20th century for military operations. As technology improved over the time, they were used for numerous non-military operations too. Unmanned upstanding vehicles (UAV) or drones have numerous uses in different fields, like upstanding photography, timber fire prediction, husbandry, policing and surveillance, examinations, delivery of products from one place to another place, and entertainment. UAVs are also defined as a" powered, upstanding vehicle that doesn't carry a mortal driver, uses aerodynamic forces to give vehicle lift, can fly autonomously or be piloted ever, can be expendable or recoverable, and can carry a murderous or nonlethal cargo". The cargo is the weight a drone can carry. It's generally considered outside of the weight of the drone itself and includes anything that's fresh to the drone – such as redundant cameras, detectors, or objects for delivery purposes. A quadcopter or quadrotor is a kind of copter or unmanned upstanding vehicle with four rotors. Advantages like the small size and low indolence of drones allow the operation of a particularly simple flight control system.

In order to give the functionality of carrying and dropping the cargo in the copter, a cargo drop system actuated by the radio regulator needed to be designed. Limited published exploration is available on upstanding mechanisms because utmost of the exploration in this field is done by defensive associations and not available to all druggies. In literature, we developed a single servo actuated string grounded airdrop medium to give the functionality of dropping cargo (for illustration- a first aid tackle) from unmanned disaster relief quadcopter. The proposed medium was specifically designed for the 90 g size quadcopter and was able of only carrying cargo up to 1 kg. likewise, the proposed airdrop medium wasn't tested for the flight and slightly heavy for its aerodynamic use. Also, the string grounded medium wasn't dependable for the upstanding operation. analogous type of conception has been used in this exploration for the development of cargo drop medium for the CopterWorks upstanding platform, but the medium is relatively different from the former bone. In the proposed airdrop medium, string grounded medium has been replaced with gearbox to give advanced control over actuation and to increase the robustness of overall medium. Likewise, the proposed medium has been gauged for CopterWorks platform to carry further cargo up to 9 kg.

II. REVIEW OF LITERATURE

Robotics is the way of the future. Companies like Amazon are presently taking advantage by starting services like Prime Air, which is a completely independent delivery system designed to safely shoot packages to guests in a timely manner using robotic unmanned upstanding vehicles, also called drones. The robotization of Amazon package delivery enhances client service by being suitable to give rapid-fire package delivery. UPS, Google and other European

delivery services are also experimenting with delivery drones. Drone delivery is getting ubiquitous as drone technology progresses. Therefore, the thing of this design is to design an upstanding robot able of cargo delivery. In addition to rapid-fire delivery, drone services also increase the overall safety and effectiveness of the transportation system, and it can reduce the overall footmark of home delivery on the terrain. The thing is achieved by designing and erecting a quadcopter with 6 degrees of freedom and an attached package carrier. The design redounded in a performing quadcopter able of delivery.

III. OBJECTIVES

The following objects were drafted to define our success in creating this delivery drone.
The drone will:

- Cost lower than$ 250
- Carry a small cargo of over to 1 kg
- Be simple and robust enough to be operated by a neophyte airman
- Have a 3 km range
- Snappily and reliably release the cargo

While there are always advancements to be made on such a complex and potentially dangerous system, designing and erecting a introductory delivery drone that meets the forenamed pretensions is a starting point for negotiating a more streamlined and energy effective delivery network. For the introductory delivery system, it was decided that starting with a well- established and customizable drone from which we could fix a package delivery system. Due to the fact that customizable racing quadcopters have lately come mainstream, copping factors made for this operation was an affordable and dependable option. contending quadcopters have a veritably high thrust- to- weight rate (generally between 8-15) and are specifically designed to be strong enough to survive indeed the hardest crashes. The high thrust- to- weight rate is consummate to a quadcopter's capability to carry a cargo efficiently.

IV. METHODOLOGY

A. Block diagram of the UAV

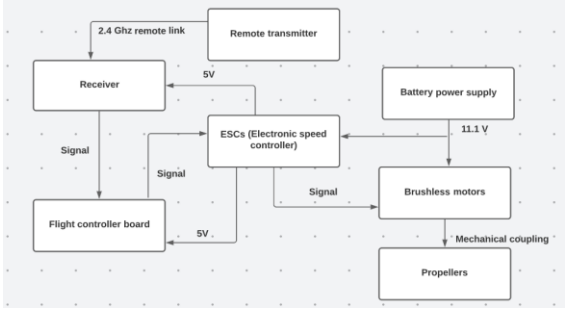


Fig.4.1 Block diagram of the UAV

- A UAV has 4 propellers at each corners of the frame
- For each one, speed and direction of gyration are single-handedly controlled for balance and movement of the UAV
- In a traditional quadrotor, all four rotors are placed at an equal distance from each other
- To maintain the balance of the system, one brace of rotors rotates in a clockwise direction and the other brace rotates in opposite-clockwise direction
- To move up (hang), all rotors should run at high speed. By varying the speed of rotors, the UAV can be moved in any direction like forward, backward, and side- to- side.

B. Proposed payload drop mechanism

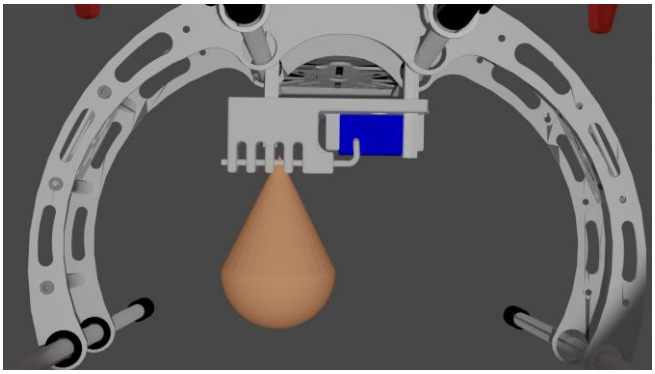


Fig.4.2 Proposed payload drop mechanism of the UAV created in blender software

This section describes the introductory conditions and methodology for the cargo drop medium. Introductory conditions for the airdrop medium are cargo capacity, Centre of graveness (CG), installation, weight, functionality and climate insulation.

For the mileage on CopterWorks unmanned copter listed are the specific conditions for the proposed cargo drop medium.

- Medium should be able of holding, carrying, and drooping the cargo of over to 9 kg.
- Medium design should be Modular, can singly be mounted without any structural changes and affecting the functionality of being copter.
- Medium shouldn't affect the overall CG of copter in any other axis other than perpendicular axis.
- Cargo attached with medium shouldn't oscillate during the flight and should be an integral part of copter.
- Overall weight of the proposed medium shouldn't exceed1.65 kg.
- Medium should be fit within the available space beneath the Copter Works copter.
- Medium should be remote and easy to install and remove from the copter.

C. Circuit diagram of the UAV

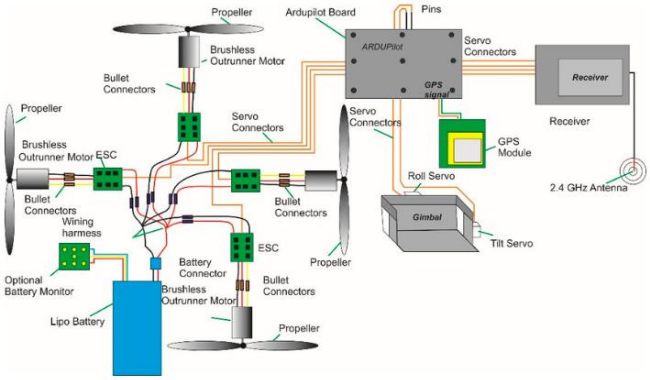


Fig.4.3 Circuit diagram of the UAV

D. Components used in the UAV

a. **Propellers:** The speed and cargo lifting capability of a drone depends on shape, size, and number of propellers. The long propellers produce huge thrust to carry heavy loads at a low speed (RPM) and less sensitive to change the speed of gyration.

b. **Motor**: Both motors brushless and brushed type can be used for drones. A brushed motor is cheap and useful for small- sized drones Brushless type motors are important and energy veritably effective. But they need Electronic Speed Controller (ESC) to control their speed. These brushless motors are extensively used for contending freestyle drones, business checks and upstanding photography drones.

c. **ESC (Electronic Speed Controller)**: ESC is used to connect the battery to the electric motor for the power force. It converts the signal from the flight regulator to the revolution per formed (RPM) of motor. ESC is handed to each y motor of the drone.

d. **Flight Controller (FC)**: It's the computer processor which manages balance and telecommunication controls using different transmitters. Detectors are located in this unit for the accelerometer, mark, magnetometer, gyro meter and GPS. The distance dimension can be carried out by an ultrasound detector.

e. **Radio Transmitter** sends the radio signal to ESC to airman to control motor speed.

f. **Radio Receiver** entered the signal from the airman.

g. **Battery:** This device is attached to the UAV. High- power capacity, Lithium Polymer (LiPo) is used for utmost drones. The battery can have 3 or 4 cells.

h. **Frame:** It should have sufficient strength to hold the propeller instigation and fresh weight for motors and cameras and have sturdy and less aerodynamic resistance.

V. RESULTS AND DISCUSSION

Each rotor produces both lift and necklace about its center of gyration, as well as contrary to the vehicle's direction of flight. Quadcopters generally have two rotors spinning clockwise and anticlockwise. Flight control is handled by independent variation of the speed and hence lift and necklace of each rotor. Pitch and roll are controlled by varying the net center of thrust, with yaw controlled by varying the net necklace. These terms relate to the three confines that an aircraft in flight is free to move it. Brushless motors correspond of a rotor with an endless attraction and a number of electromagnets girding it, these are also called poles. The brushless motors can have 2-14 poles. The lesser the number of poles the more precisely the motor can be controlled. Brushless motors have three cables, these cables control the motors three expansions. By changing the connections on these cables, you can have the motor spin clockwise or retrograde.

Pitch is generally defined as "trip distance per gyration". The advanced pitch means a slower gyration which will increase vehicle speed but will also use further power. We can extend the flight time of our UAV by simply replacing lower pitch propellers in actuality. Lower pitch propellers can induce further necklace and will bear the motor to consume lower current. The periphery of the propeller refers to its size. Adding the periphery increases the propeller effectiveness but will also consume more current from the motor. For a large UAV to carry big loads large propellers and low propellers and low KV motors tend to work efficiently.

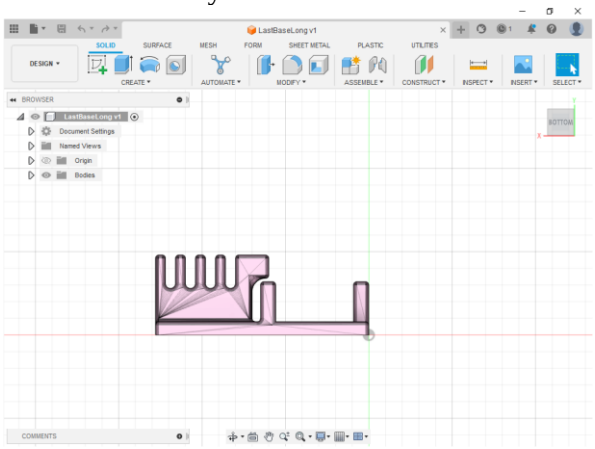


Fig. 5. Bottom view of the 3D printed payload drop mechanism in fusion 360

VI. CONCLUSION

Servo actuated, gear grounded cargo carries and drop medium has been designed and dissembled for the functionality of carrying and dropping the cargo in medium size copters. Proposed medium is actuated by two servo motors and able of carrying and dropping the cargo of over to 9 kg. Drop test analysis has been performed to check the effect of stresses on the

medium falling under the influence of graveness. Results presented in show that the proposed design is able of bearing the needed stresses and within the safe limits. Medium has been specifically designed for the CopterWorks medium size copter and can be used for the purposes like carrying imagery cargo, first aid tackle or any general-purpose cargo.

While the drone is suitable to work easily, implicit advancements include better battery positioning, indispensable energy sources, and an incorporated GPS system for automated delivery. Battery positioning is pivotal for a balanced take- off. In this design, the lipo-battery is positioned underneath the carbon- fibre frame. Given the size of the battery, this forces the drone to balance on the battery. This isn't optimal for drone take- off as the propellers may force the drone to tip over.

Despite the advancements demanded, the results of the package- delivery trials described in this report prove that there's eventuality in exercising a drone's rotational movements, in order to deliver packages. originally, there was concern that the parachutes won't emplace; still, grounded on the trials, there were no issues with planting the parachutes. The drone was suitable to achieve perpendicular lift, rotate easily, and release the cargo reliably with each trial. Although the loads weren't delivered at a significant distance, the trials seek to prove that a drone's rotational movements may be the low- cost result to package delivery.

In conclusion, the described trials show promising eventuality for a fast upstanding, featherlight, and low-cost package delivery system. This is an ongoing exploration design and implicit unborn workshop involves the detailed structural analysis, vibrational analysis and necklace analysis for the proposed medium. likewise, medium has been planned to be fabricated in future after performing detailed simulations.

VII. APPENDICES

A. MOVEMENTS OF THE UAV

- **Throttle/ Hover:** up-down motion of the UAV is known as throttle. If all the propellers run normally, also the UAV will move down If all the propellers run at advanced speed, also the UAV will move over. This is called the swimming of a drone.

- **Pitch:** movement of a drone about a side axis (either forward or backward) is called pitching stir. If two hinder propellers run at high speed, also the drone will move in a forwarding direction. If two propellers in the front run at high speed, also the UAV will move in the backward direction.

- **Roll**: movement of a UAV about the longitudinal axis is known as rolling stir. If two right propellers run at high speed, also the drone will move in the left direction. If two left propellers run at high speed, also the drone will move in the right direction.

- **Yawn:** the gyration of the head of the UAV about the axis perpendicularly (either the left or right) is called yawning stir. If two propellers of a right slant run at high speed, also the drone will rotate in anti-clockwise direction. If two propellers of a left slant run at high speed, also the drone will rotate in a clockwise direction.

