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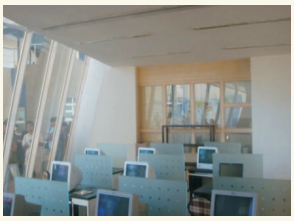

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VIT

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 520 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 20 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 PhD. centre in Computer Engineering.

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Foreword

Dear Readers,

Vidyalankar Institute of Technology's technical journal titled 'Applied Engineering and Technologies' aims to facilitate a forum wherein intellectual exchange of ideas is encouraged among participants from academic, industrial and research backgrounds, who will get an opportunity to effectively present and share their research initiatives. We are proud to present the seventh issue of the technical journal. 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 theme of the journal focuses on applications in the areas of Electronics, Electronics and Communication, Information Technology, Computers and Bio-Medical Engineering. This year's issue includes 48 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

GetPlaced - Seamless Placement Application

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Abstract - Training and Placement Cell is an important part of any educational institute, in which most of the work till now is being done manually. The training and placement officer has to inform around thousands of students about every single training and placement related activity. So, to make the placement process easy and effective for the training and placement department as well as the students, a Mobile application can be developed.

This application can help the placement officers to provide the details of upcoming companies. The students will be alerted via a notification. Once the recruitment process is completed, a list of placed students will be available in the application for the administrator. It would be easy for the students to view the details of those who have been recruited.

Keywords — TPO(Training and placement officer), UI(User Interface), UX(User Experience).

I. INTRODUCTION

The use of smartphones, internet and the World Wide Web help the user to gain information on a particular action. This app would help the user to manage the placement process. The earlier system was not computerized and all the transactions in the earlier system was done manually by maintaining a record. It will take much time for the placement officer to collect and approve all the student details. There is no proper communication between the students and the placement officer. So, with the help of this application the students can easily communicate with the placement officer.

The training and placement cell plays an important role in improving the overall performance of the student. The main objective of the training and placement department is to manage the details of the placement, student details, overall academic details of the students, and their technical skills. Once the details are stored in the database, it would be easy for the training and placement officer to filter the students based on the criteria of the campus drive. The overall system of the training and placement officer is managed by the administrator.

This application can be accessed by the student throughout the organization with the proper login credentials. This application can also be used by the training and placement officer to maintain all the records of the students as well as the activities related to the training and placement cell. The students need to register themselves with college email for the placement through this application. Once the registration gets successful, he can log in with college email ID and password. Notifications will be sent to the students about the upcoming campus drive and, they can access the information about the previous placement.

II. EXISTING SYSTEM FOR PLACEMENT

In the existing system every work is done manually, and student details are maintained in excel sheets. Maintaining and managing a large amount of data is a difficult task. The existing portal is inconvenient for the students to access and keep updates about the placement activities.
It fails to provide proper analytics, data of students and placement stats to the college TPO. It also fails to check the eligibility criteria and dream logic when the students apply to a particular job and has to be checked by the placement team manually. The UI and UX of the system is not user-friendly and confusing. So, to overcome the drawbacks of existing system the proposed system is developed.

III. OBJECTIVES

The main goal of this project is to provide a bridge of communication between the students, college and companies so that they can get together and do placement activities seamlessly that is beneficial for all the stakeholders.
The features included in the proposed system are:

- It provides an easy way for the training and placement team to post information about campus drives, view analytics, export students data and placement data to excel files for their records.
- This system can save time and efforts of the administrator.
- Less manual work as most of the things would be automated.
- Seamless Application Tracking.
- Apply for jobs and view notices in a convenient way on the mobile app.
- Automatic eligibility criteria checking while applying for job.

IV. SYSTEM ARCHITECTURE

The basic system architecture of the project includes four dashboards for different types of users which includes:

1. Student Dashboard
2. College DashBoard
3. Company Dashboard
4. Admin Dashboard

All the dashboard mentioned above, contains specific features proposed in the system required for all the stakeholders.

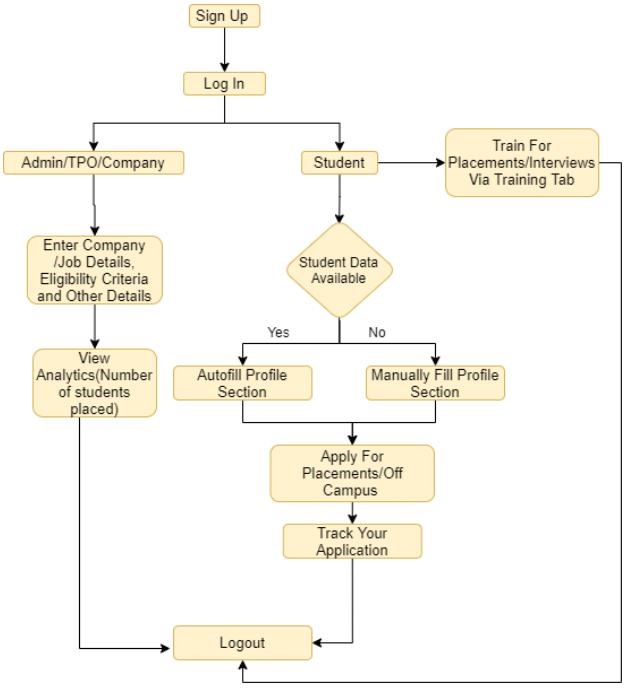

Fig. 1: System Architecture Diagram

In any digital applications there is an admin to handleall the backend. Similarly in this system we have the admin with certain administrartive rights like, creating colleges and companies alongwith the accounts of their respective administrative teams handelling there particular dashboards.

V. PROPOSED SYSTEM

1. Student Dashboard

- Signup-Student can register themselves on our application by filling all the personal and academic details using a valid Email ID or an Email ID provided by college.
- Login-After signing up students need to verify their accounts by the verification link mailed on their valid email ids for the first time when they tries to login with their credentials. After the verification process students can start using their student dashboard seamlessly.
- Student eligible for placements will be able to see companies coming in college campus placements and can apply for the same with ease by reading the description of job profile provided by companies.
- While applying for the job application automatically checks whether the student is eligible for that particular job or not. Application also checks for dream company logic which make sure if the student is already placed for a particular company or not if he/she is placed for a higher package than the job he/she is currently applying for then the application doesn't allow the student to apply for that job and only allows them to apply for the higher salary job.
- Student Dashboard has notice section in drawer where student is able to read notices posted by the college, this will keep students up-to-date with the companies they are interested in.
- Student Dashboard also has status section where students can track their application status of the job they have applied for.

2. College DashBoard

- Training and placement teams can login into application using the credentials provided by the administrator of the application to access the college dashboard.
- Colleges will be able to see the placement analytics i.e. number of students registered, number of students having job offers, branch and company wise placements in the form of pie charts.
- Colleges can post notices from their dashboard reading placement activities.
- Colleges can see students profile registered for placements along with the statuses of their job applications.
- Colleges can also export students data and placement data to excel files for their records.

3. Company Dashboard

- Company's recruitment team can login into application using the credentials provided by the adminstrator of the application to access the company dashboard.
- Company administratives can create and post jobs for a particular college providing required information like job description, salary package and eligibility requirements.
- They can view student's profile and update the status of student's job application as student progresses through different rounds and eventually either accept or reject the application.

4. Admin Dashboard

- Admin has special administrative rights like, creating colleges and companies along with the accounts of their respective administrative teams handling their particular dashboards.
- Admin can view the profiles of all the users including college, company and students registered on the application.
- While creating college, college can specify custom salary ranges for the feature of dream company logic according to their requirements.

VI. SCREENSHOTS OF PROPOSED SYSTEM

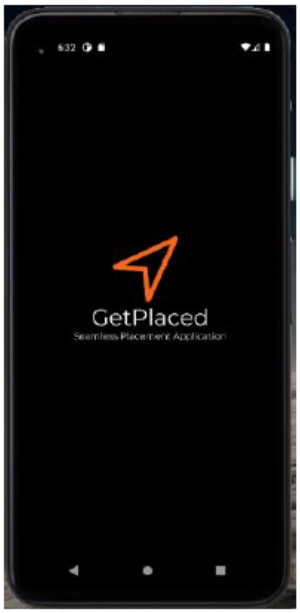

Fig. 2: Splash Screen

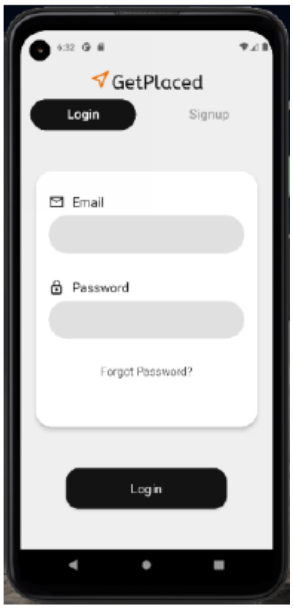

Fig. 3: Login

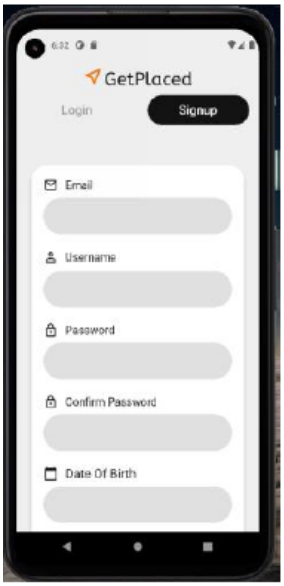

Fig. 4: Signup

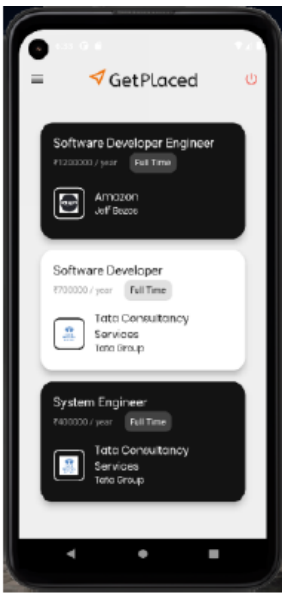

Fig. 5: Student Dashboard

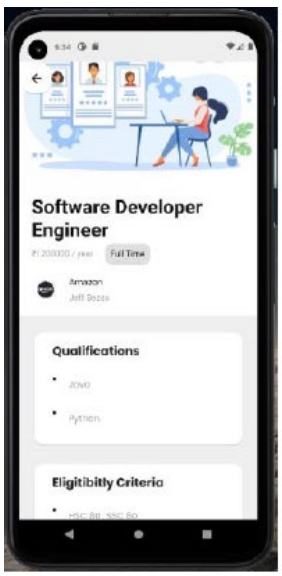

Fig. 6: Job Description

Fig. 7: App Drawer

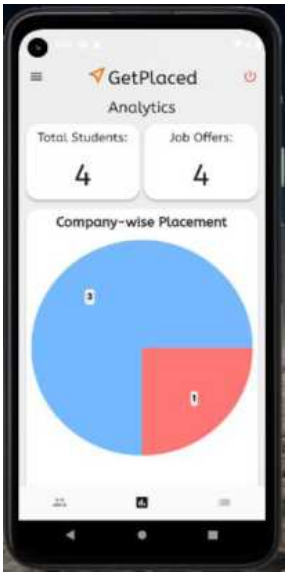

Fig. 8: College Analytics (College Dashboard)

Fig. 9: Placement Data

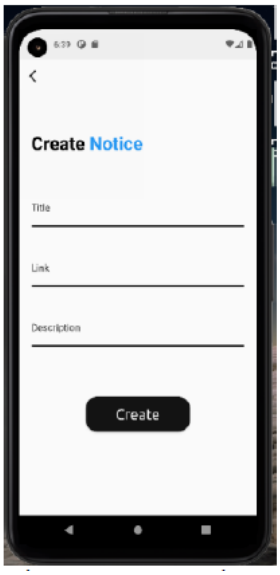

Fig. 10: Create Notice

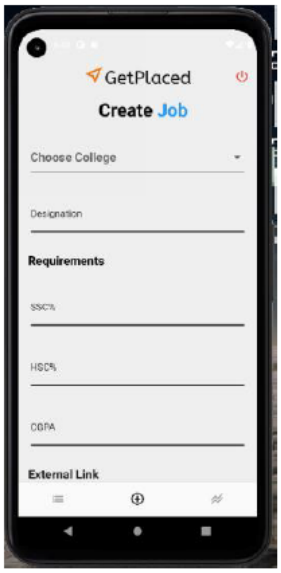

Fig. 11: Create Job

Fig. 12: Job Profiles (Company Dashboard)

Fig. 13: Candidate Status

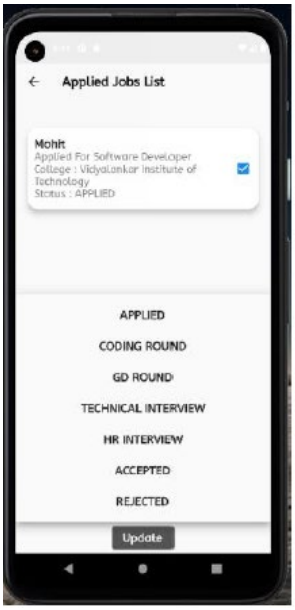

Fig. 14: Updating Status

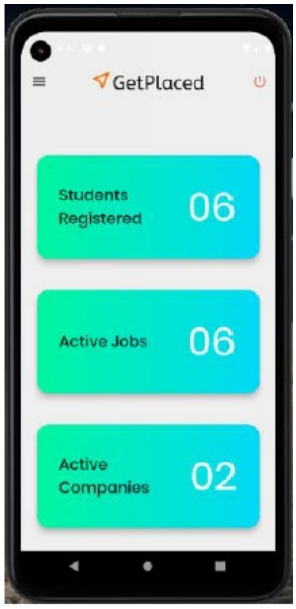

Fig. 15: Admin Dashboard

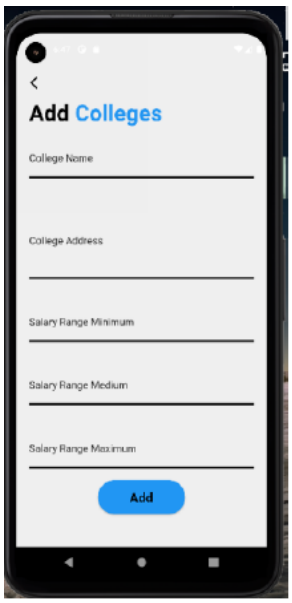

Fig. 15: Creating College

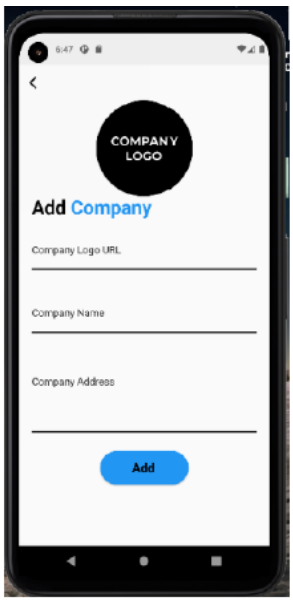

Fig. 16: Creating Company

ACKNOWLEDGMENT

We would like to take the opportunity to thank and express deep sense of gratitude to our Guide Prof. Avinash Shrivas, Department of Computer Engineering, VIT for providing his time and knowledge for our project and giving us the opportunity to implement our ideas. We greatly appreciate his prompt and enthusiastic response to our requests for comments, positive feedback, valuable advice and constructive suggestion for the correction, modification and improvement which helped towards the completion of the project.