B. FORCES AND MOMENTS ACTING ON THE UAV

When a drone moves in the air, many forces act on it. The attendant force will decide its movement. There are many forces acting on the UAV like:

1. **Weight:**
   Due to the mass of the UAV, the body mass force always acts graveness direction. Advanced the weight of the drone, further power is needed to lift and move the drone. Weight of drone = mass of drone × acceleration due to graveness.

2. **Lift**:
   The force acting perpendicularly on the UAV is named lift. This force occurs due to pressure differences on the UAV (in the perpendicular direction). Hence, the speed, size, and shape of the propeller blade decide the quantum of lift force.
   Lift is essential to lift the body against the graveness. To produce this force, all four propellers run at high speed to lift the drone.

3. **Thrust:**
   The force acting on the drone in the direction of stir is called thrust. still, for drone dynamics, it's normal to the rotor aeroplane.
   During swimming, the thrust is purely perpendicular. If thrust is inclined also the drone will cock forward or backward. This force is crucial to move the UAV in the desired direction at equal speed. Like, two propellers have been given high speed.

4. **Drag:**
   The force acting on the drone in the contrary direction of stir due to air resistance is called drag. This may be because of pressure difference and density of air. To reduce the drag, the aerodynamic shape of the drone is named.

VIII. LITERATURE CITED

[1] R. Mardiyanto, M. Pujiantara, H. Suryoatmojo, R. Dikairono and A. N. Irfansyah, "Development of Unmanned Aerial Vehicle (UAV) for Dropping Object Accurately Based on Global Positioning System," 2019 International Seminar on Intelligent Technology and Its Applications (ISITIA), 2019, pp. 86-90, doi: 10.1109/ISITIA.2019.8937269.

[2] C. Burke, H. Nguyen, M. Magilligan and R. Noorani, "Study of A Drone's Payload Delivery Capabilities Utilizing Rotational Movement," 2019 International Conference on Robotics,Electrical and Signal Processing Techniques (ICREST), 2019, pp. 672-675, doi: 10.1109/ICREST.2019.8644318.

[3] Deng, X. Xu and Y., "UAV Power Component—DC Brushless Motor Design With Merging Adjacent-Disturbances and Integrated- Dispatching Pigeon-Inspired Optimization," IEEE Transactions on Magnetics, vol. 54, pp. 1-7, 2018.

[4] U. Iqbal, S. I. A. Shah and M. S. Sadiq, "Servo actuated payload carry and drop mechanism for unmanned helicopter," 2016 International Conference on Emerging Technologies (ICET), 2016, pp. 1-6, doi: 10.1109/ICET.2016.7813221.

[5] M. S. S. Umair Iqbal and S. I. A. Shah, "Design, development and fabrication of airdrop mechanism for first aid kit drop in unmanned disaster relief helicopter," in *Proceedings of the 3rd International Conference on Engineering and Emerging Technologies (ICEET), Lahore, Pakistan*, 2016.

[6] A. C. Watts, V. G. Ambrosia, and E. A. Hinkley, "Unmanned aircraft systems in remote sensing and scientific research: Classification and considerations of use," *Remote Sensing*, vol. 4, no. 6, pp. 1671–1692, 2012.

AET 042

Multiple diseases Prediction using Machine Learning

Harish Ojha (Assistant Professor)
Department of Biomedical Engineering, Vidyalankar Institute Of Technology Wadala, Mumbai-400018
harish.ojha@vit.edu.in

Manasi Bajare
Department of Biomedical Engineering, Vidyalankar Institute Of Technology Wadala, Mumbai-400018
manasi.bajare@vit.edu.in

Nilesh Paraskar
Department of Biomedical Engineering, Vidyalankar Institute Of Technology Wadala, Mumbai-400018
nilesh.paraskar@vit.edu.in

Shivani Rasale
Department of Biomedical Engineering, Vidyalankar Institute Of Technology Wadala, Mumbai-400018
shivani.rasale@vit.edu.in

Sushil Magare
Department of Biomedical Engineering, Vidyalankar Institute Of Technology Wadala, Mumbai-400018
sushil.magare@vit.edu.in

Abstract In today's world, artificial intelligence and machine learning play a significant role. We can find them everywhere, from medical fields to self-driving cars. The clinical business produces an enormous measure of patient information which can be handled in a great deal of ways. Thus, with the assistance of AI, we have made an Expectation Framework that can identify more than each illness in turn. With lower accuracy, many of the existing systems can only predict one disease at a time. Lower precision can genuinely jeopardize a patient's wellbeing.

Diabetes and Parkinson's disease are the two currently under consideration, but many more conditions may be added in the future. The client needs to enter different boundaries of the illness and the framework would show the result whether he/she has the sickness or not. Because one can monitor a person's condition and take the necessary precautions, this project can help a lot of people live longer.

Keywords – Prediction, SVM, Machine Learning, Artificial Intelligence.

I. INTRODUCTION

The paper focuses on multiple diseases prediction like Parkinson's and Diabetes using machine learning algorithms. This paper shows how machine learning can help to predict multiple diseases [1]. The health care industry generates a vast quantity of data in the form of diagnosis reports, patient data, and other types of information that may be used to spot trends and make predictions. In health care, machine learning is utilized to tackle a variety of issues.

There is no common system where one analysis can perform more than one disease prediction. The importance of this analysis to analyse the maximum diseases, so that to monitor the patient's condition and warn the patients in advance to decrease ratio of loss of life. The paper focuses on the parameters that causes the diseases so that it is possible to detect the maximum effects that the disease will cause [2].

II. LITERATURE SURVEY

There are number of literature surveys has been done related to disease prediction system using different Machine Learning algorithms and achieved different results for different methods in medical field.

1. Multiple Disease Prediction System.
   In this paper using machine learning techniques to find out multiple diseases as it is easy and flexible to forecast whether the patient has illness or not.
   Their aim of this analysis was to invent a system that can help the patient to detect the diseases of the patient with accurate results [3].

2. Disease Prediction Using Machine Learning. The author discusses "Disease prediction using Machine Learning over Big Data". Big data is the idea that is spreading the quickest in the present trend, therefore it is used in more industries. Medical sectors use big data, while at the same time, medical fields increase growth in the big data industry. Big data facilitates improved growth in the medical and healthcare industries[4].

3. A Machine Learning Model for Early Prediction of Multiple Diseases to Cure lives.
   The idea of using machine learning algorithms to predict various diseases is presented in this study. Here, authors applied the idea of supervised machine learning, whose implementation will involve the usage of Decision Tree, Random Forest, and Naive

Bayes. This will help in the accurate early diagnosis of diseases and improved patient care. Results ensured that the system would perform properly and be patient-focused for immediate disease diagnosis [5].

4. Multiple Disease Prediction Using Different Machine Learning Algorithms Comparatively.
   The research makes an offer for such a system that will have a quick, easy-to-use user experience. Researchers want to create a more focused survey that the system will use in an effort to reduce the time required. They want this technology to be used as an interface between patients and doctors. This system will also advise the user to consult a doctor about the report after providing the results [6].

5. A Detailed Review on Disease Prediction Models that uses Machine Learning.
   The article presents and analyses the performance of a survey of various models based on such algorithms and methodologies. Support Vector Machine, Decision Tree, Naive Bayes, and Random Forest are some of the models of supervised learning algorithms that have been the subject of research. A literature review was used to determine that a single algorithm is impossible of performing well, but that if it is integrated with other algorithms, the accuracy can significantly increase [7].

III. ALGORITHM DETAILS

IMPLEMENTATION

1) Collecting data: The Kaggale website and a few available URLs are used to gather data.
2) Cleaning the Data: dealing with values that are missing and arranging the data in the appropriate format.
3) Separating the collected data into train and test sets.
4) Model for classification: making use of the right prediction algorithms. [8]

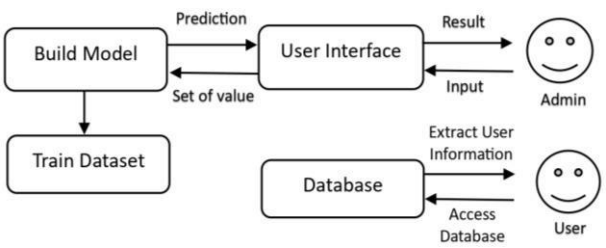


Figure .1: Flow Diagram

The Information Stream Outline shows the movement of the model. Here the data will be taken care of in the informational collection and which is gotten to by the Administrator. After the client has visited the website and entered the legitimate sources of information, the data will be sent to the model, which will compare the data to the prepared dataset and send a prediction back to the user interface.

ALGORITHMS USED FOR CLASSIFICATION:

Logistic Regression:

Calculated regression is one of the most famous AI calculations utilized in the Administered Learning method. Using a collection of independent variables, this method can be used to predict a categorized dependent variable. Logistic regression can predict what a dependent categorical variable will do.

There must be a discrete or classified value as the outcome. Valid or bogus, yes or no, 0 or 1, etc, yet rather than giving definite qualities like 0 and 1, it gives probabilistic qualities that are in the scope of 0 and 1.

IV. RESULT

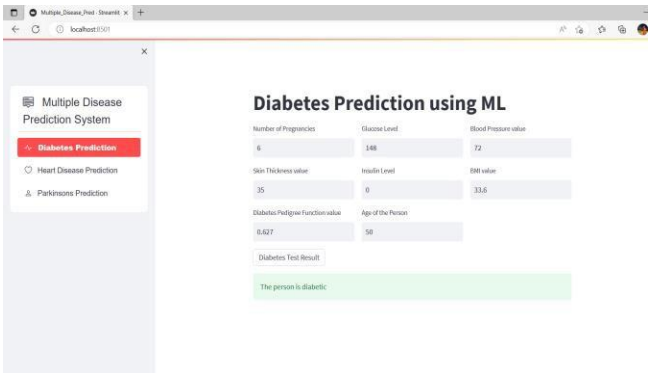


Fig. 2: Diabetes prediction for diabetic

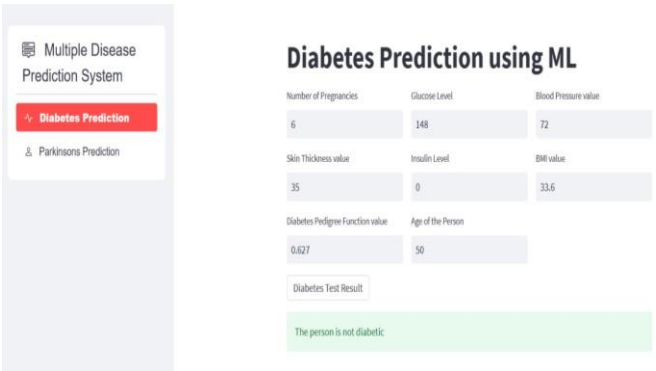


Fig. 3: Diabetic prediction for non-diabetic

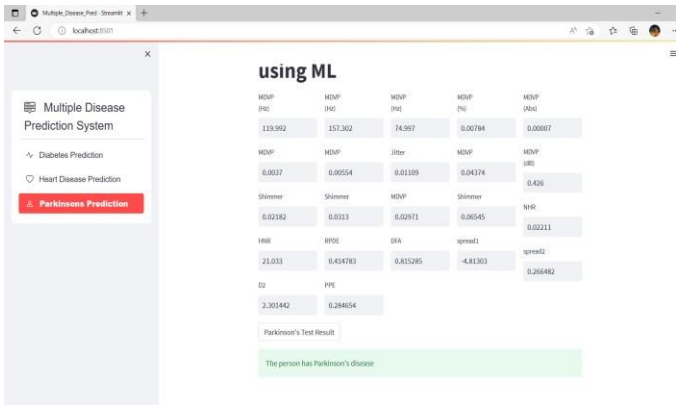


Fig. 4 Parkinson's prediction for Parkinson's.

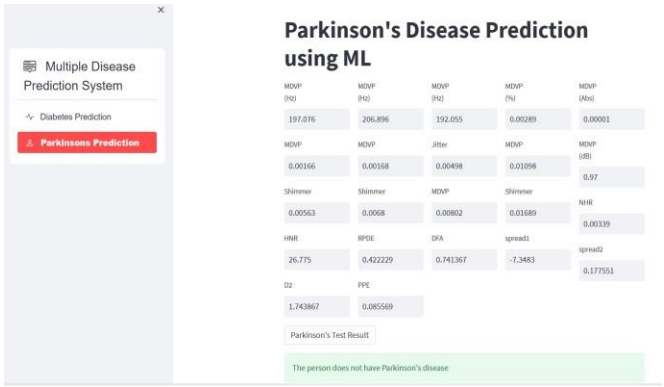


Fig. 5 Parkinson's prediction for non- Parkinson's.

Based on the disease that has been identified, the patient's disease status will be displayed when the disease parameter is provided. An error message requesting the user to enter the correct value will be displayed if any of the values provided fall outside the required range, are invalid, or are missing from the parameters..

V. CONCLUSION

The development of a system that could accurately predict a variety of diseases was the primary objective of this research. Because of this work, the patient does not have to visit multiple locations, which also saves time. The early identification of illnesses can both increment your life and save you from monetary challenges. For this purpose, we employ linear regression and other machine learning methods. reduces the amount of time required to identify a problem.

VI. FUTURE SCOPE

- By lowering mortality rates, we can work to increase prediction accuracy.
- Make the framework as easy to use and give a Chabot to habitually sought clarification on pressing issues.
- More advanced machine learning algorithms that are quicker and better at identifying a variety of potential diseases.
- Working on persistent results.

VII. REFERENCES

1. Kajal Patil, Sakshee Pawar, Pramita Sandhyan and Jyoti Kundale "Multiple Disease Prognostication Based On Symptoms Using Machine Learning Techniques" doi.org/10.1051/itmconf/20224403008 https://www.itm-conferences.org/articles/itmconf/pdf/2022/04/itmconf_icacc2022_03008.pdf

2. Akkem Yaganteeswarudu "Multi Disease Prediction Model by using Machine Learning and Flask API" doi: 10.1109/icces48766.2020.9137896 https://ieeexplore.ieee.org/document/913789 6

3. Ankush Singh, Ashish Yadav, Saloni Shah,Prof. Renuka Nagpure, "Multiple Disease Prediction System" IRJET I Volume: 09/Issue: 03/March 2022 https://www.irjet.net/archives/V9/i3/IRJET-V9I3312.pdf

4. Anjali Bhatt, Shruti Singasane, Neha Chaube, "Disease Prediction Using Machine Learning" IRJMETS I Volume:04/Issue:01/January- 2022 https://www.irjmets.com/uploadedfiles/paper/issue_1_january_2022/18238/final/fin_irjmets1641707340.pdf

5. Anuj Kumar, Mr.Analp Pathak, "A Machine Learning Model For Early Prediction Of Multiple Diseases To Cure Lives" Turkish Journal of Computer and Mathematics Education I Vol.12 No.6/2021 https://www.turcomat.org/index.php/turkbilmat/article/download/8372/6578

6. Rudra A. Godse , Smita S. Gunjal , Karan Jagtap , Neha S. Mahamuni , Prof. Suchita Wankhade, "Multiple Disease Prediction Using Different Machine Learning Algorithms Comparatively" IJARCCE I Vol. 9, Issue 4/April https://ijarcce.com/papers/multiple-disease-prediction-using-different-machine-learning-algorithms-comparatively-2/

7. Md. Ehtisham Farooqui, Dr. Jameel Ahmad' "A Detailed Review on Disease Prediction Models that uses Machine Learning." IJIRCST I Volume- 8, Issue- 4, July- 2020 https://ijircst.org/DOC/14-a-detailed-review-on-disease-prediction-models-that-uses-machine-learning.pdf

8. A. Akhila, K. Hemalatha, A. Navya, B. Tejaswi, K. Hemanth, Ramesh Alladi; "automatic multi-diseases prediction using machine learning" Volume 6 Issue 3 June 2022 ISSN NO 2582-0958 https://www.trendytechjournals.com/files/issues/volume6/issue3-8.pdf

AET 043

Diabetes Prediction using Machine Learning Techniques

Ashish Kadam
Department of Biomedical Engineering,
Vidyalankar Institute of Technology, Mumbai, India
ashish.kadam@vit.edu.in

Rasika Utture
Department of Biomedical Engineering,
Vidyalankar Institute of Technology, Mumbai, India
rasika.utture@vit.edu.in

Shaikh Mohammed (Amin)
Department of Biomedical Engineering,
Vidyalankar Institute of Technology, Mumbai, India
sheikh.mohammad@vit.edu.in

Harish Ohja (Assistant professor)
Vidyalankar Institute of Technology, Mumbai, India
harish.ohja@vit.edu.in

Abstract Chronic diabetes has the potential to become a global health care emergency. According to the International Diabetes Federation, 382 million people worldwide have diabetes. By 2035, this number will quadruple to 592 million. An elevated level of glucose in the blood leads to diabetes. The side effects of this raised glucose level incorporate successive pee, expanded thirst, and expanded craving. Diabetes is a major contributor to stroke, heart failure, amputations, blindness, and order failure. Our bodies convert food into sugars, like glucose, when we eat. At that point, our pancreas should release insulin. Our cells are unlocked by insulin, allowing glucose to enter, and be utilized as fuel. Diabetes, however, prevents the operation of this system. The most prevalent varieties of diabetes are type 1 and type 2, although there are other types, such as gravid diabetes, which occurs during pregnancy, and others.. Another logical point in information shrewdness called machine proficiency is centered around how machines gain as a matter of fact. By combining, results of numerous machine literacy methods, this design aims to develop a system that can perform early vaticination of diabetes in a case of advanced delicateness. d. Utilizing every one of the methods, the models not entirely settled. Moreover, the bone with great sensitivity is utilized as a model for foreseeing diabetes.

INTRODUCTION

Diabetes is a condition that spreads quickly, even among children. If we are to comprehend diabetes and its genesis, we must comprehend what takes place in the body without diabetes. Sugar (glucose) is gotten from the dinners we eat, remarkably those high in carbs. Carbohydrates are the body's primary energy source, so people with diabetes as well as everyone else do need them. Carbohydrate-rich foods include bread, cereal, pasta, rice, fruit, dairy products, and vegetables (particularly starchy vegetables). When we eat these foods, our bodies turn them into glucose. The body's glucose moves throughout the bloodstream. A portion of the glucose is delivered to our brain in order to enable us to function and think clearly. The excess glucose is shipped off our body's cells for use as fuel, and it is likewise put away as energy in our liver for later use by the body. In order for the body to use glucose as fuel, insulin is required. The beta cells of the pancreas makes the chemical insulin. Insulin is similar to a door key. Insulin binds to the cell's doors and opens them so that glucose can enter from the blood stream. Glucose develops in the dissemination and diabetes happens assuming the pancreas cannot create sufficient insulin (insulin deficiency) or on the other hand assuming the body cannot use the insulin that is delivered (insulin obstruction). Diabetes Mellitus is characterized by elevated blood and urine glucose (sugar) levels.

Diabetes Subtypes

- **Type 1** diabetes happens when the invulnerable framework is debilitated and the cells cannot make sufficient insulin. There are currently no effective preventative measures and no convincing studies demonstrating the causes of type 1 diabetes.
- **Type 2** diabetes is portrayed by either a low degree of insulin creation by the cells or ill-advised insulin use by the body. This form of diabetes affects 90% of diabetics, making it the most common. Both hereditary and way of life factors add to its event.
- **Embryonic:** Diabetes develops quickly in pregnant women who have high blood sugar levels. During consecutive pregnancies, it will occur twice as often. There is high probability that type 1 or type 2 diabetes will develop following a pregnancy with gestational diabetes.

LITERATURE REVIEW

1) Predicting Diabetes with Machine Learning KM Jyoti Rani B Tech. Researcher, Division of CSE, IMS

Designing School, Ghaziabad, Uttar Pradesh, India 2020, July-August. The purpose of this project is to combine a number of machine learning approaches to produce a system that can more correctly predict diabetes in its early stages.

2) MACHINE LEARNING FOR DIABETES DIAGNOSIS Boshra Farajollahi1*, Maysam Mehmannavaz2, Hafez Mehrjoo2, Fateme Moghbeli3, and Mohammad Javad Sayadi1 will use Machine Learning Classification and ensemble techniques to predict diabetes on a dataset in this work. Which is K's closest.

3) Diabetes Forecasting Technique Research In light of machine learning Citing this piece: Jingyu Xue et al. 2020 The early diagnosis of diabetes is crucial. We employ supervised machine learning algorithms like the Support Vector Machine in this paper.

4) Prediction and analysis of diabetes using machine learning algorithms: an ensemble approach. The use the PIMA dataset for their experiment that has about 768 27 rows of data or patients with about eight columns that are useful for the analysis and prediction if diabetes. The variety of methods or algorithms and statistical techniques used by them are Random Forest (RF), classification algorithm, Nearest Neighbor (KNN), Naïve Bayes. Classification algorithm like J48 which is an improvement to ID3 one of the classification algorithms. This can assist continuous as well as categorical instances to the process of tree construction.

SCOPE

Only existing patient records are used in the detection process. We must process the growing amount of medical data for detection in today's world. In any case, it is tedious thus information mining procedures assists with getting freed from this issue. We classify using Python and naive bayes. Machine learning algorithms can help in predicting the likelihood of someone developing diabetes in the future, allowing for early intervention and management. By analysing patient data, machine learning can aid in the development of personalised treatment strategies for diabetic patients. Machine learning algorithms can help in identifying patients who are at high risk of developing diabetes and targeting them for preventative interventions. By analysing data from continuous glucose monitoring devices and other wearable sensors, machine learning can be utilised to monitor diabetic patients. Machine learning can aid in the discovery of new biomarkers for diabetes, providing new insights into the disease and its underlying mechanisms.

PROPOSED SYSTEM

Methodology: Aim to investigate for model to predict diabetes with better accuracy. We experiment using different classification and ensemble algorithms to predict diabetes. In the following, we briefly discuss the phase as below.

Dataset Description:

The information is accumulated from Kaggle which is named as Pima Indian Diabetes Dataset. The 768 patients in the dataset have many characteristics.
Table Dataset Description

S No.	Attributes
1.	Pregnancy
2.	Glucose
3.	Blood Pressure
4.	Skin thickness
5.	Insulin
6.	BMI (Body Mass Index)
7.	Diabetes Pedigree Function
8.	Age

The 9th attribute is class variable of each data set. This class variable shows the outcome patient is diabetic and patient is not diabetic for diabetics which indicates positive or negative for diabetics. Circulation of Diabetic Patient- We made a model to foresee diabetes anyway the dataset was marginally imbalanced having around 500 classes marked as "patient isn't diabetic" signifies negative means no diabetes and 268 labeled as: patient is diabetic" means positive means diabetic.

Data Preprocessing:

It is the most important step. The vast majority of healthcare data contains missing values and other imperfections that can reduce its usefulness. The goal of is data preparation is to improve the efficiency as well as high grade of mining results. This method is essential for precise outcomes and great expectation while applying AI strategies to the dataset. Two pre-processing steps are required for the diabetes dataset from the Pima Indians. It is the most important step. Most information relating to medical care has missed qualities and different pollutants that can influence the information's convenience. The purpose of data preparation is to improve the efficiency and quality of mining results. When using machine learning techniques to dataset, this procedure is required for producing accurate results and making accurate predictions. diabetic Pima Indian dataset requires two stages of preprocessing.

Apply Machine Learning:

We use the Machine Learning Technique when the data are ready. We utilize different order and troupe strategies, to foresee diabetes. the methods used with

the diabetes dataset of Pima Indians. The main goal was to use machine learning techniques to look at how well these methods worked, how accurate they were, and which features were responsible or important for making predictions.

The methods are as follows:

- Choose the hyper plane that divides the class more effectively.
- To find the better hyper plane you need to compute the distance between the planes and the information which is called Edge.
- The likelihood of miscarriage increases when the distance between the classes is low, and vice versa. Therefore, we must
- Select the class with the highest margin. IT is equal to the distance between the positive and negative points.

Process Model Used for the Project:

• Logistic Regression: When dependent variables can be categorized, a machine learning technique called

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
0	2	138	62	35	0	33.6	0.127	47	1
1	0	84	82	31	125	38.2	0.233	23	0
2	0	145	0	0	0	44.2	0.630	31	1
3	0	135	68	42	250	42.3	0.365	24	1
4	1	139	62	41	480	40.7	0.536	21	0

logistic regression is used. The available features serve as the foundation for the logistic regression outputs that are produced. Here sigmoidal capability is utilized to order the result.

One one of the most popular classification algorithms is logistic regression.

	Training Accuracy	Testing Accuracy
C=1	0.779	0.788
C=0.01	0.784	0.780
C=100	0.778	0.792

In first line, the default worth of C=1 furnishes with 77% exactness on the preparation and 78% precision on the test set. On both training and testing sets, the outcomes of the second row show an accuracy of 78% when using C=0.01. Because of this less regularization and A more complicated model might not work. generalize better than the default setting is demonstrated by the fact that using C=100 results in slightly lower accuracy on the training set and slightly higher accuracy on the test set.

Hence, we ought to pick default esteem C=1

K-Nearest Neighbors:

K-neighbors (KNN) calculation utilizes highlight likeness to foresee the upsides of new information focuses which further suggests that the new information point will be relegated a worth in light of how precisely it aligns with the objectives of the preparation set. Expectations are made for another case (x) via looking through the whole preparation set for the K most comparative occurrences (the neighbors) and summing up the result variable for those Kin stances.

Decision Tree:

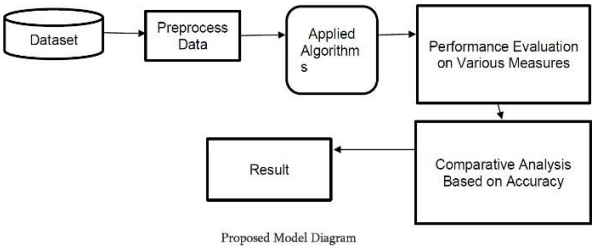
In supervised learning, the decision tree is a non-parametric classifier. In this technique every one of the subtleties are addressed as tree, where leaves are relates to the class marks and traits are compares to interior hub of the tree. The Gini Index was used to split the nodes. The decision tree that this classifier creates is the basis for the class values that it assigns to each data point. Here, we can adjust the maximum number of features that the model can consider.

Preparing Precision	1.00
Testing Precision	0.99

Support Vector Machine:

By varying the distance among the data points and the hyper plane, this classifier aims to create a hyper plane capable of separating the classes to the greatest extent possible. The hyper plane is chosen from among a number of kernels. I tried four kernels: a sigmoid, linear, poly

Proposed Model Diagram:



Proposed Model Diagram

Dataset collection:

incorporates information assortment and understanding the information to concentrate on the secret examples and patterns which assists with foreseeing and assessing the outcomes. Dataset carries1405 lines i.e., all out number of information and 10 sections i.e., absolute number of highlights. Pregnancy, glucose, blood pressure, skin thickness, insulin BMI, diabetes, pedigree function, and age II are examples of features.

Data pre-processing:

In order to get results that are more precise and accurate, this phase of the model handles data that is inconsistent. Because the ID in this dataset is inconsistent, we eliminated the feature. This dataset doesn't contain missing qualities. Since glucose level, blood pressure, skin thickness, BMI, and age cannot have values of zero, we imputed missing values for a few selected attributes. The Standard Scaler was then used to scale the data. Since there were fewer features that were crucial for

prediction, the feature selection process was carried out.

Identifying the omitted value:
We obtained the missing values in the datasets, as depicted in Table, by utilizing the Panda library and SK-learn. We substituted the corresponding mean value for the missing value Informational index the dataset gathered is initially from the Diabetes Data Set for Pima Indians accessible on Kaggle. There are a few variables for medical analysts and one variable for the target. The target of the dataset is to anticipate regardless of whether the patient has diabetes. The outcome is the only dependent variable in the data set The number of pregnancies a patient has had, as well as their BMI, insulin level, age, and other variables, are examples of independent variables.

- **Dataset Description:**

Informational index the dataset gathered is initially from the Pima Indians Diabetes Data set is accessible on Kaggle. There are a few variables for medical analysts and one variable for the target. The target of the dataset is to anticipate regardless of whether the patient has diabetes. The outcome is the only dependent variable in the data set. The number of pregnancies a patient has had, as well as their BMI, insulin level, age, and other variables, are examples of independent variables.