We express our sincere thanks to Dr. Sachin Bojewar, Head of Department of Computer Engineering, VIT for his encouragement and help for the project.

We would also like to express our sincere gratitude to the Department of Computer Engineering for giving this opportunity and continuously encouraging us to learn and experience the practicality in different fields which helped me to perceive this subject.

We look forward to apply the knowledge and experience gained while working on this project, which has given us sought-after skills, to enhance our career. Along with continuing to better our skills set and work on their improvement to work on projects with relevance to human society and marketing need.

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AET 002

Cookbook

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Abstract — Due to busy lifestyles and irregular food habits, many of us have to eat diet food according to ingredient parameters. It is difficult to ask the chef to make a variety of recipes as per the diet plan. Many recipes exist on a number of recipe websites, tempting the chef to prepare in their kitchen without knowing the diet ingredient proportion and side effects. In addition, listing all recipes containing a specific ingredient is still not an easy job. This paper proposes an algorithm for extracting all the recipes' details using web scraping and artificial intelligence for searching recipes containing the intended ingredient. Web scraping retrieves the contents of a web page and forms a database of them. Then it uses AI algorithms to provide the user with the best possible recipe from the acquired dataset of recipes according to the user's profile. A mobile app is developed for users to maintain a healthy life with a variety of dishes.

Index terms – CookBook, mobile application, recipes, recipe recommendation, recipe search.

I. INTRODUCTION

In the fast-paced world of today, there is hardly any time left to be wasted. Cooking might take a significant chunk of that time which can be used for doing some other activities. Also, it takes time to sort the ingredients and find an appropriate recipe which can be followed to cook a meal which may or may not be the best for the user. However, the recipe found may not consider the requirements of the user and is not custom tailored to suit the taste that the user may be accustomed to. Hence, to overcome these limitations, the app CookBook can be used. CookBook is based on web scraping and artificial intelligence to provide a custom recipe as per users' needs. It provides recipes based on the ingredients entered by the user. The recipes provided reduce the time required to search for the recipe. After each recipe is used, a feedback will be taken from the recipe, regarding whether any changes are required within the recipe such as amount of ingredients, spices, etc. If enough feedback is generated then the recipe will automatically suggest the user to make the necessary changes once the said recipe is used again by another or the same user. Users who follow a nutrition plan will also be able to keep track of the calorie intake as each recipe will take into consideration the number of calories set by the user before recommending the recipe to the user. Hence, the users with certain health goals in mind can also use this app to better achieve their goals. Users with the same preferences will be recommended the same recipes and can contribute to the recipes as they will constantly be updated via feedback from the users. The users with the same preferences will be able to form their own communities and can create their own recipes on the app.

Users will be able to create their own profiles and add their own recipes which will be recommended to other users if liked by majority, just like music apps such as Spotify, where users can create a playlist of their own of all the available songs, similarly users will be able to create their own recipe list of their own among the all the available recipes.

The app can also convert the amount of servings. When the user wants to cook for 5 servings but the recipe is for 2 servings then the user will get instructions accordingly to prepare 5 servings of the recipe.

Cookbook is an android application designed to give the users their desired recipes with the click of a button. The objective is to make searching for recipes as easy as possible. A new feed will be generated for the user with a variety of recipes to choose from. According to the ingredients provided by the user, the filtered recipes will be shown by the application thus making the selection of recipes easier and convenient for the user.

Users will be able to create their own profiles and add their own recipes which will be recommended to other users if liked by majority, just like music apps such as Spotify, where users can create a playlist of their own of all the available songs, similarly users will be able to create their own recipelist of their own among the all the available recipes.

II. CONTEXT-BASED RECOMMENDATION ALGORITHM EVALUATION

Artificial Intelligence (AI) has been very successful in creating and predicting cooking playlists for online users based on their data; data received from users' experience using the app such as searching for the recipes they like. There are lots of current technological advancements in AI due to the competition between platform owners such as Spotify, Pandora, and more. In this paper, machine learning algorithms and their individual accuracy for predicting whether a user will like a recipe are explored across 3 different platforms including Weka, SKLearn, and Orange. The algorithms explored include Logistic Regression, Naive Bayes, Sequential Minimal Optimization (SMO), Multilayer Perceptron (Neural Network), Nearest Neighbor, and Random Forest. Random Forest is the most successful algorithm for predicting whether a user will like a song with an accuracy of 84%.

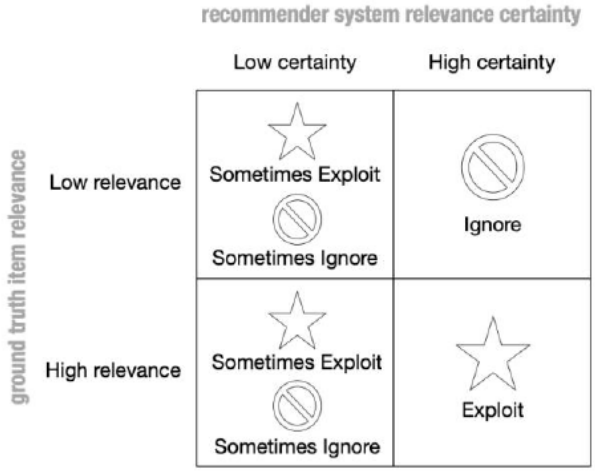
This is higher than the accuracy of 82.72% found by Mungekar using the Random Forest technique and slightly different characteristics of a song [2]. Finally, this paper shows how recipe prediction can be accomplished without any monetary investments, and thus, inspires an idea of what amazing results can be accomplished with full research.

BART MODEL

The system behind the Cookbook customization is called BaRT ("Bandits for Recommendations as Treatments"). The BaRT model has two modes: Exploitation and Exploration.

Exploitation is used when the system uses the information it gathered about you (the user), such as your skips, your favorite recipes etc.. Exploration instead, is used when the system suggests you recipes based on all other information that the system can use, e.g. what other users have used to cook , what cooklist have been built, what is trending, what was published etc.

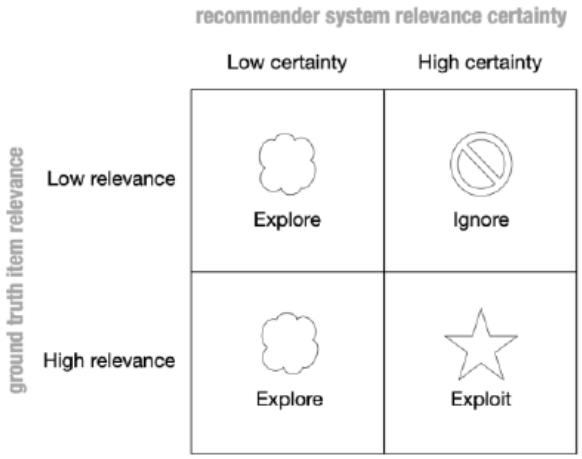
The Exploitation mode is the conventional mode that recommender systems based on collaborative-filtering use. In the case that there exists enough historical data about the users and what users clicked start cooking, this mode is perfect. The exploitation mode uses all the data available about the user and the item. One of the major problems of systems only based on Exploitation is the item relevance. If there is barely data about a user or an item (in this case a certain recipe)



(a) Exploitative methods have two modes: exploit or ignore an action.

This is the point where the Bandit Algorithm comes into place and where the second mode steps into the spotlight: **Exploration**. Since the Exploitation mode does not perform well when there is uncertainty (not enough data), the exploration mode covers exactly these cases. "Exploration recommends content with uncertain predicted user engagement for the purpose of gathering more information. The importance of exploration has been recognized in recent years, particularly in settings with new users, new items, non-stationary preferences, and attributes." [2]

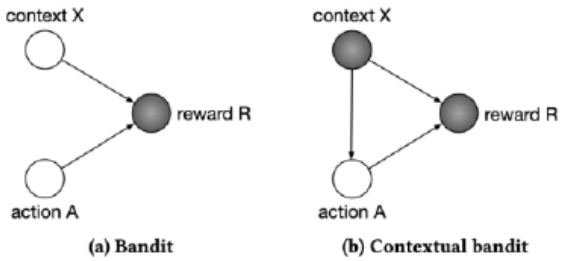
In other words, if a new recipe has not been seen often yet, you need data to verify if the recipe has potential. So, Cookbook's BaRT recommends these recipes via exploration and gathers information for the new recipe. A recipe is considered a positive recommendation after 30 seconds. This means if you see a recipe for less than a half minute, it is counted negatively. If you have seen a recipe for more than 30 seconds, you will get positive feedback for the recommendation.



(b) Bandit methods have three modes: exploit, ignore, or explore an action.

As can be seen in the graph above, when there is low certainty about the relevance of a recipe, the exploration mode is necessary and more helpful than the exploitation mode. The BaRT model is able to "learn and predict satisfaction", which is measured for example in click-through rates and consumption probabilities. It constantly logs, retrains, and learns from its own mistakes. [2]

So, in other words, BaRT is based on Reinforcement learning and tries to get feedback to maximize user satisfaction and correct predicted recommendations. For this the BaRT model uses a multi-armed bandit, that is trained to execute a certain action A for which the probability is the highest to receive a reward R. So, every action A depends on the previous actions and rewards. The "goal of a multi-armed bandit (MAB) is to choose actions that maximize the total sum of rewards"[2]. Conventional MAB ignores their context, such as time of day, device, playlist, user features etc., completely. That's why the Spotify team introduced the contextual multi-armed bandit. It has an eye on contextual information and evaluates this information before it decides to execute an action.



Four elements are crucial for a well-performing contextual bandit: of course the context, the reward model, the training procedure, and the exploitation-exploration policy. [2] " In the reward model exist three parameters: an explanation e (explanation why the item has been chosen), an item j (the recipe), and a context x.where θ denote the coefficients of the logistic regression.and 1_i "represents a one-hot vector of zeros with a single 1 at index" [2

$$r(j,e,x) = \sigma\left(\theta_{global} + \theta_j^T 1_j + \theta_e^T 1e + \theta_x^T x\right),$$

Now this reward function has an impact on the action. In a certain context x the user u performs the optimal action wit, where θ denote the coefficients of the logistic regression and 1_i "represents a one-hot vector of zeros with a single 1 at index" [2i]on has an impact on the action. In a certain context x the user u performs the optimal action with

$(j^*, e^*) = \arg_{j,\,e} \max r(j, e, x)$

For the exploration approach, the authors use epsilon-greedy. This "gives equal probability mass to all non-optimal items in the validity set f (e,x) and (1− ε) additional mass to the optimal action (j∗, e∗)." [2] The policy is set to "either exploit or explore the item and explanation simultaneously" [2].

$$\pi_c^{item}\left(j|x,e\right) = \begin{cases} (1-\varepsilon) + \dfrac{\varepsilon}{|f(e,u)|}, & \text{if } j = j^*, j \in f(e,x) \\ \dfrac{\in}{|f(e,u)|}, & \text{if } j \neq j^*, j \in f(e,x) \\ 0, & \text{otherwise} \end{cases}$$

Where $j^* = \arg_{j1}$ maximum $r(j_1, e, x)$

The training procedure itself is nothing special. BaRT "retrains periodically in batch mode. " [2]

Collaborative filtering works fine for users and recipes that have already uploaded a recipe. But what if a chef is completely new and did not even have any recipe yet? This type is called the cold-start problem. The recommendation system fails for new and unpopular recipes.

COLD START PROBLEM

Due to the high number of recommender algorithms available as well as system type and characteristics, many strategies to mitigate the cold-start problem have been developed. The main approach is to rely on hybrid recommenders, in order to mitigate the disadvantages of one category or model by combining it with another.[9][10][11]

All three categories of cold-start (new community, new item, and new user) have in common the lack of user interactions and present some commonalities in the strategies available to address them.

A common strategy when dealing with new items is to couple a collaborative filtering [12]

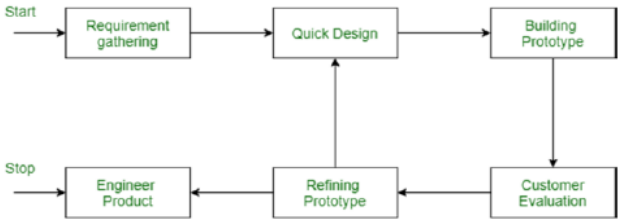
recommender, for warm items, with a content-based filtering [13] recommender, for cold-items. While the two algorithms can be combined in different ways, the main drawback of this method is related to the poor recommendation quality often exhibited by content-based recommenders in scenarios where it is difficult to provide a comprehensive description of the item characteristics. [4]

In case of new users, if no demographic feature is present or their quality is too poor, a common strategy is to offer them non-personalized recommendations. This means that they could be recommended simply the most popular items either globally or for their specific geographical region or language.

III. METHODOLOGY

Android Studio[15] was selected as the IDE for this project as it has all the required tools for developing android applications. Database was implemented using Firebase[14] as the data needed to have flexible format and would be changed as per requirement in the future.To display the recipes, first a simple home screen was designed with cards for individual recipes. Then the side navigation panel was added for additional features.Recipe card was designed to view each recipe in the list format. This would display the ingredients along with the recipe.Google sign in[14] was implemented for seamless login. This is implemented using firestores authentication services.Whenever a new user first signs in using a google account, information such as the users' location, preferred type of cuisine, some favorite ingredients are taken from the user and accordingly few recipes are recommended to the user.Some cards according to the feeling of the users are also added which contain recipes related to that mood.A profile page is created for the user. This page contains the liked recipe list i.e. the cooklist, history list and the user info tab. When the recipe is viewed, the recipe is stored in the history of the profile page. Whenever a user likes the recipe, it is stored in the cooklist. The data from cooklist and history can later be used to recommend recipes to the user.For searching recipes, a search engine was implemented, later the feature of searching the recipe according to ingredients was added. The search engine can take names of the recipes or the ingredients to search a specific recipe overview page was designed in which all the information about the recipe is shown, such as ingredients required, steps for cooking, time required, difficulty level, further the Start-cooking screen was designed which classified the method for cooking, to make it easier to follow along with the recipes, the feature of text-to-speech was added. Also, the feature to translate the recipe was added. Recipes would also show the vegetarian / non-vegetarian icons so that they can easily be classified. Recipes are rated and accordingly recommended to the users in the search engine.