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
0	2	138	62	35	0	33.6	0.127	47	1
1	0	84	82	31	125	38.2	0.233	23	0
2	0	145	0	0	0	44.2	0.630	31	1
3	0	135	68	42	250	42.3	0.365	24	1
4	1	139	62	41	480	40.7	0.536	21	0

There are 768 data points in the diabetes data set, each with nine features. Result is the element we will anticipate, 0 methods No diabetes, 1 method diabetes

RESULT AND CONCLUSION
Machine learning characterization calculations created for expectation of diabetes in prior stage. We used 70% of data for training and 30% of data for testing. In this ratio of data splitting Here we found that Random Forest Classifier predicted with 99% of accuracy as highest accuracy for the dataset

Algorithms	Training Accuracy	Testing Accuracy
k-Nearest Neighbours	81%	78%
Logistic Regression	78%	78%
Decision Tree	98%	99%
Random Forest	94%	97%

CONCLUSON
Machine learning-based diabetic prediction has shown encouraging results in identifying those at risk of developing diabetes. Using a range of machine learning algorithms and relevant input elements such as medical history, lifestyle factors, and biomarkers, researchers and healthcare practitioners have been able to construct prediction models that can aid in the early detection and prevention of diabetes.
Numerous research have shown this. predictive models' efficacy through the application of sophisticated machine learning methods and the analysis of large datasets. The models have been able to identify individuals as diabetic or non-diabetic with high accuracy, allowing for prompt intervention and individualized healthcare plans.
Finally, reliable risk assessments and support in the development of particular prevention programmes have shown that machine learning has enormous potential for diabetic prediction. Despite challenges, machine learning approaches have the potential to improve diabetes management, reduce disease burden, and ultimately improve the quality of life for persons at risk.

REFERENCE

1] https://www.studocu.com/in/document/indraprastha-institute-of-informationtechnology-delhi/computer-sciences-and-applied-mathematics/projectreportdiabetes-prediction/30748724

2] https://www.sciencedirect.com/science/article/pii/S24059 59518304624

3] https://www.researchgate.net/signup.SignUp.html?hdrsu= 1&_sg%5B0%5D=st43DK4CRdXhXMfpTxD3OxQ1WA4dhQMCJG2sjhIbPqn0Cv 6pvi9l33ZBwtkOtJeVj3QmkyskAZZ99Q_4GpSvFZ6DWkhttps

4] https://www.researchgate.net/publication/347091823_Dia betes_Prediction_Using_ Machine_Learning

5] https://www.frontiersin.org/articles/10.3389/fgene.2018.00515/full]https://doi.org/10.22214/ijraset.2022.41143

7] "Using Machine Learning to Predict Diabetes Mellitus Techniques" was written by Quan Zou, Kaiyang Qu, Yamei Luo, Dehui Yin, Ying Ju, and Hua Tang. Front. Genet., 06 November 2018 Sec. Computational Genomics Volume 9 – 2018. https://doi.org/10.3389/fgene.2018.00515

8] Sunita Varma's article, "Diabetes Prediction Using Machine Learning Techniques," appeared in the International Journal of Engineering Research & Technology (IJERT) with the following ISSN: 2278-0181 Vol. 9 Issue 09, September-2020

https://www.ijert.org/research/diabetes-prediction-using-machine-learningtechniques-IJERTV9IS090496.pdf

9] "Diabetes Mellitus Prediction Using Various Ensemble Machine Learning Ensembles Approaches" will be presented at the 2020 11th International Conference on Computing, Communication, and Networking Technologies by Md. Tanvir Islam, M. Raihan, Nasrin Aktar, MD. Shahabub Alam, Romana Rahman Ema, and Tajul Islam. (ICCCNT) IEEE 15 October 2020 DOI: 10.1109/ICCCNT49239.2020.922555

AET 044

To Develop a Watermarking Technique for Medical Data

Anushka Tuse
Department of Biomedical Engineering
Vidyalankar Institute of Technology
Mumbai, India
Anushka.tuse@vit.edu.in

Kashvi Pota
Department of Biomedical Engineering
Vidyalankar Institute of Technology
Mumbai, India
Kashvi.pota@vit.edu.in

Dr. Gajanan Nagare
Department of Biomedical Engineering
Vidyalankar Institute of Technology
Mumbai, India
Gajanan.nagare@vit.edu.in

Kinjal Malharkar
Department of Biomedical Engineering
Vidyalankar Isntitute of Technology
Mumbai, India
Kinjal.malharkar@vit.edu.in

I. INTRODUCTION

In the context of medical data, security requirements are essential to ensure the confidentiality, integrity, and authenticity of patient information. Various security measures, such as cryptography, can help achieve these requirements during data transmission through public channels. However, these techniques may not be enough to protect against unauthorized copying or transmitting of illegal materials. To address this, digital watermarking technologies have emerged as an effective tool for detecting copyright infringement and content authentication in medical data.

II. TECHNICAL APPROACH

In general, watermarking schemes can be roughly divided into two categories: spatial domain watermark and transformed domain watermark. They are: least significant bit (LSB) based watermarking scheme, threshold-based correlation watermarking scheme, direct sequence watermark, discrete Fourier transform (DFT) with template matching, discrete wavelet transform (DWT), discrete cosine transform (DCT) and spread spectrum watermarking scheme. Our watermarking procedure introduces a novel scheme for doing this work. We develop a new blind watermarking algorithm, which embedding the binary watermark into the blue component of a RGB image in the spatial domain, to avoid the problem of protecting copyright. For embedding watermark, the generation principle and distribution features of direct current (DC) coefficient are used to directly modify the pixel values in the spatial domain, and then four different sub-watermarks are embedded into different areas of the host image for four times, respectively. An attack simulation system is built consisting of vast number of attacks to analyze the embedding scheme at different points of watermarking procedure.

III. PROBLEM STATEMENT

The security and privacy prevention of medical data is a major concern, and it is necessary that some techniques be implemented for this purpose.

IV. PARAMETERS

- PEAK SINGNAL TO NOISE RATION(PSNR)

It is used to measure deviation of the watermarked and attacked frames from the original video frames.

$$PSNR(dB) = 10log_{10}\frac{255^2}{\frac{1}{N*N}\sum_{i=0}^{N}\sum_{j=0}^{N}[f(i,j)-f'(i,j)]^2}$$

Where N is the size of image, f (i, j), f ' (i, j) is the pixel gray value of host image and pending detection image respectively.

- NORMALIZED CORRELATION (NC)

The normalized coefficient (NC) gives a measure of the robustness of watermarking. Its peak value is 1.

- STRUCTURAL SIMILARITY INDEX MODULE

SSIM is a perception-based model that considers image degradation as perceived change in structural information, while also incorporating important perceptual phenomena, including both luminance masking and contrast masking terms. Structural information is the idea that the pixels have strong inter-dependencies especially when they are spatially close.

- MEAN SQUARED ERROR

The mean squared error measures the average of the squares of the errors or deviations that is the difference between the estimator and what is estimated.

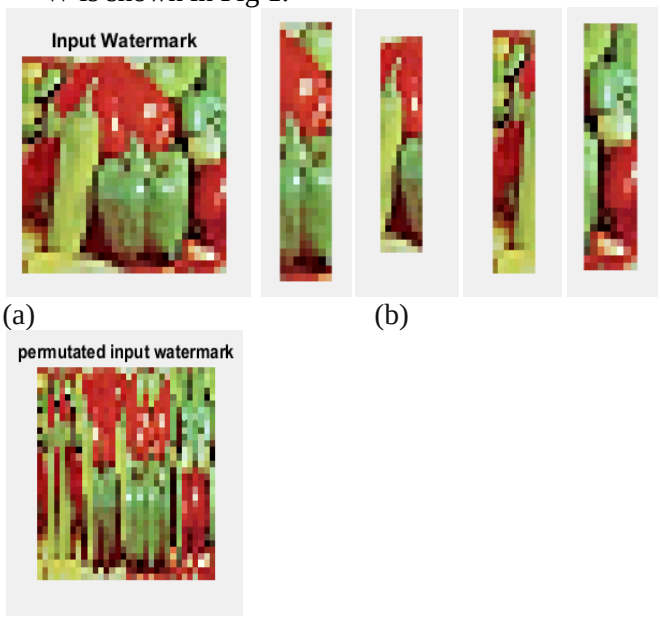
- EMBEDDING CAPACITY

The maximum payload that can be safely be hidden in a work without causing statistically detectable artifacts.

V. WATERMARKING PREPROCESSING

The preprocessing of watermark is one of the key steps in the watermarking algorithm, and it will directly influence the robustness and security of watermark, which includes the following two steps.
Firstly, the 32×32 original watermark is divided into four sub-watermarks with size $32\times8(1 \leq i \leq 4)$, which will decrease the probability of whole watermark be attacked and enhance the robustness of watermark.

Hence, this proposed algorithm is of higher security. The permuting process of the original binary watermark W is shown in Fig 1.



(a) (b)

(c)

Fig. 1 The permuting process of original watermark: (a) original watermark, (b) sub-watermark blocks and (c) permuted sub-watermark image.

VI. BLOCK DIAGRAM

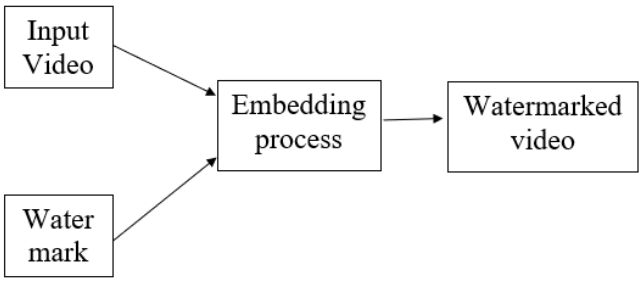


Fig. 2 Block diagram embedding

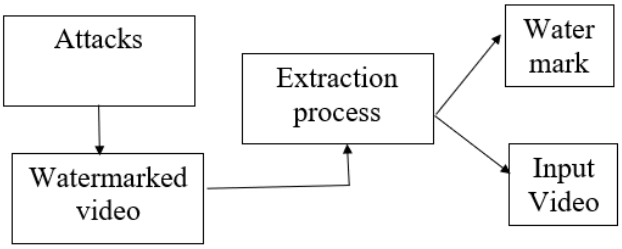


Fig. 3 Block diagram extraction

VII. EXPLANATION

Before providing the system with required inputs some pre-processing is done on the image and video. The image is divided in predefined number of physical parts. The individual frames of the videos are extracted. Then each frame and image part are provided as input to the embedding block in a sequential order for embedding of each part into each frame. After embedding is done parameters like PSNR, SSIM, NC are calculated comparing different images and videos.
For the process of extraction, the watermarked image is taken as input to the system. The video is then sent forward to the extraction algorithm which does the work of extracting the embedded watermark image from the video. Different videos obtained at different levels of the watermarking procedure can be given as input to the extraction block. The extraction block extracts image from each plane of each frame of the video in a sequential order and then recompiles the frame to get a single video. The image parts thus obtained from each frame are ordered in a matrix to get single image.

VIII. ALGORITH

- Embedding Block Diagram

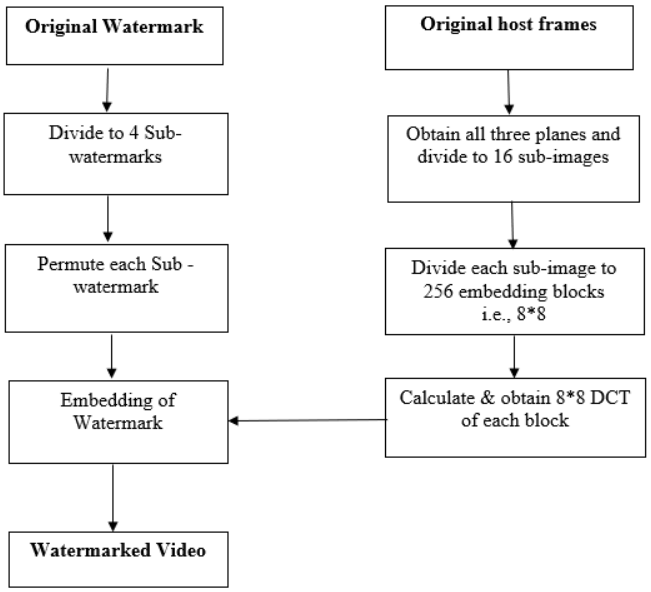


Fig. 4 Diagram of embedding Watermark process

Step 1: Take the input watermark (32*32)



Fig. 5 Input watermark

Step 2: Divide into 4 sub-watermarks

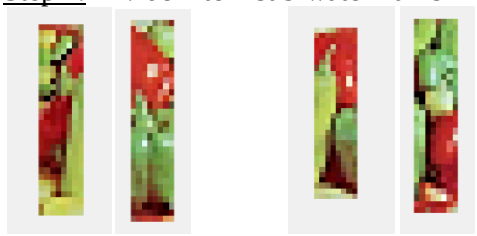


Fig. 6 Sub-watermarks

Step 3: Permute each sub-watermark

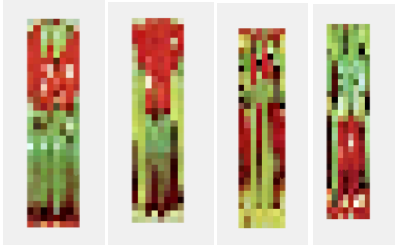


Fig. 7 Permutation

Step 4: Obtain Permuted watermark by combining permuted sub-watermark

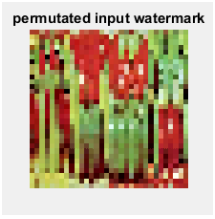


Fig. 8 Permuted watermark

Step 5: Host video frame (512*512)



Fig. 9 Host Frame

Step 6: Obtaining the DCT of each plane of host frame (up to 32 frames). We have to separate R, G, B plane of permuted input watermark image and each plane is embedded into respective planes of each frame

Step 7: DCT of R, G, B frame is calculated according 2D-DCT formula. In that select (8x8) block value as DCT coefficient for watermarking purpose.

Step 8: Replace 1st 32 DCT coefficient(8x8) by permuted input watermark pixel value. Do this process for all 3 plane of permuted input watermark for respective frame.

Step 9: Take IDCT of each embedding frame so we get watermarked frame. So, color frame contained 32-pixel value hence we required 32 frames for 32x32 input watermark image. Repeats above steps for 32 frames. So, we get watermarked video.

- Extraction Block Diagram

Step 1: Select Watermarked Video.

Step 2: Divide each plane of watermarked frame into 8x8 block i.e., 32frame

Step 3: Obtained DCT of each block of frame of each plane (R, Y, B),

Step 4: Take 8x8 value of DCT coefficient to form original image.

Step 5: Repeat this process for all watermarked frame Finally combine each plane to form extracted watermarked color image

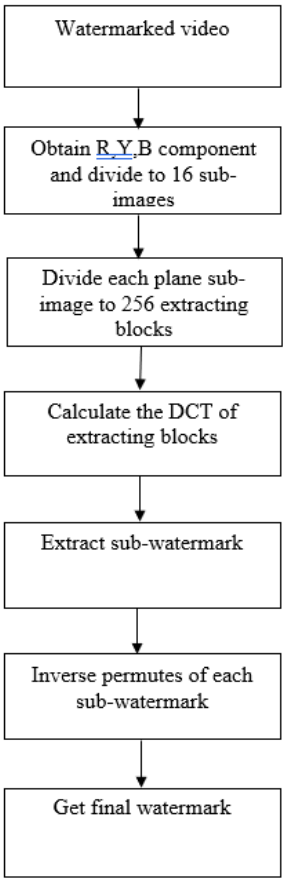


Fig. 10 The diagram of extracting watermark process



Fig. 11 The extracted watermark

IX. RESULT



Fig. 12 Video Frame (sample frame)

Video is a continuous sequence of frames, so we require vide of minimum 32 frames, for watermarking. Size of video frame is 512*512.
Above frame is sample frame of the video which we have used to watermark.



Fig. 13 Standard Watermark Images

Above images are standard images which we have used to watermark in the video frames. They are used because they have better pixel combinations and are used by all the researchers in DIP.

X. FUTURE SCOPE

Further areas that can be developed more in medical data watermarking are:

1. Medical data often includes both images and audio, so a focus on watermarking in the audio signal of medical videos could be a valuable area for development in medical data security.
2. Just like in the broader field of video watermarking, there is currently no uniform framework for video watermarking in the medical field that provides protection against all possible attacks. Thus, developing a more comprehensive framework for medical video watermarking would be an important step forward.
3. As new forms of piracy and attacks on medical data emerge, researchers will need to continue developing increasingly complex algorithms to ensure the robustness and fidelity of medical videos. However, this complexity can also create overhead that may not be practical for real-time applications, so striking a balance between complexity and practicality will be an ongoing challenge.

XI. CONCLUSION

In conclusion, the proposed blind watermarking technique based on modifying pixel values of input watermark in the spatial domain using DCT can effectively improve the invisibility and robustness of medical data watermarking. By embedding the watermark in the spatial domain for four permuted sub-watermarks, the proposed method provides strong resistance to various attacks, while maintaining high-quality images with good PSNR, SSIM, and MSE values. This method also ensures privacy preservation of medical data without the need for the original host image or watermark during the extraction process. Therefore, this proposed approach can be a useful tool for securing medical data and ensuring its confidentiality and integrity.

XII. REFERENCE

1. International Journal of Electronics and Communications (AEÜ) A novel blind robust image watermarking in DCT domain usinginter-block coefficient correlationChinmayee Das, Swetalina Panigrahi, Vijay K. Sharma∗, K.K. Mahapatra .
2. International Conference on Information and Communication Technologies (ICICT 2014) Robust and Invisible Image Watermarking in RGB Color space using SVD D.Vaishnavia,* , T.S.Subashinib
3. 2017 International Conference on Advanced Computing and Communication Systems (*ICACCS* -2017), Jan. 06 – 07, 2017, Coimbatore, INDIA Survey on Patended and Unpatented Video Watermarking Techniques. *Shaik Hedayath Basha B. Jaison*
4. 2017 2nd International Conference on Multimedia and Image Processing A Simplified and Robust DCT-based Watermarking Algorithm Xin Li, Xingjun Wang□□Anqi Chen and Linghao Xiao
5. IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS FOR VIDEO TECHNOLOGY 1 An Overview of Digital Video Watermarking Md.

Asikuzzaman and Mark R. Pickering

6. 2016 IEEE Students' Conference on Electrical, Electronics and Computer Science 978-1-4673-7918-2/16/$31.00 ©2016 IEEE A Blind Video Watermarking Technique for Indoor Video Content Protection using Discrete Wavelet Transform Sneha Kadu M. Tech. Scholar, VNIT Nagpur. Ch. Naveen Research Scholar, VNIT Nagpur. V. R. Satpute Assistant Professor, VNIT Nagpur. A. G. Keskar Professor, VNIT, Nagpur.
7. Copy-Move Forgery Detection Using the Segment Gradient Orientation Histogram Ali Retha Hasoon Khayeat1,2(B), Paul L. Rosin1, and Xianfang Sun1
8. 2016 Online International Conference on Green Engineering and Technologies (IC-GET) Index Mapping based Hybrid DWT-DCT Watermarking Technique for Copyright Protection of Videos Files Alavi Kunhu, Nisi K, Sadeena Sabnam, Majida A Saeed AL-Mansoori
9. 2016 First International Conference on Multimedia and Image Processing A Proposed Robust Video Watermarking Algorithm: Enhanced Extraction from Geometric Attacks R. Maharjan1, Abeer Alsadoon1, P.W.C. Prasad1, A. M. S. Rahma2, A. Elchouemi3, and SMN Arosha Senanayake4
10. 2015 International Conference on Communication, Information & Computing Technology ICCICT), Jan. 16-17, Mumbai, India 978-1-4799-5522-0/15/$31.00 ©2015 IEEE A Robust Technique for Relational Database Watermarking And Verification Swathi Melkundi, Chaitali Chandankhed.
11. 2015 International Conference on Advanced Technologies for Communications (ATC) A Robust Blind Video Watermarking in DCT Domain Using Even-Odd Quantization Technique Tuan Thanh Nguyen and Duan Dinh Nguyen
12. A robust semi-blind watermarking for color images based on multiple decompositions Prasanth Vaidya S.1 · Chandra Mouli P. V. S. S. R.1 Received: 30 June 2016 / Revised: 30 November 2016 / Accepted: 5 January 2017 © Springer Science+Business Media New York 2017
13. A DCT-Based Watermarking Technique for Image Authentication Mohamed Al Baloshi and Mohammed E. Al-Mualla *Multimedia Communication and Signal Processing Research Group, Etisalat University College, P.O.Box: 573, Sharjah, United Arab Emirate*
14. IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS FOR VIDEO TECHNOLOGY, VOL. 13, NO. 8, AUGUST 2003 831 Joint Security and Robustness Enhancement for Quantization Based Data Embedding Min Wu, *Member, IEEE*
15. IEEE TRANSACTIONS ON IMAGE PROCESSING, VOL. 15, NO. 6, JUNE 2006 Color to Gray and Back: Color Embedding Into Textured Gray Images Ricardo L. de Queiroz, *Senior Member, IEEE,* and Karen M. Braun
16. 2014 First International Conference on Computational Systems and Communications (ICCSC) | 17-18 December 2014 | Trivandrum Image Watermarking Scheme based on MD5 and Simplified DES Aparna J R Department of Computer Science SCMS School of Engineering and technology.
17. Robust color image watermarking technique in the spatial domain Qingtang Su[1]· Beijing Chen[2] Springer-Verlag Berlin Heidelberg 2017.

AET 045

3D Printed Prosthetic Arm using EMG

Ketki Kulkarni
Dept. of Biomedical Engineering
Vidyalankar Institute of Technology
Mumbai, India
ketki.kulkarni@vit.edu.in

Shweta khatake
Dept. of Biomedical Engineering
Vidyalankar Institute of Technology
Mumbai, India
shweta.khatake@vit.edu.in

Isha Doshi
Dept. of Biomedical Engineering
Vidyalankar Institute of Technology
Mumbai, India
isha.doshi@vit.edu.in

Prof. Komal Lawand
Dept. of Biomedical Engineering
Vidyalankar Institute of Technology
Mumbai, India
komal.lawand@vit.edu.in

Disha Patil
Dept. of Biomedical Engineering
Vidyalankar Institute of Technology
Mumbai, India
disha.patil@vit.edu.in

Dr. Gajanan Nagare
Dept. of Biomedical Engineering
Vidyalankar Institute of Technology
Mumbai, India
gajanan.nagare@vit.edu.in

Abstract—The goal of this project is to use electrical signals from muscles to control the hand. The prosthetic hand is a device used for the amputee to make them capable of doing daily life. Losing upper limbs is not just a physical loss it also affects the way that person sees their life, they start feeling disabled all the time. In this project, we use an Arduino board, servo motors, and an EMG module to design and create a robotic hand. The hand's layout is centered on a straightforward, adaptable, and minimum controlling method. The entire hand is 3D Printed in parts using a 3D printer. All five of the robotic hand's fingers have been given separate commands to open, close, pick, place, and return to their starting position. In extremely precise instrumentation workings, such as when a doctor operates on a patient using a robot without human hands, technology can also be useful. The technique offers a wide range of advantageous uses in the fields of robotics, surgery, humanoid robots, etc.

Keywords— Amputees, Arduino, FFRH, Robotic-Hand, Replication System

I. INTRODUCTION

The prosthetic hand is an artificial device that is designed for the people with upper branch amputations to come up with some functions of the natural hands. The number of amputees in the developing countries is significantly lesser than in developed countries due to minimal medical installations and the fashion ability of ails that have been cured in the advanced world. Loss of upper branches has numerous circumstances not only in the sense of physical but also in social and physiological departments.[1] There are many design and manufacturing obstacles to be solved in order to build a functional prosthetic arm. The created prosthetic arm is expensive and has limited movement. A group of bodily muscles' signals, or EMG signals, can be used to control the proposed system. Muscle signal from the amputee is used to stimulate the myoelectric arm. Servo motors electronically operate and regulate the arm. The offered bionic arm may be employed by an amputee or a person born without an arm. Although it is pricey and typically not accessible to individuals in developing nations, this kind of technology does exist. The 3D printing sector is expanding quickly, enabling individuals to start their own small businesses as manufacturers. Recent developments have led to the attachment of 3D-printed prosthetic arms to war victims across North Africa. However, it is clear that 3D-printed objects have the potential to improve people's lives. It is not affordable for everyone in this era to get a prosthetic arm as it is really expensive. So, the aim is to create an affordable arm of reasonable complexity and quality. The prosthetic arm can be controlled by signals from a set of muscles in the body (i.e., EMG signals) and will have a functional elbow and hand with independent functionality. The myoelectric arm is stimulated by a muscle signal available from the amputee. EMG signal detected by sensors or electrodes. The amplitude of the surface EMG signal (SEMG) varies in range. The voltage value for the upper movement of the arm is more than the voltage value for the downward movement of the arm. Similarly, the voltage value for the clockwise movement of the arm is more than the voltage value for the anticlockwise movement of the arm. Based on this a microcontroller was programmed to perform up/down and clockwise/anticlockwise movements in steps depending on the dc voltage level. The levels of the dc voltage corresponding to the EMG signal were taken. The objective is to make a functional prosthetic arm that will move on the electrical muscle signals connected to the amputated arm. It is expected to make small yet significant movements like fingers opening and closing and some signs.

II. LITERATURE SURVEY

The focus of this research is amputees who have lost their upper limb due to an accident or other reasons. The fact that people perceive themselves as disabled in such an educated culture is appalling. Absolutely nothing for them is being done by us. Due to its large population, India has a large number of amputees who are not living their lives to the fullest. We are therefore here with a project to enable the disabled to perform some tasks and be more independent.

Amputees are one of the most significant groups in the world when it comes to persons with disabilities. The primary goals of prosthetics development are to enhance these people's quality of life and aid in their regaining dignity and independence. A complicated problem, replacing an amputated limb requires replacing the osseous skeleton, collapsing the locomotive system, and providing the prosthetic with a command system. The main engineering difficulty is to make the system weigh less than it did before while still fitting into the space that the arm originally did.

Base Paper: Wearable Mind

Thoughts Powered 3D Printed Open-Source Arm with Integrated Feedback Sensor System. Address:

https://www.researchgate.net/publication/327387513 Wearable Mind Thoughts Powered 3D Printed.

Open-Source Arm with Integrated Feedback Sensor System.

Related Projects: Developing a Helping Hand. The human body is a remarkable machine, and this is also true of our hands. They can handle delicate and difficult tasks like collecting pens and instruments to produce art with some training.

Unfortunately, there is an increasing need for artificial hands. p042/humanbiologyhealtNbuild-prosthetic-hand at https://www.sciencebuddies.org/science-fairprojects/project-ideas/HumBio He employs a previously created Robotic hand that is a component of the open-source robotics project InMoov for his DIY prosthetic hand and forearm.

https://www.instructables.com/id/VoiceControlled-Prosthetic-Hand-Forearm/ Creating a Human Hand The pricey and limited utility of today's prosthetic hands. An affordable anthropomorphic prosthetic hand was designed. Web address: /Pubs/Eproject/Available/ Eproject-042612-145912/unrestricted/MQP PaulV The Internet of Things: Principles, Practices, and Solutions for the Internet of Things, by Samuel Greengard, and Complete Final 3.pdf

What sets that apart from the traditional prosthetics is that all of the mechanical parts are made 3D printed, bringing along considerable cost savings this limb is both functional and aesthetically pleasing, and making sure its wearer feels comfortable wearing them-both physically and socially. Ke Xu et. al., “A prosthetic arm based on EMG pattern recognition”, IEEE International Conference on Robotics and Biomimetics, 2016

EMG is a diagnostic test used to evaluate the condition of the motor neurons, the nerve cells that regulate muscles. Results from EMG tests may show issues with nerve function, muscle function, or nerve-to-muscle signal transmission. Muscle contraction is brought about by electrical signals that are sent by motor neurons. These signals are converted into graphs, noises, or numerical values by an EMG using minuscule electrodes, which are subsequently evaluated by a professional. The results of an EMG can identify difficulties with nerve-to-muscle signal transmission, muscle dysfunction, or both. Muscle contractions are triggered by electrical signals sent by motor neurons.