IV. ANALYSIS



The prototype model requires that before carrying out the development of actual software, a working prototype of the system should be built. A prototype is a toy implementation of the system. A prototype usually turns out to be a very crude version of the actual system, possibly exhibiting limited functional capabilities, low reliability, and inefficient performance as compared to the actual software. In many instances, the client only has a general view of what is expected from the software product. In such a scenario where there is an absence of detailed information regarding the input to the system, the processing needs, and the output requirement, the prototyping model may be employed.

Steps:

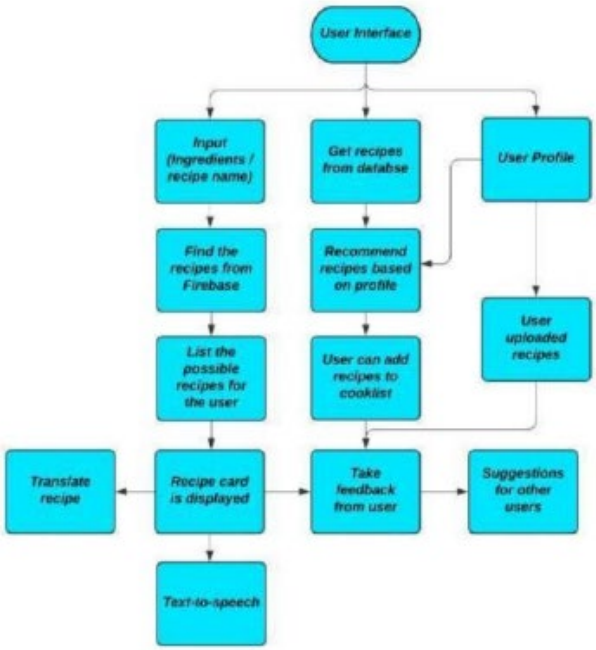
1. Requirement Gathering and Analyst
2. Quick Decision
3. Build a Prototype
4. Assessment or User Evaluation
5. Prototype Refinement
6. Engineer Product

The Prototyping Model should be used when the requirements of the product are not clearly understood or are unstable. It can also be used if requirements are changing quickly. This model can be successfully used for developing user interfaces, high technology software-intensive systems, and systems with complex algorithms and interfaces. It is also a very good choice to demonstrate the technical feasibility of the product.

Feasibility study: The purpose of this feasibility research report was to address the problem of finding recipes according to the ingredients. As applications of this type are not abundant on online application stores, this project was undertaken as the idea was unique. The tools used are freeware and do not incur any additional costs.

Cost analysis: The IDE (Android Studio)[15] used for developing this application is freeware. Also the online database service (Firebase)[14] was used without premium membership and was used as a freeware. Additional references and information was gathered from videos on online platforms and developer forums for solving the problems.

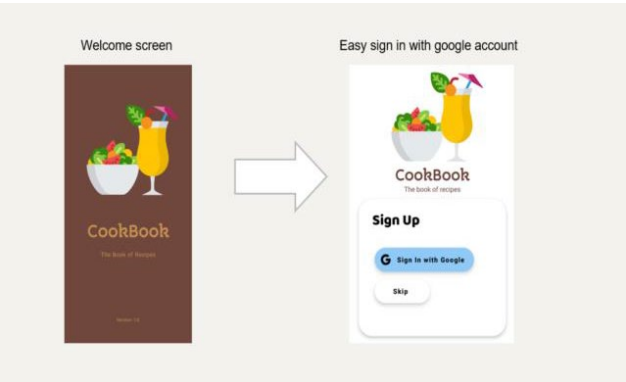
V. DESIGN

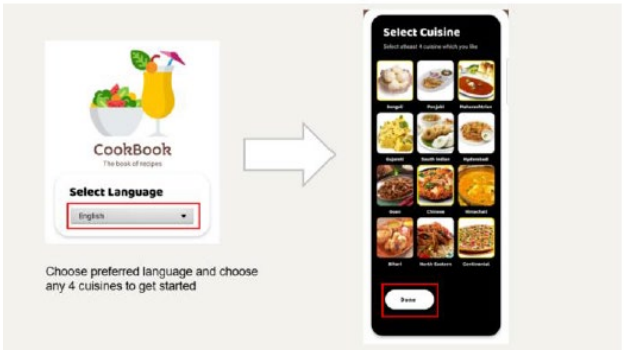


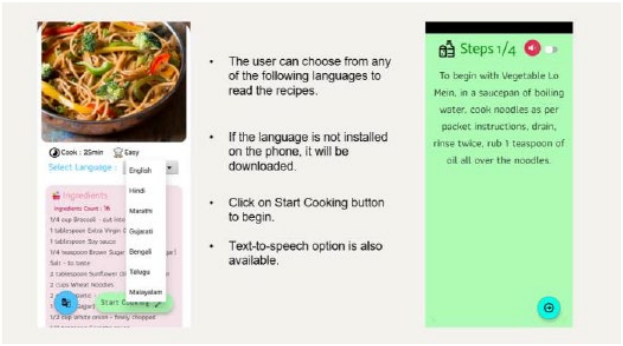
Android Studio[15] was selected as the IDE for this project as it has all the required tools for developing android applications. The data was transformed from csv to json[25] file for uploading on Firebase. Firebase was used because it uses NoSQL and this type of database is suitable for making changes in the future[16][17][19][20].
Home screen was added as an empty activity and designed to open with animation. A side bar was added which will open when swiped from left or clicking the hamburger icon on the home screen.
Side bar contains options of Home, cooklist, profile, logout, about and share.Home redirects back to the home screen. Home screen displays recipes in the form of cards and can be expanded into individual cards. Some cards according to the feeling of the users are also added which contain recipes related to that mood.
Recipe information such as time to prepare, difficulty and whether the dish is vegetarian or non vegetarian is displayed. Recipes have a like button on the right side. Clicking this will add the recipe to the cook list which can be viewed later. Recipes can be searched using a search bar at the top of the home screen. Search can be done via searching for the recipe's name or by listing the ingredients. Option to include / exclude ingredients is given. Once a particular recipe card is clicked, its details will be presented including the ingredient list and the actual recipe. The option to view the recipe in different languages is provided[21][22][23]. The option for converting text-to-speech is also provided[18]. Users can login via google sign in implemented via Firebase's authentication service[14].

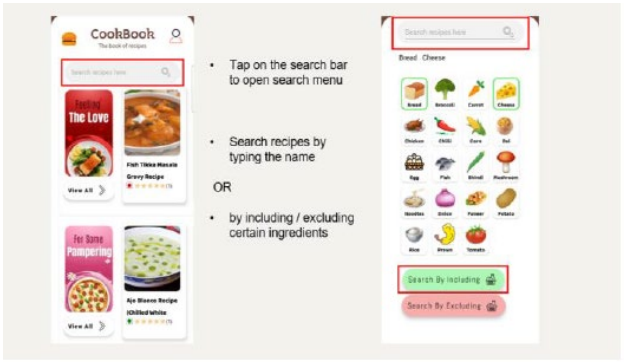
This will enable the users to keep track of their cooklist and searched recipes and will help in recommendation of recipes. Profile can be accessed from the side navbar and contains information of cooklist and search history which can be deleted as well. Whenever a new user first signs in using a google account, information such as the users' location, preferred type of cuisine, some favorite ingredients are taken from the user and accordingly few recipes are recommended to the user. For project management we are using Github[24].
This will enable the users to keep track of their cooklist and searched recipes and will help in recommendation of recipes. Profile can be accessed from the side navbar and contains information of cooklist and search history which can be deleted as well. Whenever a new user first signs in using a google account, information such as the users' location, preferred type of cuisine, some favorite ingredients are taken from the user and accordingly few recipes are recommended to the user. For project management we are using Github[24].

VI. IMPLEMENTATION



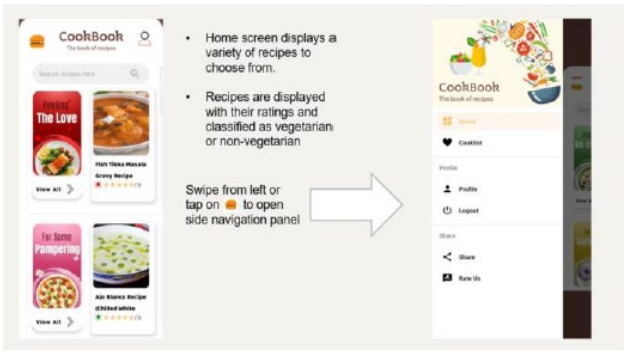






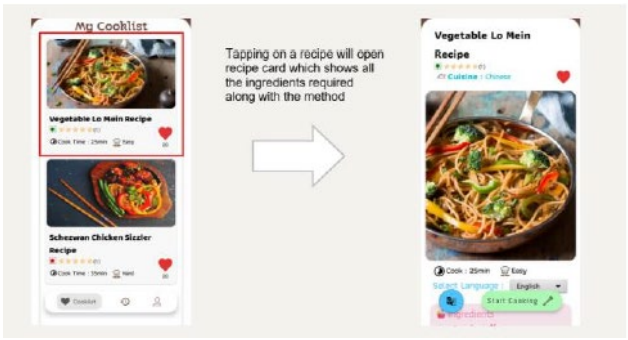
VII. EXISTING SYSTEM

1. There is no option for searching recipes by ingredients. If it is possible then recipes are searched only by name.
2. There is no option to search recipes according to location.
3. Recipes can be viewed only in a single language.
4. Recipes are recommended randomly.
5. Existing systems don't have a system to maintain and evaluate the user data and provide suggestions accordingly.



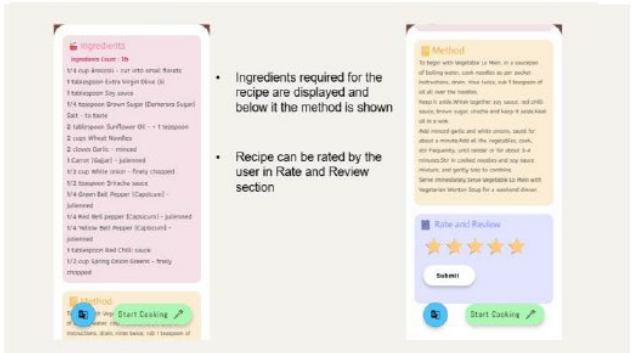
VIII. PROPOSED SYSTEM

1. Searching recipes by ingredients.
2. Recipes can be viewed in multiple languages.
3. Text-to-speech feature is available for the recipes.
4. Giving recommendation to the user according to the cuisines selected.
5. Storing liked recipes in the users' profile and recommending recipes accordingly
6. Recommending recipes according to the location of the user.
7. Taking feedback from the user and adding suggestions to recipes.



IX. ADDITIONAL FEATURES

1. Users will be able to directly take a picture of the ingredients and the app will use AI to detect the ingredients.
2. Taking custom recipes from the user and storing them in the database.
3. Creating a community based on the profiles and recommending recipes accordingly.



X. CONCLUSION

In this paper, we discuss how the Cookbook app is implemented, its working and features. This app will serve recipes to the user according to their profile and liking. Moreover, the user can search recipes according to the location. The user can also search recipes by the ingredients provided, the filtered recipes will be shown by the application thus making the selection of recipes easier and convenient for the user.

This app will allow users to create their own profiles and add their own recipes which will be recommended to other users if liked by majority, just like music apps such as Spotify, where users can create a playlist of their own of

all the available songs, similarly users will be able to create their own recipelist of their own among the all the available recipes.

In this paper, we discuss the BART model and its implementation in various recommendation algorithms.The BaRT model is able to "learn and predict satisfaction", which is measured for example in click-through rates and consumption probabilities. It constantly logs, retrains, and learns from its own mistakes.

Any machine learning algorithm requires a lot of data to work correctly but if there is no or limited data then a cold start problem occurs. We also discuss solutions such as collaborative filtering and content-based filtering to tackle this problem of cold start.

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AET 003

Sarcasm Detector

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Abstract—Sarcasm is a nuanced form of language in which individuals state the opposite of what is implied. Oxford dictionary defines sarcasm as "the use of irony to mock or convey contempt". With this intentional ambiguity, sarcasm detection has always been a challenging task, even for humans.

In recent years, social media sites such as Twitter have gained immense popularity and importance. These sites have evolved into large ecosystems where users express their ideas and opinions uninhibitedly. Companies leverage this unique ecosystem to tap into public opinion on their products or services and to provide real-time customer assistance.

Through this project, we aim to tackle the difficult problem of sarcasm detection. We analyze the nuances in a sentence according to the context it has been used in to evaluate whether a sentence tweeted by the user is sarcastic or not. Hence, to follow a systematic approach, we first theorize the core forms of sarcasm using existing psychological and behavioral studies. Next, we develop computational features to capture these forms of sarcasm. Finally, we combine these features to train a learning algorithm to detect sarcasm.

Index Terms—Sarcasm Detector, RoBERTa, Natural Langugage Processing.

I. INTRODUCTION

Social Media Platform Twitter is a very useful tool in giving your brand a voice and a personality which has led to the rise of product and company reviews on Twitter as everyone is given freedom of speech to portray their thoughts on it. In the previous years, it is gaining traction as a way to keep good communication with users of a product of the company. Companies are starting to use it to keep track of how well their product is doing. But in some cases, they deploy bots to converse with the people rather than employing social media managers, which leads to inappropriate answers to some user questions. The major challenge in such bots is to identify the sarcasm in the user's sentences. This sarcasm hinders the use of bots on social media platforms. Misunderstanding sarcasm to be genuine leads to improper feedback for the company and comes in the way of the growth of the company. The purpose of this project is to overcome the difficulty of understanding sarcasm, for that, we built a sarcasm detector that detects sarcasm in a sentence tweeted by a user according to their tweet's sentence structure and the context of a tweet on what makes a user says something sarcastic. By doing this, the misunderstanding that is caused by misinterpreting the sarcasm in a sentence can be negated and the communication between the company's bots and the users can be improved, leading to better bonds between the user and the company. Since the usage of slang and sarcasm has significantly increased with increasing familiarity of the social media environment, it becomes fundamental to understand sarcasm for smoother conversations and feedback between companies and customers. For those with mental health issues, this project enables them to converse with their friends freely while fully understanding the intention behind their words, leading to better social interactions and inevitably, developing confidence in them.