In developing countries, very few amputees have prosthetics not because they are pricey, but also due to distribution and maintenance problem. One of its main goals of our project is to develop a lower-cost 3D prosthetic hand printed for amputees. A standard myoelectric hand, where all the EMG surface electrodes on the amputee hand capture myoelectric signals that are manipulated to enable the hand to open and close.

In many ways, the human hand may be a fine tool. This serves as a representation of the various levels of freedom and can relate to other things. It is unfeasible to expect that any of the parameters and output requirements of the conventional hand can be recreated in a handcrafted unit using current technologies. Consensus can be reached and a functional prosthetic hand can be created with these ideal characteristics.

III. METHODOLOGY

A. implementation of project

Step 1: We must have every piece of equipment we'll need for the project, which includes an Arduino, three EMG stickers, two batteries that are less than 18 volts, wires as needed, and five servomotors.

Step 2: Make sure that every connection is made correctly.

Step 3: Uploading program in Arduino.

Step 4: Attach the EMG stickers and supply power.

Step 5: The outcome is seen once our hand has been moved.



Fig.1 Forearm main



Fig.2 wrist assembly part



Fig.3 palm



Fig4. servo mount

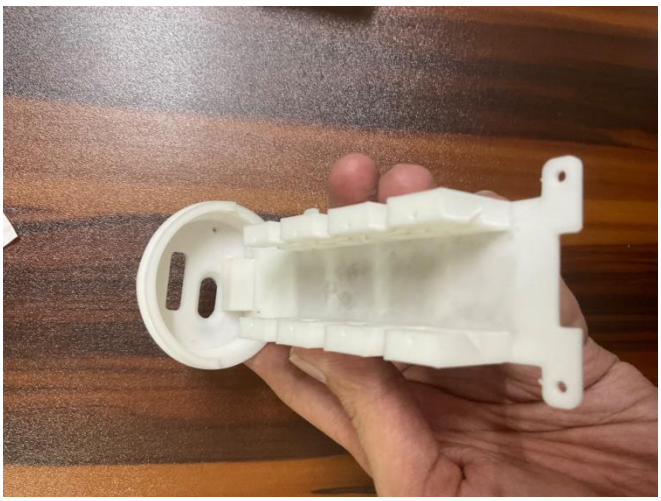


Fig 5



Fig 6

Step 2:
Attach the palm with wrist assembly with 3 mm screw

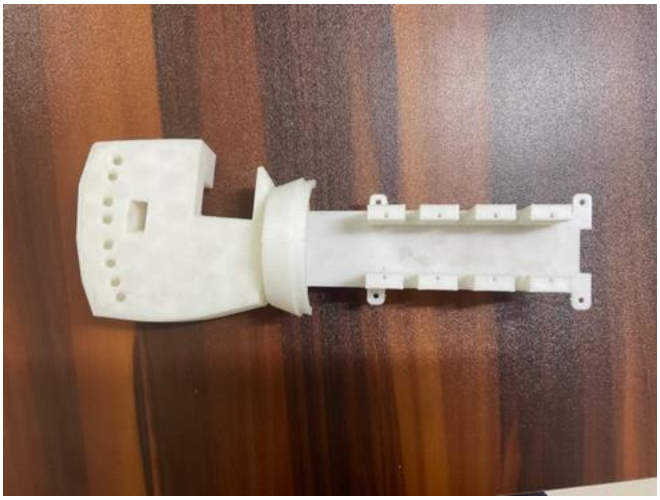


Fig 7



Fig 8

step 3: (pic remaining)
Mount the Servo's on servo mount

Step 4: Arrange the fingertips like this.

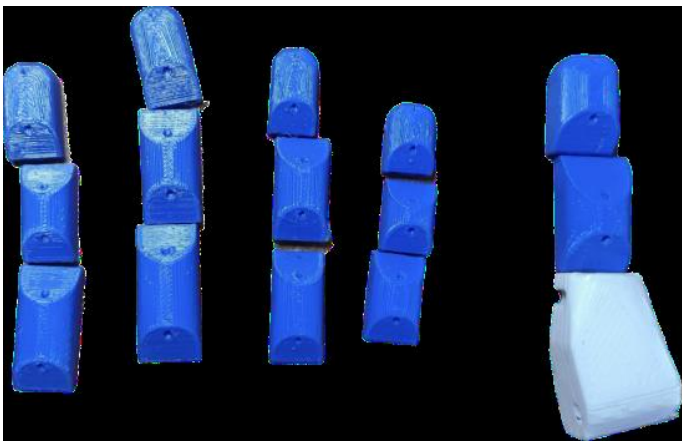


fig.9

Step 5: Insert braided elastic cord from two holes of fingers.
Insert braided elastic cord from two holes of fingers.

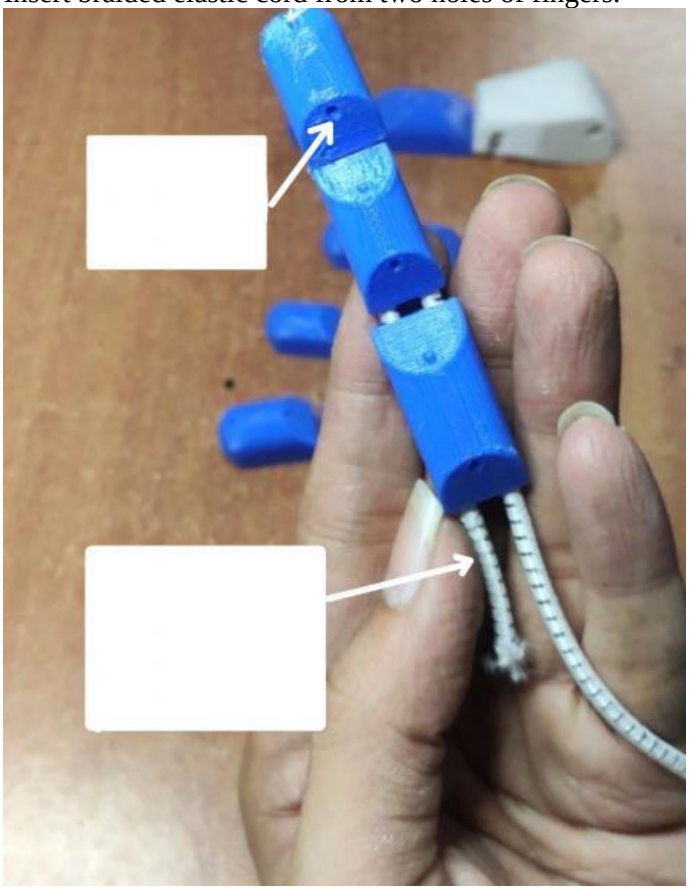


fig.10

Step 6:
fig.10 Insert the two ends from the palm backside as shown in picture

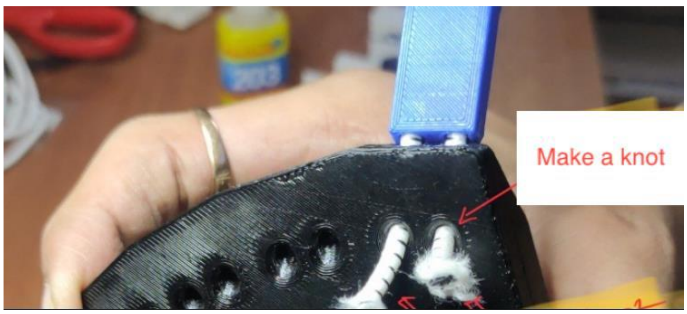


fig.11

Step 7:
Tie all the fingers together with palm

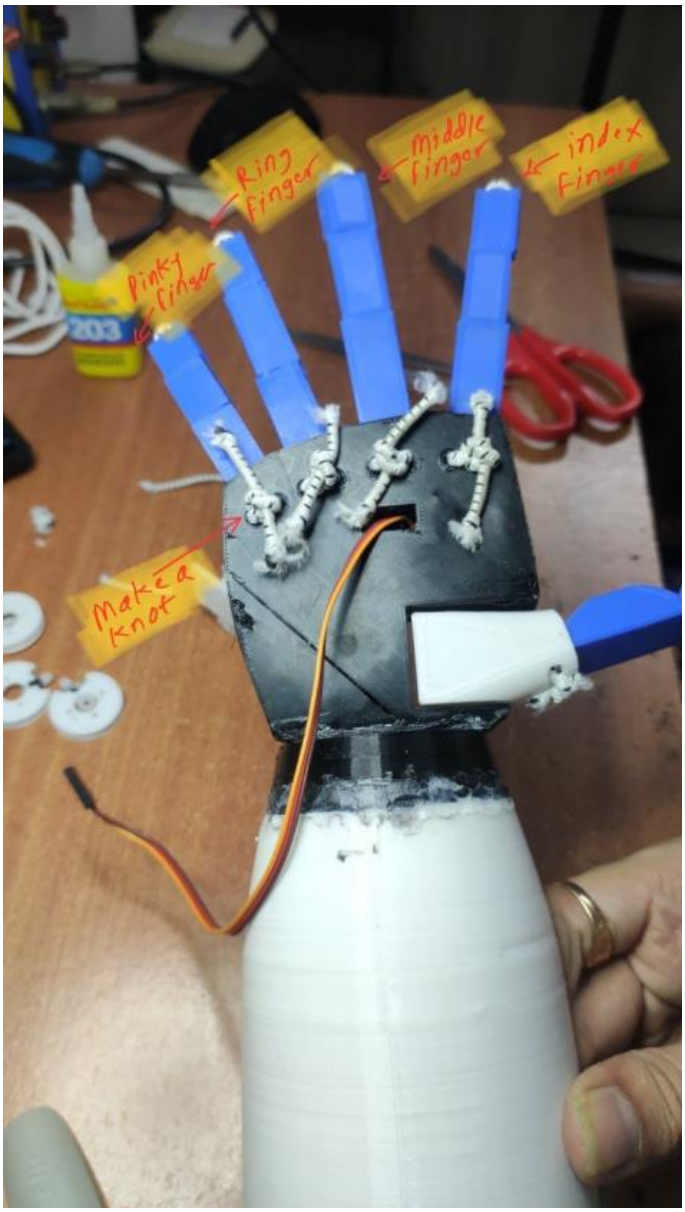


fig.12

Step 8:
Glue the servo horn with thumb.



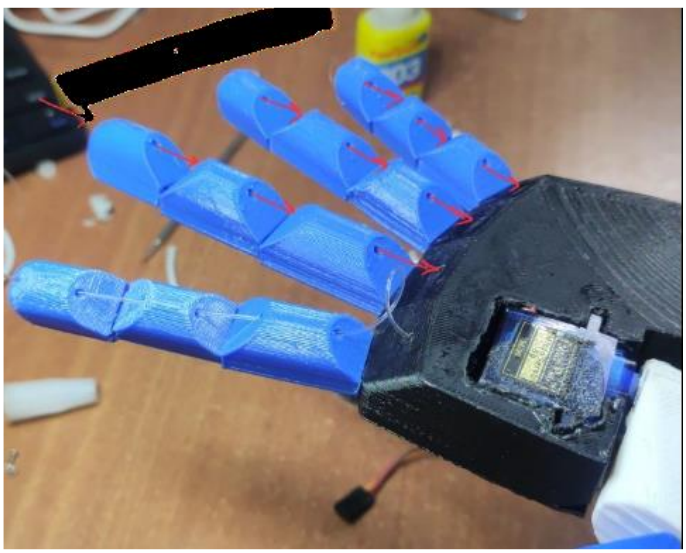
fig.13



fig.14

Step 10:

Insert the fishing line into each fingers and take it out from palm attachment Cut at-least 10 cm extra from the palm



Step 11:
Tie the fishing thread to each of the servo (there are 4 servos and we have 4 fishing threads for each finger)

Step 12:

Attach the servo mount on the forearm lid with 3 mm screws. (In picture Servo and fingers are not mounted its already there (we have already assemble these things))

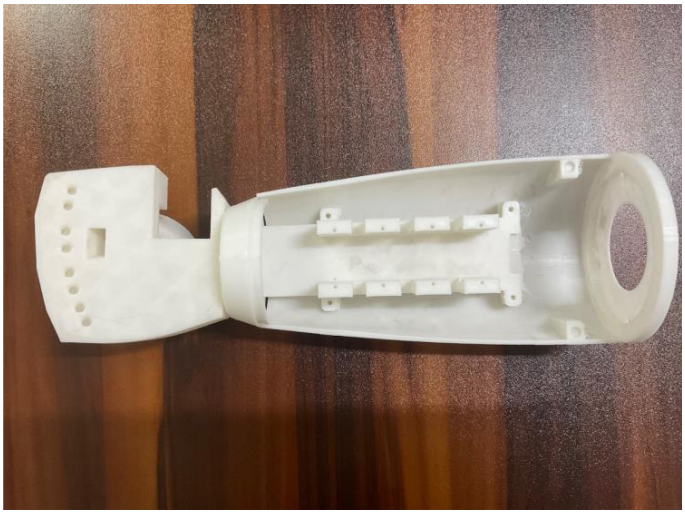


fig.16

Step 13:
Attach the 2 5 mm magnets on the side of the forearm.
Step 14:
Mount the forearm on base box with 4mm screw and nuts