This project is a prototype for sarcasm detector and is restricted within the same. The main intended audience for our project are the social media management team. The work of the social media management team can be cut by a lot if the sarcasm detection filters out the sarcastic comments and only passes the non-sarcastic comments to a Chat Bot so that they don't have to reply to every single messages sent to them by the Users. The project also targets users who find it difficult to understand sarcasm of people they follow, either due to lack of fluency in the language or due to mental health issues like autism. Not understanding sarcasm leads to misunderstanding what a user wants to say and completely misinterpreting the point they want to convey which in-turn may lead to disputes and frustrations. In some cases, if the reply is controversial, it might create commotion and rage among huge groups of people and offend them.

Sarcasm is a nuanced form of language in which individuals state the opposite of what is implied. Oxford dictionary defines sarcasm as "the use of irony to mock or convey contempt". With this intentional ambiguity, sarcasm detection has always been a challenging task, even for humans. Sarcasm is the major challenge when to comes to understanding Twitter tweets for bots.

The main purpose of this sarcasm detector is to improve the usage of bots to understand the tweets of the users and reduce the work of the social media management team. When bots make mistakes in identifying the intention behind a tweet and reply incorrectly, it builds up more frustration for the users and paints a bad image of the company.

II. LITERATURE SURVEY

Cai et. al [1] have proposed a multi-modal sarcasm detection with hierarchical fusion model. It takes 3 vectors i.e., image, image attribute and text vectors whose weighted average is calculated using modality fusion and sent to classification for results. It collects English tweets with hastags of sarcasm as positive samples and those

without sarcasm such as hashtag like "not sarcasm" to be negative samples. The model is trained using a ResNet which is available online using 80-10- 10 as train-test-development.

Pan et. al [2] have proposed a pre-trained BERT model which encodes a given sequence and the hashtags within it. For image representation in the model, a ResNet is used. Intra-modularity and inter-modality attention has been paid to the model to notice the incongruity between the sentence and the image attached to it. The incongruity is used further to combine and predict whether a tweet is intended to be sarcastic or not. The dataset used is based on the publicly available multimodal sarcasm dataset mentioned in [1].

Dr. Vaidhu G and Sindhu Chandra Sekharan in their work [3], have proposed a model which analyzes the sentence structure by tokenization of data, removal of stop words, stemming and lemmatization and POS tagging to break down the structure of the sentence. For further classifying the tweet, frequency of the terms, Ngram and Word2vec, feature presence has been used.

Ahuja et. al. [4] have performed a comparative study of different sarcasm detection techniques based on behavioral approach and listed some of the common techniques to classify the tweet as a sarcastic one along with some common algorithms such as guassian naïve bayes, extra trees, decision tree, adaboost being used.

Castro et al. [5] propose a new sarcasm dataset, compiled from TV shows. They treat text features, speech features, and video features as three modalities and use SVM as the classifier.

Schifanella et al. [6] first consider both textual and visual features for sarcasm detection and propose two alternative frameworks.

Mishra et al. [7] propose a cognitive NLP system for sentiment and sarcasm classification. They introduce a framework to extract cognitive features from the eye-movement/gaze data automatically. They use CNN to encode both gaze-based and textual features for classification.

III. MODEL PROPOSED

A. General System

1. Collection of Data: Data collection is the process of gathering and measuring information from countless different sources. In order to use the data we collect to develop practical artificial intelligence (AI) and machine learning solutions, it must be collected and stored in a way that makes sense for the business problem at hand.

2. Cleaning the Data: Although, it looks that the data is clean but the data may have some special symbols that have to be eliminated. So, we can use Regular Expression to eliminate special symbols.
3. Feature and label extraction: Here we extract features and labels out of our data. Here we can consider hash tags as the only feature that can be used to determine the sarcastic nature of the sentence.
4. Stemming of features: Stemming is the process of reducing a word to its word stem that affixes to suffixes and prefixes or the roots of words known as a lemma. Stemming is important in natural language understanding (NLU) and natural language processing (NLP).
5. Vectorization of features using TF-IDF Vectorizer: TF-IDF is an abbreviation for Term Frequency-Inverse Document Frequency and is a very common algorithm to transform the text into a meaningful representation of numbers. The technique is widely used to extract features across various NLP applications.
6. Training and testing data: After all the important stuff, it's time to split our data into training and testing chunks.
7. Training and testing the model: We train the model depending on the machine learning algorithm we plan on using

B. Approach Taken by the Project

1. Data collection: The data is to be collected from the Twitter Development platform and it gives infinite amounts of tweets to train the model. Twitter declines the request for accessing the tweets then we used a publicly available multi-modal sarcasm detection dataset mentioned in [1] by Cai et. al. It extracts tweets with images according to hashtags such "#sarcasm" and takes three vectors: image, image attribute and text vector. The only part we take for the dataset are the text vectors to train our model. A survey can also be taken to take sarcastic and non-sarcastic comments and marking them
2. Data Pre-processing: The collected data is first cleaned of noise comments. The data we got is in text format, it has to be converted to a csv format. The text format is converted to csv format. The csv format will contain 2 columns, first one consists of the tweet/comments, and the second columns contains a label that says whether the tweet is sarcastic or not. In this phase, we also convert the emojis to text format which correlates to the type of emoji used. For train data set with remove the tweets to "sarcasm" hashtags to train the model based on the sentence alone rather than finding "#sarcasm in the sentence"
3. Feature Extraction: To improve the performance of the model, we have decided to use pre-trained Transformer models. For this, we used Huggingface library which allows us to use different BERT pre-trained models. The best part of this library is that it allows us to shift from one model to another with just a single line of code change and hence making it easier to try different models and compare each of them. In our case, roBERTa model gave us the best scores. Here we used this for feature extraction purpose from the texts.
4. Sarcasm Detection Methods: First, the hyperparameters are set according to what is mentioned in Pan et. al [2] paper with the difference being in the fact that this model trains only for 1 epoch instead of 8, for faster result calculations. The model used is RoBERTa, which

is an optimized BERT model which modifies key hyperparameters in BERT, including removing BERT's next-sentence pretraining objective, and training with much larger mini-batches and learning rates. Hence it is a bigger model but is more efficient than BERT. The model is made to consider only the textual aspect of the tweets along with the hashtags to understand the context behind it. Simple Transformers Library has been used to code it

5. Calculations of result and accuracy: As our project isn't deployed for any application, so we can't check this model with extrinsic testing. So with used intrinsic testing to determine the F1 score of the model, which came around 92.5%

C. Reason for Usage of RoBERTa

RoBERTa follows two concepts called Masked Language Prediction (MLM) and Next Sentence Prediction for achieving this. MLM is the process where a few words in a sentence are intentionally hidden for the model to predict it. This can be done only by fully grasping the context behind a sentence and predicting the next word correctly. Next Sentence Prediction is the process where the model identifies if two sentences are logically linked together or not. This helps in understanding if the previous sentence is connected to the next, thus enabling the model the understand the logical flow structure of the text. Understanding if two sentences are connected or not can also help in deciding if the previous sentence is a factor that can be considering for understanding context for sarcasm detection.

The model used here is RoBERTa because unlike in BERT model where masking is done at the dataset multiplied 10x at the pre-training stage, which leads to static variations in masking, RoBERTa performs MLM during training phase. In the training phase, every time a sentence gets incorporated into a minibatch, it undergoes MLM hence making the process more dynamic and leading to more variations in the masked sentences. In BERT, because of mere amplification of sentences by multiplying them, the accuracy in understanding the context would be far lower than it would be in RoBERTa.

IV. RESULTS

During our research we came across different machine learning algorithms for finding best way to detect sarcasm in the sentence but none of the algorithms were accurate enough. Using Linear Support Vector Classifier, the accuracy obtained was 90.93% on the training phase and 83.75% on the testing phase. Similarly using Gaussian Naïve Bayes, the accuracy obtained was 78.86% on the training phase and 73.80% on the testing phase Using Logistic Regression we found out that the accuracy on the training phase was 88.16% and 83.08% on the testing phase. While testing Random Forest Classifier, we found out that the training accuracy was a lot better than any of the other models 98.82% but during testing phase it wasn't that great and only got 79.71%. With RoBERTa Model, we found the accuracy during training phase 93.02% while in the testing phase it retained the accuracy, and had an accuracy of 92.50% which made it by far the most suited for detecting sarcasm

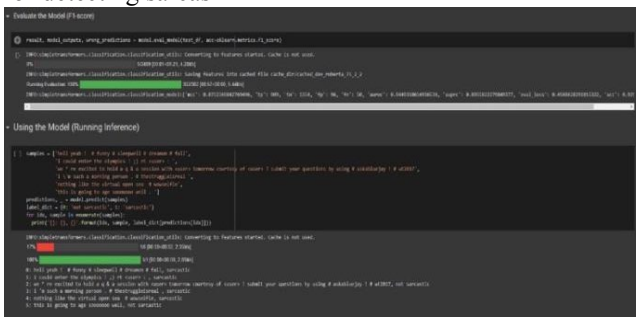

Fig 1. Accuracy of the Model

V. CONCLUSION

Sarcasm is the use of words usually used to either mock or annoy someone, or for humorous purposes. For companies looking forward to enhance effective interaction with their customers, this imposes an extra burden on the social media team to identify these messages and respond appropriately. When customer service representatives fail to detect sarcasm, such gaffes not only upset the already disgruntled customers but also ruin the public images of companies. This system aims to recognize sarcasm in its true form and help companies and customers understand the intended meaning behind tweets.

VI. FUTURE SCOPE

The model we have built only uses textual aspects to identify if a tweet is sarcastic or not, taking the help of hashtags. Slang language is very commonly used among people of this generation. Identification and understanding slang could help in analyzing text better. Along with slang, another form of expressing sarcasm is by using references from pop culture. Combination of slang and references to pop culture makes it difficult for the system to detect sarcasm so building the model in such a way that it grasps these capricious concepts also is a challenging task, which could be implemented in the future.

This model could be extended to include visual features as suggested in [6]. Visual features could include pictures and GIFs. Use of memes and reaction images has become a popular method for expressing sarcasm.

A cognitive system for sentiment analysis and sarcasm detection [7] could be combined which includes eye-movements and gesture-tracking to identify sarcasm. Observing the body language of the user is the key to understand the intentions behind their words. Apart from this, use of speech, tone, pitch and pauses between words could also be used as a criterion to detect sarcasm.

Castro et al. (2019) [5] propose a new sarcasm dataset, compiled from TV shows. They treat text features, speech features, and video features as three modalities and use SVM as the classifier.

Though machine learning approaches have achieved significant improvement, feature extraction is a time-consuming job. With high increase in research in that area, in the near future, with the help of novel algorithms and techniques, it is possible to reduce the time consumed in extraction of features. Inclusion of modalities such as audio, real world knowledge along with text, image and

image attributes would yield results much higher than what is observed.

Observing the history of tweets of users, their familiarity with the language, their behavioral judgement along with their familiarity of the platform offers more alternatives to building a sarcasm detector. Checking immediate previous tweet of a user can help in grasping the context of the next tweet and can help in understanding if the two are logically linked together. Judging a user's mood from the tweet also enhances the accuracy since it is natural for users to be sarcastic if they're upset. Evaluating the closeness of the user to the person they're replying to is also a direction to identifying sarcasm because people tend to be sarcastic and joke around more around those, they're familiar with.

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AET 004

Optimizing Patient Wait Time in a Hospital

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Abstract— Healthcare is riddled with delays. Almost all of us have waited for days or weeks to get an appointment with a physician or schedule a procedure, and upon arrival, we wait some more until being seen. In hospitals, it is not unusual to find patients waiting for beds in hallways, and delays for surgery or diagnostic tests are common.

Optimizing a patient's wait time in the hospital can be achieved by handling queues in the hospital. Queues are inherent to hospital counters, as it is not always possible to provide service to all patients at the exact moment, they request service. Queues involve waiting for a service in a specific place that might also be crowded, they obstruct the patient's goal of receiving service and at times lead patients to mistreat hospital's service providers and in extreme cases even attack them violently. Despite digital innovation, queues in hospitals are a part of daily lives.

With this project, we look forward to solving this queueing problem with the help of queueing models, various queuing theories and by also understanding queueing psychology, i.e., the psychology of a patient waiting in a queue. With this project we will also try to investigate the connection between patient satisfaction, waiting time, service-provider satisfaction & the service time.

Also, we aim to provide an end-to-end solution to the above-mentioned problem. Hence, our goal is to provide software solutions that are a blend of various server-based & client-based technologies. Keywords— Optimizing Patient Wait Time, Artificial neural network, Firebase, Flutter.

I. INTRODUCTION

In one of a series of memorable advertisements for which it has become justly famous, Federal Express (the overnight package delivery service) noted that: "Waiting is frustrating, demoralizing, agonizing, aggravating, annoying, time-consuming and incredibly expensive."

The truth of this assertion cannot be denied: there can be few consumers of services in a modern society who have not felt, at one time or another, each of the emotions identified by Federal Express's copywriters. Each of us who can recall such experiences can also attest to the fact that the waiting-line experience in a service facility significantly affects our overall perceptions of the quality of service provided.

Once we are being served, our transaction with the service organization may be efficient, courteous, and complete: but the bitter taste of how long it took to get attention pollutes the overall judgments that we make about the quality of service. One can observe the same toxic environment at hospitals. Patients waiting in queues at any hospital face the trauma of waiting for almost an eternity. However, one can ease this trauma through optimization of queues by implementing queuing theory & understanding patient psychology.

The mathematical theory of waiting lines (or queues) has received a great deal of attention from academic researchers and their results and insights have been successfully applied in a variety of settings. However, most of this work is concerned with the objective reality of various 'queue management' techniques: for example, what the effects are upon average waiting times of adding servers, altering 'queue discipline' (the order in which customers are served), speeding up serving times, and so on. What has been relatively neglected, however, is much substantive discussion of the experience of waiting.

As Levitt reminds us, "Products are consumed, services are experienced." Accordingly, if managers are to concern themselves with how long their customers or clients wait in line for service (as, indeed, they should), then they must pay attention not only to the readily measurable, objective, reality of waiting times, but also how those waits are experienced. It is a common experience that a two-minute wait can feel like nothing at all, or can feel like forever.

We must learn to influence how the customer feels about a given length of waiting time.

II. PROBLEM DEFINATION

- Problem: In a hospital scenario one can observe patients waiting in an endless queue and complaining about the service. These complaints arise because of the experience a patient has in the queue. This experience can be linked to the patient's psychology while standing in the queue.A queue occurs when there are more patients than employees to serve them. This means that patients have to wait for their turn. Whether the waiting itself is an issue or not can only be determined by the patients.A queuing problem occurs when the number of dissatisfied patients is higher than the number of satisfied patients due to the perceived waiting experience.
- Requirement: Queues at any hospital are meaningful and therefore unavoidable. It is not possible to cater to every patient's needs at once, since every patient wants to be served first & fast. These queues cause frustration & anxiety among the patients because of unknown & unpredictable surroundings. This leads to patients mistreating hospital service providers & in

extreme cases attack them violently. We need a solution to tackle this problem & also increase patient satisfaction.

- Problem Statement: "Design an effective solution to optimize waiting time of patients in queues at a hospital service counter to enhance the patient's hospital experience.

III. LITERATURE SURVEY

- Waiting in a queue can be stressful and exhausting for the clients because of the enforced idle time, and may lead to decreased customer satisfaction. In the healthcare sector, queueing models are used to improve resource utilization in hospitals, and to handle the tradeoffs that will improve the efficiency and the quality of the provided services of healthcare systems [1]. This paper helped us in understanding how we can make an end-to-end application for a queue.
- In accordance with the results released from the analysis of the questionnaire (mentioned in the paper), five factors that impact WT issue were found, namely employee commitment and attitude, inadequate work process and procedures, employee-supervisor relations obstacle, high level of workload and capacity, and poor or unavailability of both medical and administrative facilities. such finding found to contribute to the lengthy of WT problem in primary healthcare settings. High burden of workload as declared by large number of employees found to heavily influence the length of patients' WT [2]. This paper helped us in knowing what factors affect queue waiting time.

  Previous studies regarding waiting time in medical services have focused on doctors and patient consultations in general hospitals. Such studies found that the factors influencing consultation and waiting times are medical providers' characteristics, characteristics related to consultation, and patients' characteristics as well as consultation department, whether a patient had an appointment or not, whether the patient was a new outpatient or not, patients' perceived consultation waiting times, patients' endurable waiting times, and so forth [3].
- This paper helped us in reassuring the parameters we chose & analyzing various parameters such as patient age, patient gender, purpose of visit, mode of payment, etc. and how important role they played in predicting queue wait time [4].
- The article proposes and evaluates the model for the waiting time prediction in one-stop services. Three approaches have been implemented and compared including Queueing Theory using M/M/c pattern, Average Time prediction, and Random Forest algorithm. Based on the experimental results, the method that achieves the highest accuracy is Random Forest algorithm [5].
- More than half of the patients waited for more than 1 h, with high patient load coupled with few doctors and nurses being the main causes of this long waiting time. There is an urgent need for our health facilities to increase the number of health workers. This will go a long way in reducing the long waiting time experienced by patients and thus increase the rating of satisfaction with services. Healthcare providers also need training on the various ways by which waiting time can be reduced such as the application of computer simulation to assist in allotting appointment time to patients and triage system to sort out patients with urgent need of attention [6].
- Queuing theory scrutinizes the entire system of waiting in line, including elements like the customer arrival rate, number of servers, number of customers, capacity of the waiting area, average service completion time, and queuing discipline. Queuing theory is helpful in explaining the math behind how queues run. But when queues involve humans, queue psychology is important to understand the queue experience as well [7].
- Research shows that how people feel while waiting matters more than the length of the wait. By leveraging knowledge on the psychology of queuing, you can ensure that your customers' user experience is a positive one.
- Queue psychology research shows it's not the length of the wait that determines how positive or negative the queue experience is, but rather how people feel while waiting. • Distractions or the ability to do something else while in line makes time feel like it goes by faster. And uncertain waits feel longer than known, finite waits.
- Unoccupied time feels longer than occupied time: Even if customers are in love with the product they're queuing for, not providing a distraction during the wait can make it seem torturous.
- There is always a sense of community and entertainment in a group waiting compared to waiting alone.
- The earlier customers feel certain that they are in the right place and they are making progress the better. Once they feel 'in process' the wait time usually feels shorter.
- There is a huge difference between reality and a customer's perception. Remember, 'the customer satisfaction clock is faster than the real clock and is always ticking. 'Over 90% of customers, we track and interview feel that their wait time is longer than what we observe. Perceptions can increase exponentially for some customers. In a recent parking study, we found that if customers took 2 minutes to park, most would tell us it felt like 5 to 10 minutes.
- Managing expectations are key to making a queueing experience bad or good. Customers are more patient when they know how long they will be waiting, instead of wondering whether it will be three minutes or maybe three hours. If you are given a wait time, there may be some initial annoyance, but at least you feel informed and can prepare.
- Perhaps the most emotional issue to address in the world of queueing is fairness. If customers see someone arrive after them and get served before tempers can get frayed. The most common solution to ensure fairness is what's commonly called a 'snake' queue. There is only one way in and barriers and ropes are used to optimize queueing space. When you reach the head of the queue you are directed to the next available counter. This is not the fastest method of queue management but provides solace during a

long wait that you will never see someone arrive after you and get served before.

- Waiting can be frustrating, but more so when we are in sight of available staff not serving. We become irritated, angry, and sometimes rude. Customer perceptions (and loyalty) improve if we feel organizations understand and are trying to do something about our pain. What customers like to see is staff responding to a problem and when required undertaking intervention strategies to stop things getting worse. Whilst some may dispute that such activities are demanding on staff time and expensive, they only need to be deployed at peak times, and far worse is the cost and impact of doing nothing.

IV. METHODOLOGY

Using our Predict queue wait time (PQWT) model we predict the time a patient would spend at each stage in the hospital. For this purpose, we are using relevant patient data like Age, Sex, Condition, Payment Method, New-Patient/Follow-up, is the patient accompanied? etc.

Our approach to solving this issue revolves around the psychology of a patient in queue. To keep the patient from feeling ignored or not being given proper service we will give real time updates to each patient about his wait-time, status in the queue and the reason for the delay if any. To reduce the hassle of paper forms we introduce QR codes.

Through our guided tutorials our app will seem less intimidating to patients who aren't tech savvy. We also plan to integrate a few fun games and activities within our app itself to divert patient's attention from the queue

The admin panel has a queue of patients waiting for consultation. If the patient chooses to visit the pharmacy, a separate queue is maintained there as well. For complete digitalization of the hospital environment, medicines, prescriptions and reports can be uploaded by the doctor which will reflect in the patient app. The hospital also gets a direct service maintenance and different approach to calculate time within single clicks. The hospital can also be benefited from the analytics section where in basic information like arrival rate of patient per hour, number of patients treated by the doctor in an hour and number of doctors is taken and efficiency is calculated.

System Architecture:

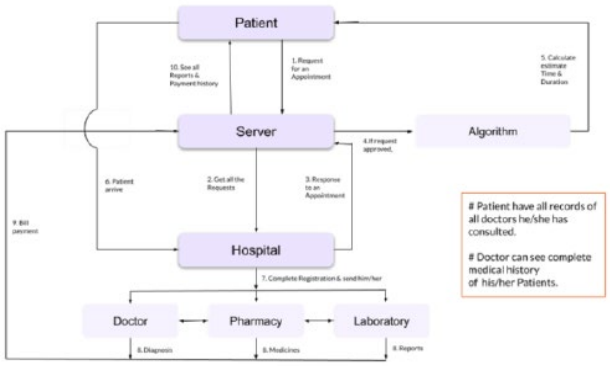

Fig 4.1: System Architecture

- **Database Model:**

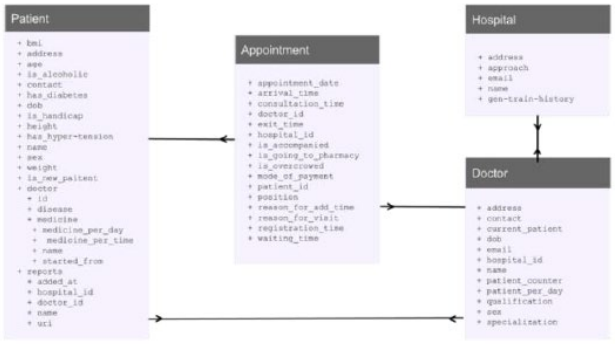

Fig 4.2: Database Model

- **Use Case Diagram:**

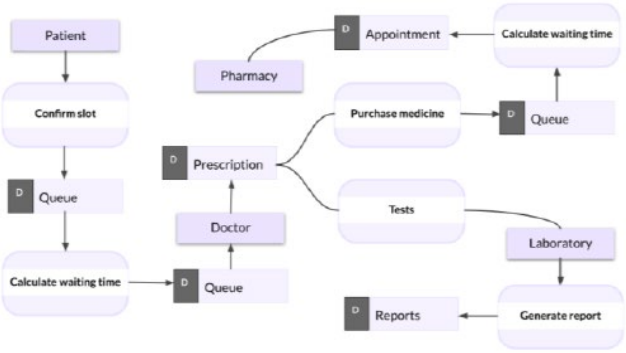

Fig 4.3: Data Flow Diagram

• Data Flow Diagram:

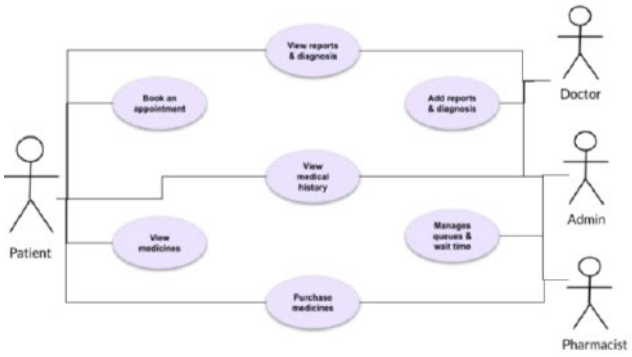

Fig 4.4: Use Case Diagram

V. PROPOSED

We propose a mobile app that predicts the queue wait time of a patient in real-time. The patient will be scanning a QR Code which enables contactless registration of the patient in the queue. Since a hospital is a multi-stage environment, a timer will be shown on the user screen at the beginning of every stage, that will show exactly the time the patient will be spending in that queue.

The patient can also view their profile that will contain their personal information along with the reports, medicines, and prescriptions given by the doctor. To reduce the discomfort and distract the patients' attention from their waiting time, we also have an in-app news section.

The admin panel has different privileges for user registration, doctor consultation, and pharmacy. As soon as the patient scans the QR, the patient is reflected in the doctor's portal. Using this portal, the doctor can now write prescriptions, upload reports, prescribe medicines, and

view a patient's past medical records. Based on the time taken by the doctor, the timer for other patients in the queue gets updated making our application an actual real-time application.

The medicines prescribed by the doctor are directly reflected at the pharmacy portal which enables complete digitalization of the hospital environment. The patient then only has to go to the pharmacy to collect the medicines and even there if the user has to wait in a queue, it is taken care of using a timer.

To handle emergencies and delays for the arrival of a doctor, an additional feature is given at the admin portal in which the admin/doctor can mention a time delay along with a reason which will be reflected in the patient portal immediately. This will result in less chaos and discomfort among the patients as they would know precisely how much time they will have to wait in the queue.

We have implemented two approaches as solutions. The first one is where the time that is being calculated i.e., for registration, consultation and pharmacy is calculated through calculating the average time from the database.

As soon as the hospital has enough data for training an algorithm, we have a service within the admin panel where the entire model can be trained with just a click and the approach (ML or Basic) can also be changed.

The admin panel also has a feature named analytics wherein the hospital can optimize their services by running simulation in a virtual environment. Basic data such as arrival rate of patient per hour, number of patients treated by the doctor in an hour, and number of doctors is taken, and based on that, efficiency of the environment is calculated.

VI. CONCLUSION

Our approach to solving this problem i.e., optimizing a patient's wait time revolves around the psychology of a patient in queue. Queue wait time prediction revolves very much around human interactions and psychology which makes the problem unpredictable. Hence it is difficult to maintain order and control over the situation. A hospital deals with a very diverse demographic daily. It's already a difficult task to reason with the patients personally, dealing them through the means of an app will be even tougher.

Using the most suitable approach, we have predicted the time a patient will probably spends at each stage in the hospital. For this purpose, we are using relevant patient data like Age, Sex, Condition, Payment Method, New-Patient/Follow-up, is the patient accompanied? etc.

To keep the patient from feeling ignored or not being given proper service we are giving real time updates to each patient about his/her wait-time, status in the queue and the reason for the delay, if any. To reduce the hassle of paper forms we have introduced QR codes. Using this feature of our app patients can easily check-in and confirm their place in the queue. Through our guided tutorials our app will seem less intimidating to patients who aren't tech savvy. With our voice reminder feature the patient will never miss updates about his/her position. We have also integrated a few fun games and activities within our app itself to divert patient's attention from the queue.

To make our application real-time, we have also implemented an admin panel where all the information gets updated and the user is notified immediately. The admin panel has a queue of patients waiting for consultation. If the patient chooses to visit the pharmacy, a separate queue is maintained there as well. For complete digitalization of the hospital environment, medicines, prescriptions and reports can be uploaded by the doctor which will reflect in the patient app.

The hospital also get's a direct service maintenance and different approach to calculate time within single clicks. The hospital can also be benefited from the analytics section where in basic information like arrival rate of patient per hour, number of patients treated by the doctor in an hour and number of doctors is taken and efficiency is calculated. The hospital can use this feature to optimize their waiting time and make their services better.

We aim to make an end-to-end appointment-based system for patients to avoid the hassle of waiting in the queues at hospitals altogether and therefore optimizing a patient's time at its best.

VII. FUTURE SCOPE

- To make our app accessible to everyone we plan to implement the 3V Scheme (Vernacular, Visual, Voice). The multi-lingual support will make our app accessible to everyone irrespective of their vernacular diversities. With our voice reminder feature the patient will never miss updates about his/her position.
- We also plan to integrate a few fun games and activities within our app itself to divert patient's attention from the queue.
- We also plan to grant the admin some special access to manage the queue in order to enhance the experience. Special accesses such as removing a patient from the queue, modifying the patient's position in the queue, etc.
- For now, we are operating in a patient walk-in-based environment i.e., mostly Government Hospitals. We plan to integrate an appointment-based queue management system, wherein a patient can book an appointment from anywhere & anytime. Thereafter, the patient will be directly added to the queue.
- Since, we would have real-time updates regarding the number of patients at a particular spot in a hospital. We could use this information to allocate resources efficiently in the hospital environment.
- Also, almost every hospital now-a-days are equipped with security cameras. We could use those equipment's to capture live footage & these updates will help us in improving our system. Thus, helping the hospital.
- Queues exist at almost every service provider's doorstep. For now, we are considering the hospital environment but we can develop a generic system or a system catering to the client's specific needs which can be then used in different environments where queue exists.