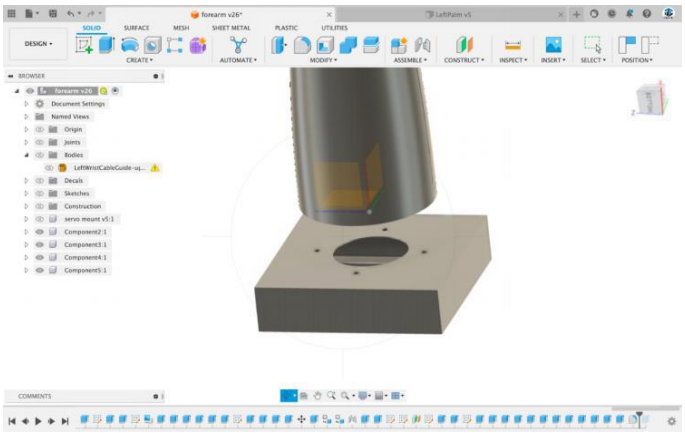


fig.17
Step 15:
Take out all the cables of servo from down side of forearm

10. Hardware and Software Requirement

Get following hardware

- Bluetooth Module HC 05

- · Arduino Nano
- · Servo Expansion PCBA
- · Power Adapter
- · Few jumper wires
- · Programming cables

Step 17:

```
Thumb to attach pin (2);
Index to attach pin (3);
Middle finger to attach pin (4);
Ring to attach pin (5);
Pinky to attach pin (6);
```

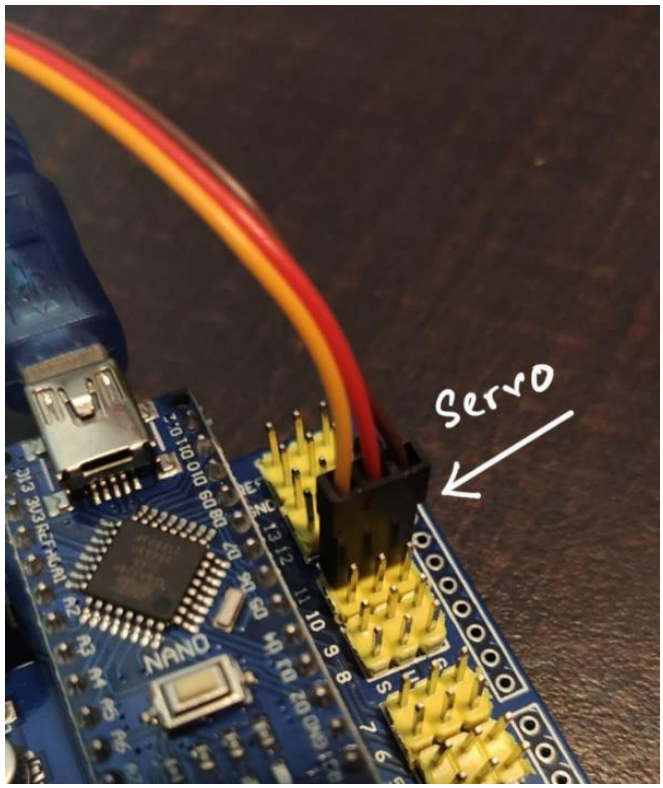


fig.18

Check the colour code of the wire.

- Orange indicates signal (on Servo PCB its denoted as S)
- Red indicates VCC (v)
- Brown (Gnd)

Step 18:

- Connect usb with laptop to flash or upload the program
- 2. Use of Arduino Nano with Servo
- Copy the following code and paste in arduino ide:

```
#include <Servo.h>
Servo servothumb;
Servo servoindex;
Servo servomiddle;
Servo servoring;
Servo servopinky;
void setup() {
 // initialize serial communication:
 Serial.begin(9600);
 servothumb.attach(2);
 servoindex.attach(3);
 servopinky.attach(4);
 servoring.attach(5);
 servomiddle.attach(6);
 delay(100);
```

```
}

void loop() {

   //if the emg value is above
   threshold level do close the fingers
      servothumb.write(90);
      servoindex.write(0);
      servomiddle.write(90);

      servoring.write(0);
      servopinky.write(90);
      delay(2000);
      servothumb.write(0);
      servoindex.write(90);
      servomiddle.write(0);

      servoring.write(90);
      servopinky.write(0);
```

IV. RESULT & DISCUSSION

Numerous negative effects in daily life might result from hand loss. The loss of hands reduces the number of opportunities. Therefore, a significant step towards prosthetics is research into creating a

separate movements of the fingers as well. This kind of prosthetic arm is quite basic. Additionally, it has the ability to hold, lift and execute other tasks.

VI. **REFERENCES**

[1] Sivapong Nilwong, Delowar Hossain, Eneo Petoku, and Genci Capi "Development of Myoelectric Robotic Hand using 3D Printer", 1st International Conference on Advances in Science, Engineering and Robotics Technology 2019 (JCASERT 2019)

[2] Vaibhav Pawar, Sneha Bire, Shubham More, Komal More and Reshma Mule, "Review on Design and Development of Robotic Arm Generation-1", International Journal of Innovative Science and Research Technology, pp.529, March 2018

[3] Tran Vanhuy, Dao Tuan Minh, Kien Nguyen Phan and Vu Anh Tran, "Simple Robotic Hand in Motion Using Arduino Controlled Servos", International Journal of Science and Research (IJSR), pp. 972- 974, March 2017.

[4] Kobayashi H, Ishida Y, Suzuki H, "Realization of all motion for the upper limb by a muscle suit", IEEE International Workshop on Robot and Human Interactive Communication, Japan, September 2004

[5] Iason Batzianoulis, Aude Billard, Nili E. Krausz, Ann M. Simon & Levi Hargrove, "Decoding the grasping intention from electromyography during reaching motions" Batzianoulis et al. Journal of Neuro Engineering and Rehabilitation 2018

[6] J.B. Gupta, Electronic Devices and Circuits, S. K. Kataria & Sons, 2009

[7] Ganiev, Asilbek, Ho-Sun Shin, and Kang-Hee Lee. "Study on virtual control of a robotic arm via a myo armband for the self manipulation of a hand amputee." Int. J. Appl. Eng. Res 11, no. 2 (2016): 775-782.

[8] Minati, Ludovico, Natsue Yoshimura, and Yasuharu Koike. "Hybrid control of a vision-guided robot arm by EOG, EMG, EEG biosignals and head movement acquired via a consumer-grade wearable device." Ieee Access 4 (2016): 9528-9541.

[9] Ke Xu et. al., "A prosthetic arm based on EMG pattern recognition", IEEE International Conference on Robotics and Biomimetics, 2016

[10] Visconti, P., F. Gaetani, G. A. Zappatore, and P. Primiceri. "Technical features and functionalities of Myo armband: an overview on related literature and advanced applications of myoelectric armbands mainly focused on arm prostheses." Int. J. Smart Sens. Intell. Syst 11, no. 1 (2018): 1-25.

[11] S. Sudharshan et. al., "Design and Development of EMG Controlled Prosthetics Limb", Procedia Engineering, Elsevier, Vol. 38, 2012, pp. 3547 — 3551.

[12] Linda Resnik et. al., "Evaluation of EMG pattern recognition for upper limb prosthesis control: a case study in comparison with direct myoelectric control", Journal of NeuroEngineering and Rehabilitation, Vol. 15, No. 23, 2018.

AET 046

Real-Time Heart Sound Transmission to Multiple Earpieces

Annanya Pingale
Biomedical Engineering Department
Vidyalankar Institute of Technology
Mumbai,India
annanyapingale@gmail.com

Kasturi Dhuri
Biomedical Engineering Department
Vidylankar Institute of Technology
Mumbai,India
kasturidhuri@gmail.com

Poorva Patil
Biomedical Engineering Department
Vidyalankar Institute of Technology
Mumbai,India
poorvapatil@gmail.com

Dr. Gajanan Nagare
Head of Department Biomedical Engineering Department
Vidyalankar Institute of Technology
Mumbai,India
gajanan.nagare@vit.edu.in

Mrs.Geetha Narayanan
Asst. Professor
Biomedical Engineering Department
Vidyalankar Institute of Technology
Mumbai,India
geetha.narayanan@vit.edu.in

Prof. Amol Sakhalkar
Asst. Professor
Electronics Engineering Department
Vidyalankar Institute of Technology
Mumbai,India
amol.sakhalkar@vit.edu.in

Abstract— This paper details the development of a Stethoscope integrated with RF technology. The system has been designed to transmit heart sounds wirelessly to a RF receiver module which subsequently sends them to earphones. The introduction of wireless technology enables real-time transmission of heart sounds, thereby providing students with a better understanding of the concept. Additionally, this product can serve as an excellent teaching aid in medical institutions, as multiple students can simultaneously receive the transmitted sounds via earpieces, using a wireless connection.

Keywords—Stethoscope, heart sounds, wireless transmission, amplifier, radio frequency, microphone, murmurs, real-time.

I. INTRODUCTION

A stethoscope is a medical instrument used for listening to sounds produced within the body, particularly the heart and lungs. It consists of a small disc-shaped resonator placed against the skin, and two tubes leading to earpieces for the listener. Stethoscopes are commonly used by doctors, nurses, and other medical professionals to diagnose various medical conditions. They can be used to listen to heart sounds, such as the sound of blood flowing through the heart's chambers and valves, or to detect lung sounds, such as wheezing or crackling, that can indicate a respiratory condition. Several types of stethoscopes are available, including traditional analog stethoscopes and more advanced digital stethoscopes. Digital stethoscopes often have additional features, such as amplified sound and the ability to store and transfer sound recordings. Using a stethoscope is a fundamental part of a physical examination and an important diagnostic tool in medicine.

II. LITERATURE SURVEY

Based on similar published articles, this paper explores the development of a Real-time device to transmit heart sounds to multiple earpieces:

[1] One study conducted by Ashraf et al. (2017) developed a wireless stethoscope with RF technology that could transmit heart sounds wirelessly to a mobile phone. The study found that the wireless stethoscope was able to capture heart sounds accurately and transmit them wirelessly with high fidelity.

[2] The study by Da Costa et al. (2018) developed a wireless stethoscope with Bluetooth technology that could be used for remote monitoring of heart sounds. The study found that the wireless stethoscope was able to capture heart sounds accurately and transmit them wirelessly over a distance of up to 30 meters.

[3] A study conducted by Jaiswal et al. (2020) developed a wireless stethoscope with RF technology that could transmit heart sounds wirelessly to a receiver, which was connected to a smartphone. The study found that the wireless stethoscope was able to capture heart sounds accurate and transmit them wirelessly with low latency.

[4] Furthermore, a study conducted by Shenoy et al. (2019) developed a wireless stethoscope with RF

technology that could transmit heart sounds wirelessly to a receiver, which was connected to a computer. The study found that the wireless stethoscope was able to capture heart sounds accurately and transmit them wirelessly with high fidelity.

[5] This paper provides an in-depth review of electronic and digital stethoscopes with output transmission capabilities, including their features, advantages, and limitations. The authors also discuss the potential impact of these stethoscopes on clinical practice and the challenges associated with their widespread adoption.

[6] The development of wireless stethoscopes using Bluetooth technology has also been the subject of several research studies. A study by Mills et al. (2017) developed a wireless digital stethoscope that used Bluetooth technology to transmit heart sounds wirelessly to a smartphone. The study found that the wireless stethoscope was able to capture heart sounds accurately and transmit them wirelessly over a distance of up to 10 meters.

[7] In the study conducted by Høyte et al. (2005), the authors compared the effectiveness of electronic sensor- based stethoscopes and traditional acoustic stethoscopes in training medical students for cardiac auscultation. The study found that electronic sensor-based stethoscopes were more effective than traditional acoustic stethoscopes in detecting heart sounds and murmurs, as well as in teaching cardiac auscultation skills to medical students.

[8] Another study by Berndtsson et al. (2018) examined the use of electronic stethoscopes in improving the accuracy of heart sound auscultation. The study found that electronic stethoscopes had higher accuracy in detecting heart sounds than traditional stethoscopes. The study also showed that medical students were able to improve their auscultation skills using electronic stethoscopes.

[9] In addition, a study by Sivakumar et al. (2020) examined the use of electronic stethoscopes in remote patient monitoring. The study found that electronic stethoscopes were effective in transmitting heart sounds wirelessly to healthcare providers, allowing for remote monitoring of patients with heart disease.

III. METHODOLOGY

Systole and diastole are two phases of the cardiac cycle, which is the sequence of events that occur during one heartbeat. During each cardiac cycle, the heart undergoes a series of mechanical and electrical events that result in the pumping of blood throughout the body. The frequency of systole and diastole heart sounds is determined by the physical characteristics of the heart valves and the surrounding tissues. The "lub" sound occurs during the isovolumic contraction phase of systole, when the mitral and tricuspid valves close, and the "dub" sound occurs during the isovolumic relaxation phase of diastole when the aortic and pulmonary valves close. The frequency of the "lub" sound is typically around 20 to 30 Hz, while the frequency of the "dub" sound is around 50 to 60 Hz. However, the exact frequency of the heart sounds can vary depending on a variety of factors, such as the age and physical condition of the individual, the position of the stethoscope on the chest, and the presence of any underlying heart conditions. Heart sounds and murmurs usually have a moderately low intensity and a bandwidth of 100-1000Hz.