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AET 005

Prediction of Cricket Player's Performance Using Machine Learning

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Abstract— The foremost necessary and decisive task in any sport may be the choice of players. Analysis of individual performance and choice of the players in cricket is one of the most important tasks. The performance of the players depends on several factors like the opposition team, the venue, the player's current form, etc. In this paper, we attempt to predict the players' performance in the One Day International (ODI) and T20 matches by analyzing their characteristics and statistics. We implemented supervised machine learning techniques– Decision Tree, KNN, Support Vector Machines, Random Forest, and Stacking Ensemble Technique. Further, we've conducted a comparative study between their outcomes and performances. We have developed a tool CPPP (Cricket Player's Performance Predictor), that outputs the number of runs a batsman will score and the number of wickets a bowler will take. The Random Forest Classifier was found to be the most accurate algorithm for both tasks. The audience of this tool involves the coach, captain, team management, and sports analysts generally.

Keywords— KNN, Support Vector Machines, Random Forest, Decision Tree, Stacking Ensemble Technique, Cricket

I. INTRODUCTION

Cricket is a bat and ball game played between two teams of eleven players. It is the world's second most popular sport. Each player contributes to the team's overall performance by giving his best performance in each match. Each batsman contributes by scoring the maximum runs possible and each bowler contributes by taking maximum wickets and conceding minimum runs. The performance of a player depends on several factors like his current form, his performance against a particular team, his performance at a particular venue, etc. The team management, the coach, and the captain analyze each player's characteristics, abilities, and past stats to select the best playing XI for a given match. In other words, they try to predict the players' performance for each match.

This paper attempts to predict the performance of players as to how many runs will each batsman score and how many wickets will each bowler take. Both the problems are targeted as classification problems where the number of runs and number of wickets are classified in different ranges. we have applied five classification techniques – Decision Tree, Random Forest, Support Vector Machines, KNN, and Stacking Ensemble Technique to predict the performance of players in ODI as well as T20 match formats. We then built a software tool called CPPP which stands for Cricket player's Performance Predictor. The tool provides a choice of models to predict the performance of players.

II. LITERATURE SURVEY

An extensive online search produced very few articles related to player's performance prediction in the game of cricket. A very small number of researchers have studied the performance of cricket players. A comprehensive review of the literature regarding the performance of both the player and the game reveals the following findings:

Wickramasinghe et al [4] predicted the performance of batsmen in a test series using a hierarchical linear model. Using neural networks study of predicting "How many wickets will a bowler take?". Nimmagadda et al [1] applied statistical techniques to predict a T20 match result while the match is in progress. The authors have designed a model using a statistical approach to achieve the optimum outcome. Pathak & Wadhwa et al [3] investigated the prediction of the result for cricket matches using data mining techniques. They experimented with predicting the outcome of the ODI (One Day International) match format based on various factors such as home ground, toss decision, innings, the fitness of team players, and other dynamic strategies. Jhanwar & Pudi et al [2] conducted an experimental study to predict the outcome of ODI cricket matches using data mining techniques. The authors investigated the match result using team players' performance individually in batting and bowling aspects.

Kalpdrum Passi and Niravkumar Pandey attempted to predict the performance of players in ODI [5]. They used naïve Bayes, random forest, multiclass SVM, and decision tree classifiers to generate the prediction models. Random Forest classifier was found to be the most accurate whereas Naïve Bayes performed poorly with an accuracy of 42.4% in predicting runs and 57.7% in prediction of wickets. Results of SVM were surprising as it achieved an accuracy of just 51.45% for predicting runs and 68.78% for predicting wickets.Mukharjee.[6] applied Social Network Analysis to rate batsmen and bowlers in team performance. He generated a directed and weighted network of batsmen-bowlers using player-vs-player information available for Test and ODI cricket.

III. DATA AND TOOLS

We obtained datasets for ODI and T20 matches from Kaggle [7]

The following Datasets are Used:

- Men ODI Player Innings Stats - 21st Century.csv
- Men T20I Player Innings Stats - 21st Century.csv

For extracting batsman's data from the dataset, we removed data containing Innings Overs Bowled value as not null so that we can get only batsman's information. Similarly, for extracting bowler's data from the dataset, we removed data containing Innings Runs Scored value as not null so that we can get only bowler's information. Since, the past stats of the players such as average, strike rate, etc. are not available directly online for each match they played, we calculated them separately.

All the results in this study have been obtained using Jupyter Notebook and Python 3 on Windows 11.

IV. DATA PRE-PROCESSING

A. Removing unnecessary features

Unnecessary features decrease training speed, decrease model interpretability, and, most importantly, decrease generalization performance on the test set. We eliminated unnecessary features from the dataset in the first step of data pre-processing.

B. Manipulating features

We manipulated features as a part of the data cleaning and processing step. Pre-processing each column and saving all data in the proper format was performed so that we can use this data for the calculation of derived attributes.

C. Calculating Traditional Attributes

The stats of the players such as average, strike rate, etc. are not available directly for each game, we calculated these attributes from the innings by innings list using aggregate functions and mathematical formulae. These attributes are generally used to measure a player's performance. They are as follows:

1) Batting Attributes

a) No. of Innings: The number of innings in which the batsman has batted till the day of the match. This attribute signifies the experience of the batsman. The more innings the batsman has played, the more experienced the player is.

b) Batting Average: Batting Average is commonly referred to as average is the average number of runs scored per innings. This attribute indicates the run-scoring capability of the player.
Average = Runs Scored/ Number of times dismissed

c) Strike Rate (SR): The strike rate is the average number of runs scored per 100 balls faced. In limited-overs cricket, it is important to score runs at a fast pace. More runs scored at a slow pace is rather harmful to the team as they have a limited number of overs. This attribute indicates how quickly the batsman can score runs.
Strike Rate= (Runs Scored / Balls Faced) * 100

d) Centuries: Number of innings in which the batsman scored more than 100 runs. This attribute indicates the capability of the player to play longer innings and score more runs.

e) Fifties: Number of innings in which the batsman scored more than 50 (and less than 100) runs. This attribute indicates the capability of the player to play longer innings and score more runs.

f) Zeros: Number of innings in which the batsman was dismissed without scoring a single run. This attribute shows how many times the batsman failed to score runs, hence this being a negative factor, impacted the batsman's prediction negatively.

2) Bowling Attributes

a) No. of Innings: The number of innings in which the bowler bowled at least one ball. It represents the bowling experience of a player. The more innings the player has played, the more experienced the player is. Overs: The number of overs bowled by a bowler. This attribute also indicates the experience of the bowler. The more overs the bowler has bowled, the more experienced the bowler is.

b) Bowling Average: Bowling average is the number of runs conceded by a bowler per wicket taken. This attribute indicates the capabilities of the bowler to restrict the batsmen from scoring runs and taking wickets at the same time. Lower values of the bowling average indicate more capabilities.
Bowling Average= Number of runs conceded / Number of wickets taken

c) Bowling Strike Rate: Bowling strike rate is the number of balls bowled per wicket taken. This attribute indicates the wicket-taking capability of the bowler. Lower values mean that the bowler is capable of taking wickets quickly.
Strike Rate=Number of balls bowled / Number of wickets taken

d) Four/Five Wicket Haul: Number of innings in which the bowler has taken more than four wickets. This attribute indicates the capability of the bowler to take more wickets in an innings. Higher the value, the more capable the player.

D. Data Augmentation

Here, we used another dataset containing personal information of players like players' full name, age, batting style, bowling style, etc. we extracted the batting style and bowling style features of a player and merged it with batsman's and bowler's datasets respectively.

E. New attribute derivation

Here, we derived new attributes to further enhance the dataset[5].

1) Consistency
This attribute describes how experienced the player is and how consistent he has been throughout his career. All the traditional attributes used in this formula are calculated over the entire career of the player.

- Formula for batting:
  Consistency = 0.4262*average + 0.2566*no. of innings + 0.1510*SR + 0.0787*Centuries + 0.0556*Fifties – 0.0328*Zeros
- Formula for bowling:
  Consistency = 0.4174*no. of overs + 0.2634*no. of innings + 0.1602*SR + 0.0975*average + 0.0615*FF

2) Form
The form of a player describes his performance over the last one year. All the traditional attributes used in this formula are calculated over the matches played by the player in the last 12 months from the day of the match.
- Formula for batting:
  Form = 0.4262*average + 0.2566*no. of innings + 0.1510*SR + 0.0787*Centuries + 0.0556*Fifties – 0.0328*Zeros
- Formula for bowling:
  Form = 0.3269*no. of overs + 0.2846*no. of innings + 0.1877*SR + 0.1210*average + 0.0798*FF

3) Opposition
Opposition describes a player's performance against a particular team. All the traditional attributes used in this formula are calculated over all the matches played by the player against the opposition team in his entire career till the day of the match.
- Formula for batting:
  Opposition = 0.4262*average + 0.2566*no. of innings + 0.1510*SR + 0.0787*Centuries + 0.0556*Fifties – 0.0328*Zeros
- Formula for bowling:
  Opposition = 0.3177*no. of overs + 0.3177*no. of innings + 0.1933*SR + 0.1465*average + 0.0943*FF

4) Venue
The venue describes a player's performance at a particular venue. All the traditional attributes used in this formula are calculated over all the matches played by the player at the venue in his entire career till the day of the match.
- Formula for batting:
  Venue = 0.4262*average + 0.2566*no. of innings + 0.1510*SR + 0.0787*Centuries + 0.0556*Fifties + 0.0328*HS
- Formula for bowling:
  Venue = 0.3018*no. of overs + 0.2783*no. of innings + 0.1836*SR + 0.1391*average + 0.0972*

F. Rating the attributes
The values of the traditional attributes fall in very wide ranges and small differences in these values do not discriminate different players, So, we rated each traditional measure from 1 to 5 based on the range in which its value falls, to calculate the derived attributes, with 1 being the minimum and 5 being the maximum. We looked at the values of these attributes for different players and applied our knowledge to rate the measures.

1) For Batsman:
Rating for Consistency:
1 – 49: 1
50 – 99: 2
100 – 124: 3
125 – 149: 4
Consistency>=150: 5

Rating for Form:
1 – 4: 1
5 – 9: 2
10 – 11: 3
12 – 14: 4
Form>=15: 5

Rating for Venue:
1: 1
2: 2
3: 3
4: 4
Venue>=5: 5

Rating for Opposition:
1 – 2: 1
3 – 4: 2
5 – 6: 3
7 – 9: 4

Rating for Run Rate: (For T20)
0.0 - 9.99: 1
10.00 - 19.99: 2
20.00 - 24.99: 3
25.00 - 29.99: 4
Run Rate >=30: 5

Rating for Batting Average (for all derived attributes):
0.0 - 9.99: 1
10.00 - 19.99: 2
20.00 - 29.99: 3
30.00 - 39.99: 4
Batting Average>=40: 5

Rating for Batting Strike Rate (for all derived attributes):
0.0 - 49.99: 1
50.00 - 59.99: 2
60.00 - 79.99: 3
80.00 - 100.00: 4
Strike Rate>=100.00: 5

Rating for Target variable binning
Runs are predicted in five classes:
1 – 24: 1
25 – 49: 2
50 – 74: 3
75 – 99: 4
Runs>=100: 5

2) For Bowler:
Rating for Consistency:
1 – 99: 1
100 – 249: 2
250 – 499: 3
500 – 1000: 4
Consistency>=1000: 5
Rating for Form & Opposition:
1 – 9: 1

10 – 24: 2
25 – 49: 3
50 – 100: 4
Value>=100: 5

Rating for Venue:
1 – 9: 1
10 – 19: 2
20 – 29: 3
30 – 39: 4
venue>=40: 5

Rating for Bowling Average (for all derived attributes):
0.00 - 24.99: 5
25.00 - 29.99: 4
30.00 - 34.99: 3
35.00 - 49.99: 2
Average>=50.00: 1

Rating for Bowling Strike Rate (for all derived attributes):
0.00 - 29.99: 5
30.00 -39.99: 4
40.00 -49.99: 3
50.00 -59.99: 2
Strike Rate>=60.00: 1

Rating for Economy: (For T20)
0.0 – 5.00: 5
5.00 - 10.00: 4
10.00 – 20.00: 3
20.00 – 30.00: 2
Economy >=30: 1

Rating for Target variable binning
Wickets are predicted in three classes:
0 - 1: 1
2 – 3: 2
Wickets >=4: 3

G. Other Input Attributes

Our experiments showed that the derived attributes themselves are sufficient to accurately predict players' performance. Also, there are some other factors apart from past performances that affect players' performances, e.g. depending on the types of bowlers the opposition team has, it would be better to include more left-handed batsmen than right-handed batsmen in the team or vice versa. So, we incorporated more attributes that indicate the players', the opponents', and the venues' characteristics, in our experiments. These attributes are explained below:

- Batting Hand: The dominant hand of the batsman while batting. It has two possible values: Left or Right. Depending on the characteristics of the bowlers of the opposition team, left-handed batsmen might perform better than the right-handed batsmen or vice versa.
- Bowling Hand: The dominant hand of the batsman while bowling. It has two possible values: Left or Right. Depending on the characteristics of the opposition team's batsmen, left-handed bowlers might perform better than the right-handed bowlers or vice-versa
- Opposition: The opposition team. Players usually tend to perform better against some teams. This attribute also incorporates the characteristics of the opposition team's players in general.
- Ground: The ground on which the match is being played. The data about different pitches is not available at this time, so we tried to incorporate the general nature of the pitches at different grounds using this attribute. Also, players are more comfortable at some venues, e.g. a player who has had some world records at a particular ground, is more likely to perform better on that ground.

For the T20 Match format, along with the above attributes, we added some more attributes which can help to predict the player's performance more accurately.

- Run Rate: The Run Rate (RR) or Runs per Over (RPO), is the average number of runs a batting side scores per over.
  Run Rate = (Runs Scores * 6)/ Balls Faced
- Economy: Player's Economy rate is the average number of runs they have conceded per over bowled. The lower the economy rate is, the better the bowler is performing.
  Economy = (Runs Conceded * 6)/Balls Bowled

H. Data Cleaning

A large number of values of Opposition and Venue were zero. We treated such values as missing values and replaced them with the class average of corresponding attributes.

I. Class Imbalance

Classification predictive modeling involves predicting a class label for a given observation. An imbalanced classification problem is an example of a classification problem where the distribution of examples across the known classes is biased or skewed[8]. The distribution can vary from a slight bias to a severe imbalance where there is one example in the minority class for hundreds, thousands, or millions of examples in the majority class or classes. Imbalanced classifications pose a challenge for predictive modeling as most of the machine learning algorithms used for classification were designed around the assumption of an equal number of examples for each class. This results in models that have poor predictive performance, specifically for the minority class. This is a problem because typically, the minority class is more important, and therefore the problem is more sensitive to classification errors for the minority class than the majority class.

While performing the research, it was observed that the majority of the records fall within class 1 in both batting and bowling. This led to a major imbalance in the distribution of values and affected the performance of the learning algorithms. To tackle this problem, we applied an oversampling technique Supervised Minority Oversampling Technique (SMOTE) to minority classes to make all the classes equally distributed.

SMOTE works by selecting examples that are close in the feature space, drawing a line between the examples in the feature space, and drawing a new sample at a point along that line. Specifically, a random example from the minority class is first chosen. Then k of the nearest neighbors for that example is found. A randomly selected neighbor is chosen and a synthetic example is created at a randomly selected point between the two examples in feature space.

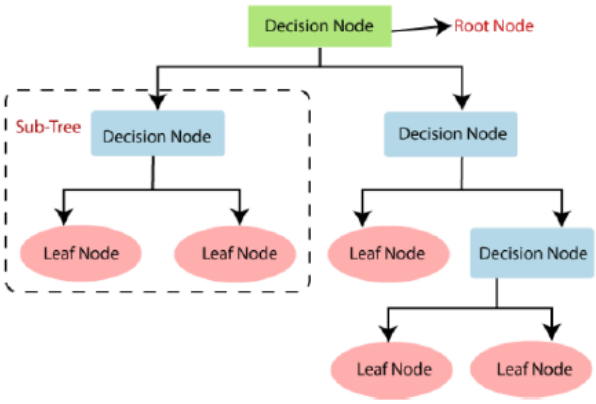
At first the total no. of oversampling observations, N is set up[9]. Generally, it is selected such that the binary class distribution is 1:1. But that could be tuned down based on need. Then the iteration starts by first selecting a positive class instance at random. Next, the KNNs for that instance are obtained. At last, N of these K instances is chosen to interpolate new synthetic instances. To do that, using any distance metric the difference in distance between the feature vector and its neighbors is calculated. Now, this difference is multiplied by any random value in (0,1] and is added to the previous feature vector. This way, a random point along the line segment joining two specific features is selected. Neighbors from the k nearest neighbors are selected based on the amount of oversampling required.ML Algorithms.

V. MACHINE LEARNING ALGORITHMS

A. Decision Tree

Decision Tree is a Supervised Machine Learning Algorithm. It is a tree-structured classifier, where internal nodes represent the features of a dataset, branches represent the decision rules and each leaf node represents the outcome. In a Decision tree, there are two nodes, which are the Decision Node and Leaf Node. Decision nodes are used to make any decision and have multiple branches, whereas Leaf nodes are the output of those decisions and do not contain any further branches. The decisions or the test are performed based on features of the given dataset. It is a graphical representation for getting all the possible solutions to a problem/decision based on given conditions [10]. To build a tree, we use the CART algorithm, which stands for Classification and Regression Tree algorithm. A decision tree simply asks a question and based on the answer (Yes/No), it further split the tree into subtrees.

In a decision tree, for predicting the class of the given dataset, the algorithm starts from the root node of the tree. This algorithm compares the values of the root attribute with the record (real dataset) attribute and, based on the comparison, follows the branch and jumps to the next node. For the next node, the algorithm again compares the attribute value with the other sub-nodes and moves further. It continues the process until it reaches the leaf node of the tree.



While implementing a Decision tree, the main issue arises that how to select the best attribute for the root node and sub-nodes. So, to solve such problems there is a technique which is called Attribute selection measure or ASM. By this measurement, we can easily select the best attribute for the nodes of the tree. We have used the Gini index for ASM.

The Gini index, or Gini coefficient, or Gini impurity computes the degree of probability of a specific variable that is wrongly being classified when chosen randomly and a variation of the Gini coefficient. It works on the categorical variables, provides outcomes of either be “successful” or “failure” and hence conducts binary splitting only [11]. The degree of the Gini index varies from 0 to 1,

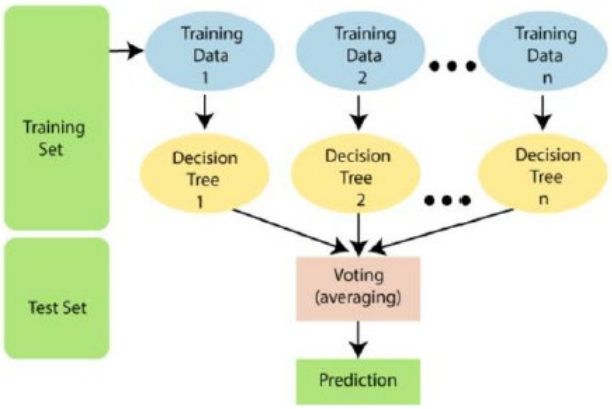
- Where 0 depicts that all the elements be allied to a certain class, or only one class exists there.
- The Gini index of value as 1 signifies that all the elements are randomly distributed across various classes.
- A value of 0.5 denotes the elements that are uniformly distributed into some classes.

An attribute/feature with the least Gini index is preferred as the root node while making a decision tree.

B. Random Forest

Random forest is a supervised learning algorithm that is used for both classifications as well as regression. It is based on the concept of ensemble learning, which is a process of combining multiple classifiers to solve a complex problem and improve the performance of the model[12]. Random Forest is a classifier that contains several decision trees on various subsets of the given dataset and takes the average to improve the predictive accuracy of that dataset. Instead of relying on one decision tree, the random forest takes the prediction from each tree, and based on the majority votes of predictions, it predicts the final output. The greater number of trees in the forest leads to higher accuracy and prevents the problem of overfitting.

Random Forest works in two-phase first is to create the random forest by combining the N decision tree, and the second is to make predictions for each tree created in the first phase.



The Working process can be explained in the below steps and diagram:

Step-1: Select random K data points from the training set.

Step-2: Build the decision trees associated with the selected data points (Subsets).

Step-3: Choose the number N for the decision trees that you want to build.

Step-4: Repeat Step 1 & 2.

Step-5: For new data points, find the predictions of each decision tree, and assign the new data points to the category that wins the majority of votes.

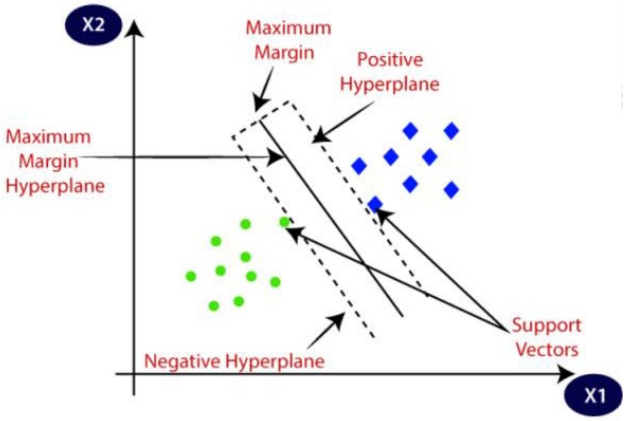
C. Support Vector Machine

Support vector machines are a set of supervised learning methods used for classification, regression, and outlier detection. The goal of the SVM algorithm is to create the best line or decision boundary that can segregate n-dimensional space into classes so that we can easily put the new data point in the correct category in the future. This best decision boundary is called a hyperplane[13].

SVM chooses the extreme points/vectors that help in creating the hyperplane. These extreme cases are called support vectors, and hence algorithm is termed a Support Vector Machine.

There can be multiple lines/decision boundaries to segregate the classes in n-dimensional space, but we need to find out the best decision boundary that helps to classify the data points. This best boundary is known as the hyperplane of SVM. We always create a hyperplane that has a maximum margin, which means the maximum distance between the data points.

The data points or vectors that are the closest to the hyperplane and which affect the position of the hyperplane are termed Support Vector. Since these vectors support the hyperplane, hence called a Support vector.



SVM transforms the original data into a higher dimension using a nonlinear mapping. It then searches for a linear optimal hyperplane in this new dimension separating the tuples of one class from another. With an appropriate mapping to a sufficiently high dimension, tuples from two classes can always be separated by a hyperplane. The algorithm finds this hyperplane using support vectors and margins defined by the support vectors. The support vectors found by the algorithm provide a compact description of the learned prediction model. A separating hyperplane can be written as:

$$W \cdot X + b = 0$$

where W is a weight vector, W = {w1, w2, w3,..., wn}, n is the number of attributes and b is a scalar often referred to as a bias. If we input two attributes A1 and A2, training tuples are 2-D, (e.g., X = (x1, x2)), where x1 and x2 are the values of attributes A1 and A2, respectively. Thus, any points above the separating hyperplane belong to Class A1:

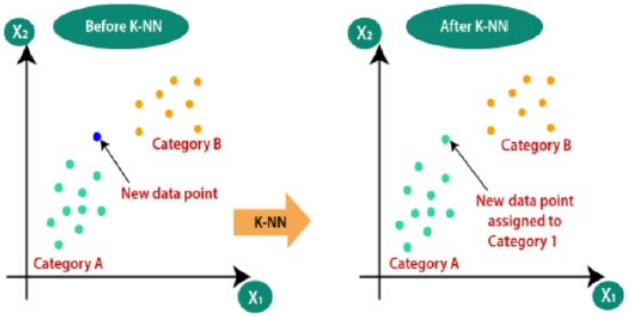
$$W \cdot X + b > 0$$

and any points below the separating hyperplane belong to Class A2:

$$W \cdot X + b < 0$$

D. K-Nearest Neighbor

K Nearest Neighbour algorithm falls under the Supervised Learning category and is used for classification (most commonly) and regression. K-NN algorithm assumes the similarity between the new case/data and available cases and put the new case into the category that is most similar to the available categories[14]. It stores all the available data and classifies a new data point based on the similarity. This means when new data appears then it can be easily classified into a good suite category by using K- NN algorithm. It considers K Nearest Neighbours (Data points) to predict the class or continuous value for the new Datapoint.



The KNN Algorithm

1) Load the data
2) Initialize K to your chosen number of neighbors
3) For each example in the data
   a. Calculate the distance between the query example and the current example from the data.
   b. Add the distance and the index of the example to an ordered collection
4) Sort the ordered collection of distances and indices from smallest to largest (in ascending order) by the distances
5) Pick the first K entries from the sorted collection

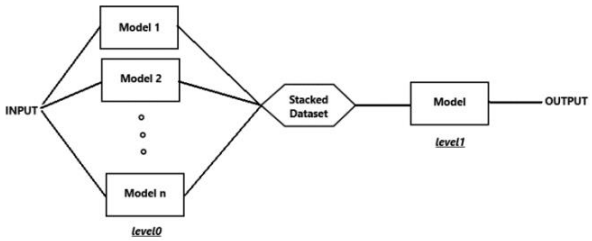
6) Get the labels of the selected K entries
7) Return the mode of the K labels

E. Stacking Ensemble Technique

Stacking or Stacked Generalization is an ensemble machine learning algorithm. It uses a meta-learning algorithm to learn how to best combine the predictions from two or more base machine learning algorithms.

The benefit of stacking is that it can harness the capabilities of a range of well-performing models on a classification or regression task and make predictions that have better performance than any single model in the ensemble[15]. Stacking Ensemble Technique works as follows:

1) We split the training data into K-folds just like K-fold cross-validation.
2) A base model is fitted on the K-1 parts and predictions are made for the Kth part.
3) We do for each part of the training data.
4) The base model is then fitted on the whole train data set to calculate its performance on the test set.
5) We repeat the last 3 steps for other base models.
6) Predictions from the train set are used as features for the second-level model.
7) Second level model is used to predict the test set.



In our project, for implementation of the Stacking Ensemble Technique, we have used KNN, Decision Tree classifier, and Naïve Bayes classifier as Level 0 or base models and Logistic Regression as a Level 1 or Meta Model.

VI. IMPLEMENTATION

The first step is to import the dataset using the Pandas library and then further data preprocessing is done. After pre-processing, the categorical data in the columns are mapped into numerical values. We applied SMOTE technique to avoid the problem of Class Imbalance. In the case of batsman performance prediction, we considered Runs Scored as an output feature, and rest independent features are considered as an input feature, and in the case of bowler performance prediction, we considered wickets taken as an output feature and rest independent features are considered as an input features.

Dataset is Split into a training set and a testing set. 80% of data is used for training the prediction model and 20% of data is used for testing the prediction model. All the required libraries are imported to implement supervised machine learning algorithms. We used 5 prediction models to predict the performance of the player and have evaluated all the Machine Learning models to determine the best prediction model.

The Graphical User Interface is developed using Tkinter. For the backend of the application, Python is used. The application can be used to predict the Player's performance in ODI and T20 matches with the help of his past records. All the input information necessary for the prediction model is provided to the model. We named our application as CPPP tool which stands for Cricket Player's Performance Predictor. The home page of the application is as shown in 'Fig. 1'. we need to first select the type of Match (ODI / T20) as shown in 'Fig. 2', then select Batsman if want to predict the Runs Scored by Batsman else select Bowler to predict the Wickets Taken by the bowler as shown in 'Fig. 3'. Next, we have to provide some information about the player and match, we have to select the player's name, Ground, Country of player, and Opposition Team as shown in 'Fig. 4'. Further, we can select a Prediction model to predict the performance of the player. The Player's performance along with the accuracy of the prediction model selected will be displayed as shown in 'Fig. 5'.