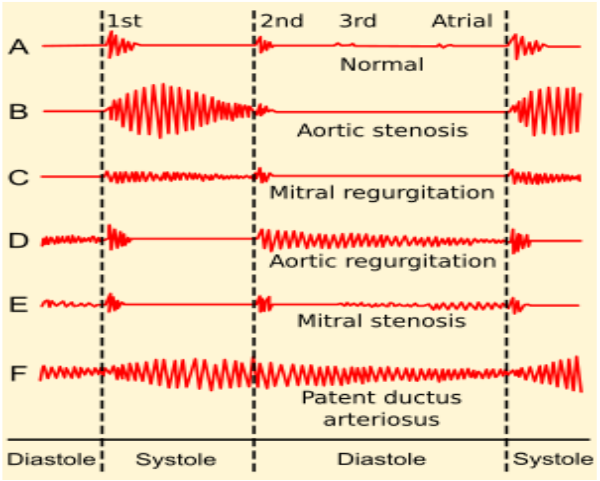


Figure No. 1 Image Source: Wikipedia

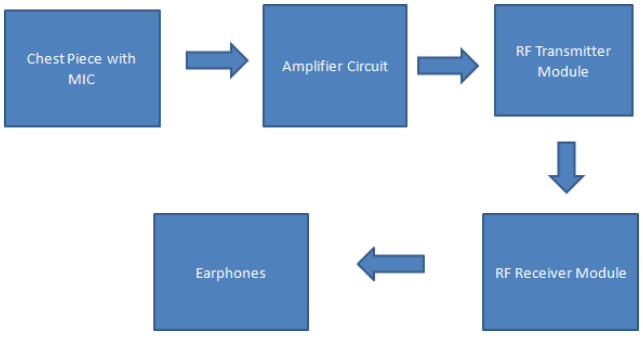
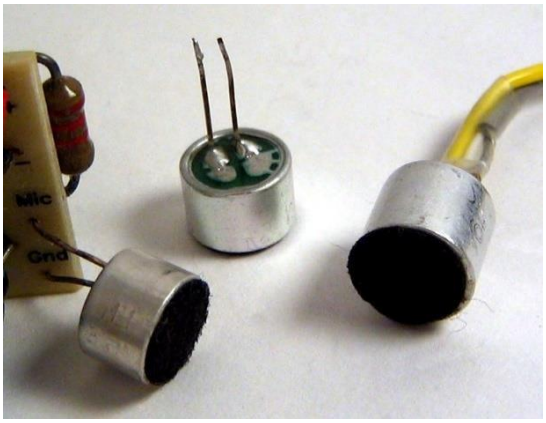


Fig no. 2. Block Diagram

The principle of operation: Heart sounds are captured via a chest piece consisting f the classic stethoscope diaphragm and tubing, in addition to a microphone. As these signals are low-power, they are first amplified before sending it to the receiver module. Then data is sent and received using a specific RF protocol and is modulated onto a carrier frequency that is transmitted through an antenna. The received signal is filtered, amplified, and demodulated to recover the original data, which is then processed by a microcontroller or microprocessor. The GND pin provides a reference point for the electrical current flowing through the module. The resulting heart sounds can be with the help of the earpieces at the receiving circuit.

IV. SENSORANDAMPLIFIER

Sensors are devices that detect changes or variations in a physical quantity and convert them into a signal that can be measured and analyzed.Whereas, Amplifiers are devices that increase the amplitude (or strength) of an electrical signal. They are used to amplify signals from sensors so that they can be accurately measured and analyzed.It is possible to incorporate a variety of different types of sensors into the chest piece of the stethoscope for the initial stage of signal acquisition. These sensors are used to convert heart sounds into electrical signals. In audio recording, microphones and accelerometers are the most commonly used sensors. A microphone such as shown in Fig.2is ideal for this task. Its output is fed into the signal amplification circuit.



.

Figure No. 3
Image Source:Indiamart

It consists of a transistor, which amplifies the low signal from the condenser microphone to the line level and thereby enhances the signal-to-noise ratio. This is followed by the rf transmitter circuit which helps receive the signalat the other end.A condenser microphone is secured at the end of the stethoscope tube, to pick up sound signals. Its placement helps to lessen the noise from the acquired signal. The output is changed into electrical variations, through the rf circuit which uses a BC547 transistor which is used for amplification in the RF circuit. The set frequency of 1.08 Hz at both ends of the transmitter-receiver circuit. To make certain maximum sensitivity and minimize external noise, the condenser microphone can be halted in an appropriate enclosure.

V. RADIO FREQUENCY MODULE

A radio frequency (RF) receiver and transmitter are electronic devices that are used to send and receive signals over radio frequencies. The 3-pin radio frequency (RF) module works by transmitting and receiving data wirelessly using radio waves. The module consists of three pins for power, ground, and data transmission.

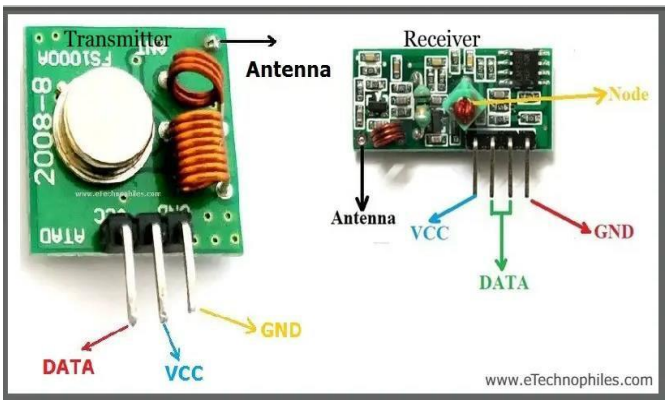


Figure No. 4
Image Source: eTechnophiles

The VCC pin is connected to a power source, typically a battery or a DC power supply. The voltage required by the module is usually in the range of 3-5 volts DC.The DATA pin is used to send and receive data wirelessly. The data is usually sent using a specific RF protocol, such as Amplitude Shift Keying (ASK) or Frequency Shift Keying (FSK) modulation. The data is encoded into a digital signal, which is then modulated onto a carrier frequency within the module's operating frequency range.

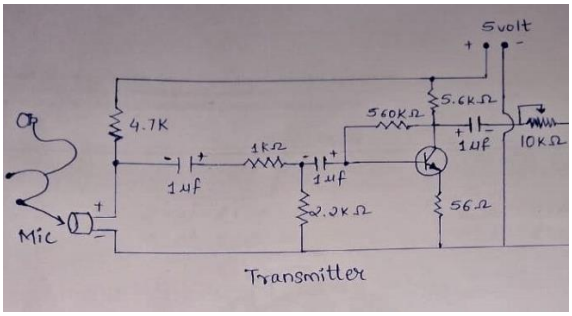


Figure No.5

The modulated signal is then transmitted through an antenna, which radiates the signal as electromagnetic waves in the air. The range of the transmission depends on the output power of the module, the antenna design, and the environment. The receiver module receives the signal through its antenna and demodulates the signal to recover the original data. The received signal is filtered and amplified before demodulation to improve the signal-to- noise ratio. Once the data is demodulated, it is processed by the microcontroller or microprocessor connected to the DATA pin. The data can be used to control various devices or to perform other functions, depending on the specific application. The GND pin is connected to the circuit's ground, providing a reference point for the electrical current flowing through the module.

VIII. RESULTSANDDISCUSSIONS

The completion of a wireless stethoscope using RF technology results in a device that eliminates the need for wires and allows medical professionals to move around freely while conducting auscultation. The RF technology used in the device would enable the transmission of heart sounds wirelessly to a receiver where they can be analyzed, recorded, and played back as needed.

This technology promotes interactive learning, enabling students to receive real-time feedback and guidance from experienced clinicians, leading to better diagnosis and treatment. The use of this type of stethoscope in medical education can enhance the learning experience and ultimately produce more skilled and knowledgeable medical professionals.

One of the main benefits of using an RF wireless stethoscope is that it reduces the noise that can occur due to the rubbing of wires against clothing or other objects, thus improving the accuracy of heart sound detection. Additionally, the wireless nature of the device makes it more convenient and easier to use. Moreover, the use of RF technology in a wireless stethoscope has the potential to enable remote patient monitoring, as the heart sounds can be transmitted wirelessly to healthcare providers who are not physically present with the patient. This can be particularly beneficial in rural or remote areas where access to healthcare is limited.

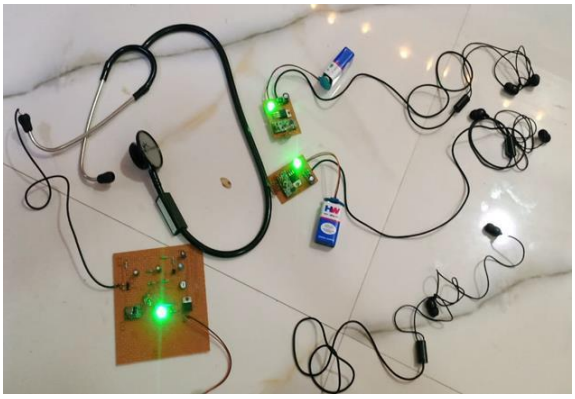


Figure No. 6

IX. APPLICATIONANDFUTURESCOPE

This innovative device not only enhances the quality of patient care but also serves as a valuable teaching aid for medical students. With the ability to simultaneously transmit auscultatory sounds to multiple listeners, medical students can gain a deeper understanding of the sounds and their interpretation. Moreover, this stethoscope can also be used in patient care, particularly in situations where multiple medical professionals need to listen to a patient's sounds simultaneously, such as during a surgical procedure. It can improve communication among the medical team, leading to better diagnosis and treatment. The stethoscope that can transmit its signal to multiple output pieces and be used as a teaching aid for medical students has tremendous potential for future development and implementation. In the near future, it may be possible to integrate artificial intelligence (AI) into this stethoscope technology. AI can analyze the sounds and provide automated feedback to students, helping them to identify subtle differences in sounds that might be missed by the human ear. Collaboration with medical schools could be another future scope. The stethoscope technology could be used to create a standardized curriculum that can be used by medical schools worldwide, providing a consistent learning experience for medical students. Finally, the stethoscope technology can be integrated with telemedicine. Remote medical professionals can use the technology to listen to patients' sounds and provide feedback to the on-site medical team. This would be particularly useful in remote areas where access to medical professionals is limited.

X. CONCLUSION

In conclusion, the project possesses a significant step towards improving medical education and healthcare delivery. The stethoscope, which transmits heart sounds wirelessly to a receiver, has the potential to revolutionize how medical students learn auscultation and diagnose heart conditions. The project has shown that the benefits of this technology for medical students are numerous, including remote learning, reduced risk of infection transmission, and improved group learning. Additionally, the wireless stethoscope can be used by healthcare providers to monitor patients remotely, which is particularly relevant in the context of the COVID-19 pandemic. The project has also highlighted the challenges associated with the development of this technology, including ensuring the accuracy and reliability of the wireless transmission. However, with further research and development, the wireless stethoscope with RF technology can contribute to improved healthcare access and outcomes, particularly in remote or underserved areas. Overall, the project for developing a wireless stethoscope with RF technology is a promising advancement in the field of medical education and healthcare delivery, and it has the potential to make a significant impact on the way healthcare is delivered globally.

XI. REFERENCES

[1] Ashraf, H., Ullah, M. A., Ullah, S., Raza, B., &Ullah, S. (2017). A novel wireless stethoscope system for heart sound monitoring on android mobile phone using Bluetooth. International Journal of Medical Informatics, 97, 235-242.

[2] Da Costa, D. A., Ferreira, J., Santos, C., & Silva, H. (2018). A Bluetooth low energy wireless stethoscope for long-term heart sound monitoring. Sensors, 18(3), 771.

[3] Jaiswal, S., Raman, B., & Raman, R. (2020). Wireless stethoscope using Bluetooth low energy technology. Journal of Medical Systems, 44(7), 125.

[4] Shenoy, P. D., Divakar, B. P., &Pai, R. K. (2019). Design and development of a wireless stethoscope for cardiovascular signal acquisition. Journal of Medical Engineering & Technology, 43(5), 273-283.

[5] Gupta, S., Mittal, P., & Jain, S. (2020). A review of stethoscopes with electronic and digital capabilities. Journal of Medical Engineering & Technology, 44(7), 398-404. Doi: 10.1080/03091902.2020.1779392

[6] Mills, G. A., Nketia, T. A., Oppong, I. A., & Kaufmann, E. E. (2017). Wireless digital stethoscope using Bluetooth technology. International Journal of Computer Science and Mobile Computing, 6(7), 140-147.

[7] Høyte, H., Jensen, T., &Gjesdal, K. (2005). Cardiac auscultation training of medical students: a comparison of electronic sensor-based and acoustic stethoscopes. BMC Medical Education, 5(1), 14.

[8] Berndtsson, M., Hedman, L., Sandberg, J., & Sundberg, C. (2018). Accuracy of electronic stethoscopes in the diagnosis of heart sounds: a systematic review. BMC Cardiovascular Disorders, 18(1), 203.

[9] Sivakumar, V., Dharmar, M., & Holmes, J. (2020). Remote auscultation using an electronic stethoscope for telemedicine applications: design and evaluation. Journal of Medical Systems, 44(10), 180.

Guidelines for Manuscript Submission

- Paper in IEEE two column format can be submitted for possible publication in the "Applied Engineering and Technologies" Journal of VIT. The template for the IEEE two column format is available at : http://www.vit.edu.in in Instructions to authors link
- The paper should be submitted in MS word format to editor.aet@vit.edu.in
- Authors of the accepted papers have to sign the copyright form which is available at: http://www.vit.edu.in Instructions to authors link
- For more information and queries refer http://www.vit.edu.in or email at: editor.aet@vit.edu.in

CONTENTS

Paper Id	Title	Page No.
AET016	Blind Stick Using Raspberry Pi	83
AET017	Digimart – A Blockchain Based Ecommerce	90
AET018	Agriculture Robotic Machine	95
AET019	Collab Pro –A Project Repository	100
AET020	Auto Categorization of reels (Quick Learn)	106
AET021	Density based Traffic Signal using Image Processing	110
AET022	IR Based Wireless Underwater Communication System	115
AET023	Smart Toll Booth System	119
AET024	AI Pose Estimation	123
AET025	B.C.S Scorer	130
AET026	Heat Vision Based Light Automation	134
AET027	An Application of IoT in Sports: Smart Monitoring System for Football Players	138
AET028	Face Recognition Based Attendance System	143
AET029	Performance Analysis of Jamming techniques on GPS Signals	151
AET030	AeroFleet: Telematic System with Air Purification, Driver Health Monitoring and Fleet Management Service	153
AET031	Brewit	160
AET032	Early Diabetes Detection	166
AET033	Smart Agro System	177
AET034	Pesticide Sprinkling Drone	186
AET035	Web Based V-Ideas	191
AET036	S-MART	197
AET037	Vriddhiyaan- Smart Shopping Cart using Raspberry Pi systems	204
AET038	Advanced Vehicle Synchronization	208
AET039	Smart Walking Stick for Blind & Elderly People	213
AET040	OxySen Pond	217
AET041	Unmanned Aerial Vehicle	223
AET042	Multiple diseases Prediction Using Machine Learning	228
AET043	Diabetes Prediction using Machine Learning Techniques	231
AET044	To Develop a Watermarking Technique for Medical Data	236
AET045	3D Printed Prosthetic Arm Using EMG	241
AET046	Real-Time Heart Sound Transmission to Multiple Earpieces	248