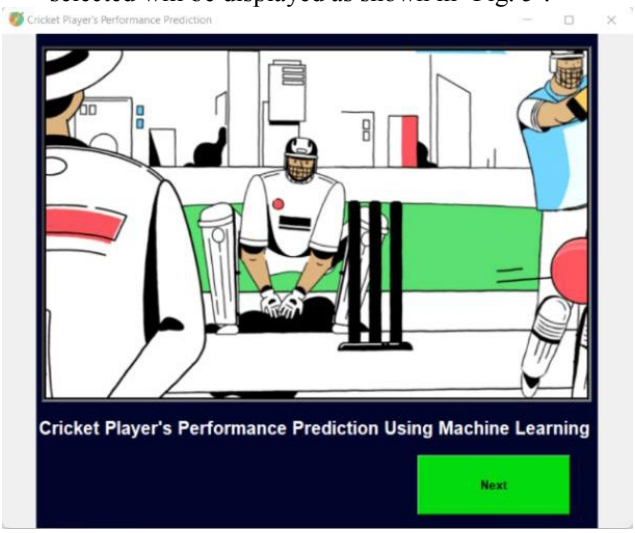


Fig. 1. Home page of CPPP tool

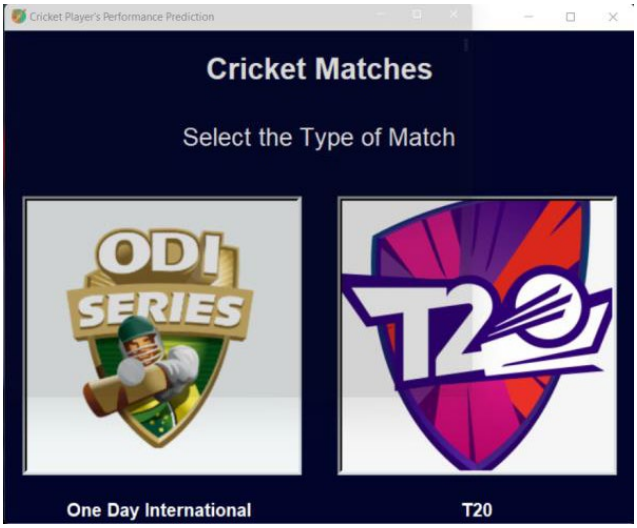


Fig. 2. Select match type

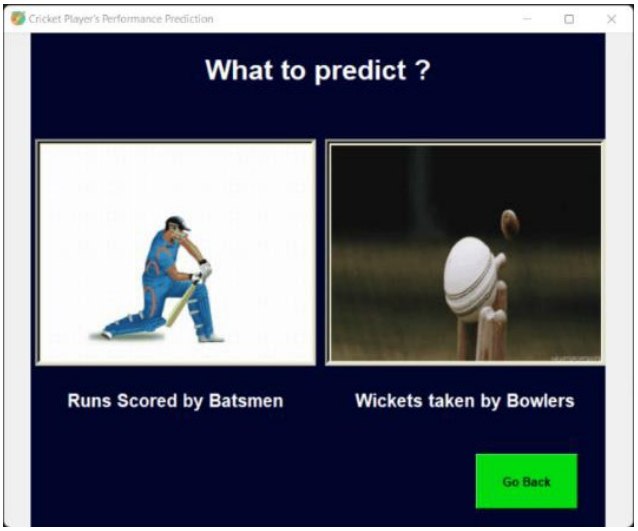


Fig. 3. Select batsman or bowler

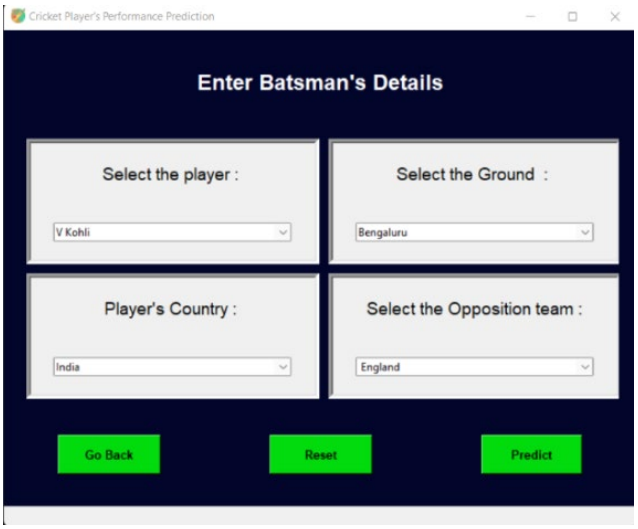


Fig. 4. Enter details of the player

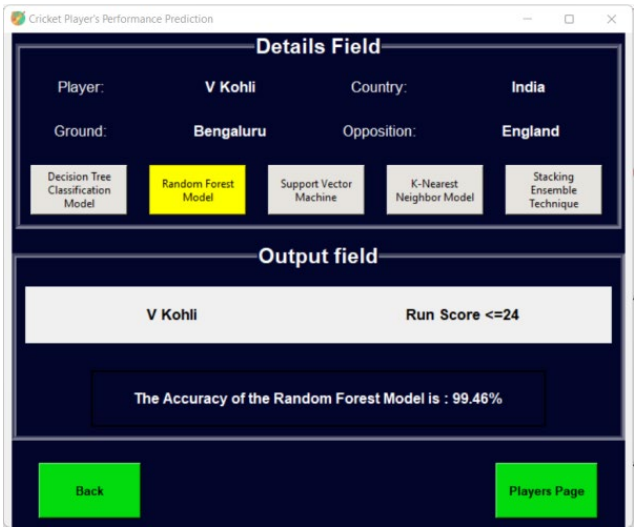


Fig. 5. Predict the performance of the player

VII. RESULTS AND DISCUSSION

We used five machine learning algorithms: Decision Tree, Random Forest, KNN, Support Vector Machine, and Stacking Ensemble Technique for prediction.

The results are tabulated below. TABLE I shows the performance measure of the prediction models for batsmen and TABLE II shows the performance measure of the prediction models for the bowler in ODI Match.

As we can see, Random Forest builds the most accurate prediction model for both batsman's and bowler's performance prediction in ODI matches. Random Forest predicts runs scored by the batsman with the highest accuracy of 99.47%. Similarly, Random Forest predicts wickets taken by a bowler with the highest accuracy of 99.86%. On the other hand, SVM predicts runs scored by a batsman with the least accuracy of 89.27% and it predicts wickets taken by a bowler too with the least accuracy of 87.71%. Stacking Ensemble Technique performs reasonably well with an accuracy of 99.28% in predicting runs scored by batsmen and an accuracy of 99.78% while predicting wickets taken by the bowler.

TABLE I. PERFORMANCE MEASURE OF THE ALGORITHMS FOR PREDICTION OF RUNS SCORED

Algorithm	Accuracy	Precision	Recall	F1 Score	RMSE
Decision Tree	0.9877	0.9877	0.9877	0.9877	0.1698
KNN	0.9221	0.9260	0.9221	0.9181	0.5436
Random Forest	0.9947	0.9947	0.9947	0.9947	0.1219
SVM	0.8927	0.8990	0.8927	0.8922	0.3275
Stacking	0.9928	0.9928	0.9928	0.9928	0.1431

TABLE II. PERFORMANCE MEASURE OF THE ALGORITHMS FOR PREDICTION OF WICKETS TAKEN

Algorithm	Accuracy	Precision	Recall	F1 Score	RMSE
Decision Tree	0.9962	0.9962	0.9962	0.9962	0.0637
KNN	0.9555	0.9595	0.9551	0.9550	0.2494
Random Forest	0.9986	0.9986	0.9986	0.9986	0.0363
SVM	0.8771	0.8780	0.8771	0.8763	0.3504
Stacking	0.9978	0.9978	0.9978	0.9978	0.3504

The confusion matrix is the summary of prediction results. A confusion matrix prints the correct and also incorrect values in number count. It helps us for a good Data Visualization It gives us insight not only into the errors being made by a classifier but more importantly the types of errors that are being made. A good matrix (model) will have large values across the diagonal and small values off the diagonal.

The confusion matrix for the Random Forest Classification model for the ODI match format is shown in 'Fig. 6' and 'Fig. 7' for batsman's and bowler's performance prediction respectively. As discussed above, we can see that there are large values across the diagonal and small values off the diagonal which indicates that our predicted values are very close to actual values in both cases.

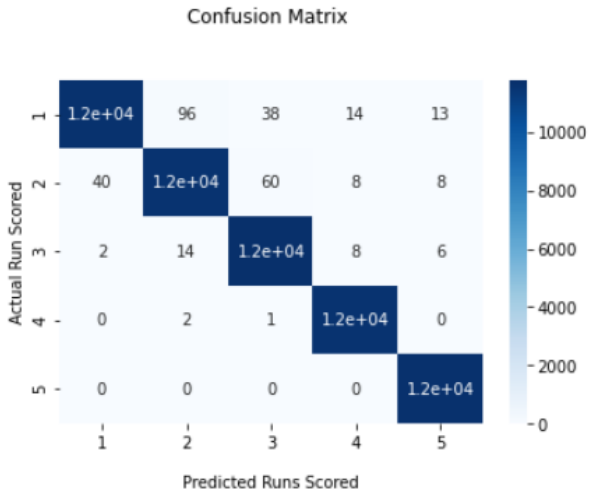


Fig. 6. Confusion Matrix for Random Forest (Batsman)

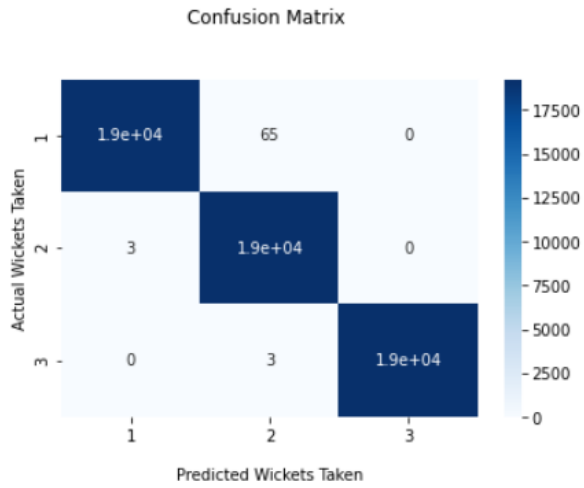


Fig. 7. Confusion Matrix for Random Forest (Bowler)

Results of all the classification models for predicting batsman's performance in the ODI match are analyzed and visualized as shown in 'Fig. 8'.

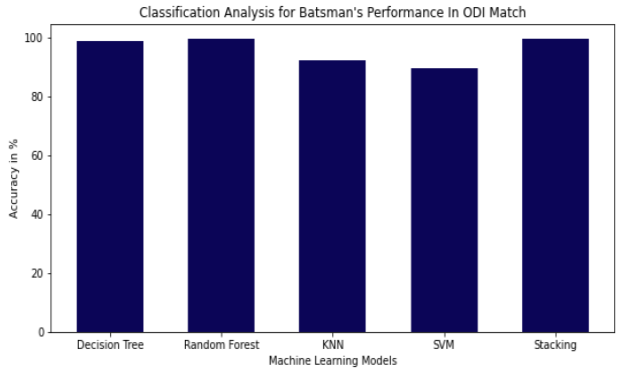


Fig. 8. Classification Models Analysis of batsman's performance in ODI match

Results of all the classification models for predicting bowler's performance in the ODI match are analyzed and visualized as shown in 'Fig. 9'.

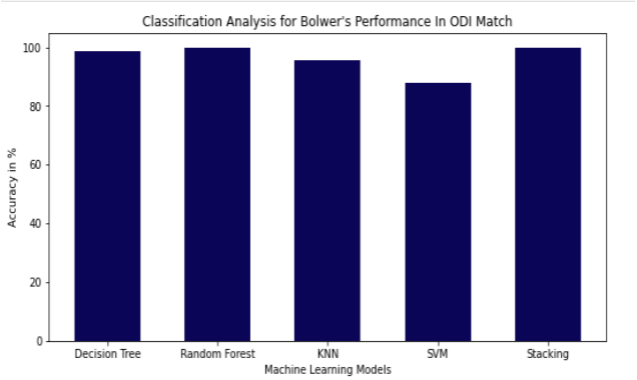


Fig. 9. Classification Models Analysis of bowler's performance in ODI match

Similarly, we used all five prediction models to predict the performance of players for the T20 match format and analyzed them. TABLE III shows the performance measure of the prediction models for batsmen and TABLE IV shows the performance measure of the prediction models for the bowler in a T20 Match.

As we can see, Random Forest builds the most accurate prediction model for both batsman's and bowler's performance prediction in T20 matches. Random Forest predicts runs scored by the batsman with the highest accuracy of 99.74%. Similarly, Random Forest predicts wickets taken by a bowler with the highest accuracy of 99.90%. Stacking Ensemble Technique performs reasonably well with an accuracy of 99.62% in predicting runs scored by batsmen and an accuracy of 99.80% while predicting wickets taken by the bowler.

TABLE III. PERFORMANCE MEASURE OF THE ALGORITHMS FOR PREDICTION OF RUNS SCORED

Algorithm	Accuracy	Precision	Recall	F1 Score	RMSE
Decision Tree	0.9951	0.9951	0.9951	0.9951	0.0858
KNN	0.9375	0.9422	0.9375	0.9352	0.3824
Random Forest	0.9974	0.9974	0.9974	0.9974	0.0619
SVM	0.9178	0.9178	0.9178	0.9178	0.2866
Stacking	0.9962	0.9962	0.9962	0.9962	0.0818

TABLE IV. PERFORMANCE MEASURE OF THE ALGORITHMS FOR PREDICTION OF WICKETS TAKEN

Algorithm	Accuracy	Precision	Recall	F1 Score	RMSE
Decision Tree	0.9977	0.9977	0.9977	0.9977	0.0493
KNN	0.9595	0.9633	0.9595	0.9592	0.2190
Random Forest	0.9990	0.9990	0.9990	0.9990	0.0306
SVM	0.7735	0.7806	0.7735	0.7864	0.4758
Stacking	0.9980	0.9980	0.9980	0.9980	0.0524

The Confusion Matrix for Random Forest Classification model for the T20 match format is shown in 'Fig. 10' and 'Fig. 11' for batsman's and bowler's performance prediction respectively.

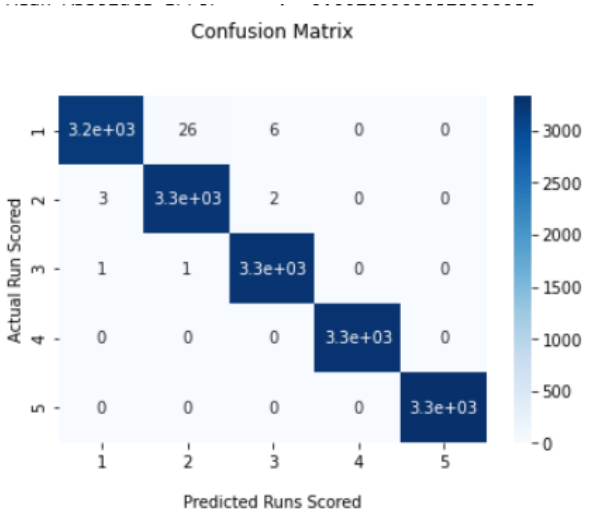


Fig. 10. Confusion Matrix for Random Forest (Batsman)

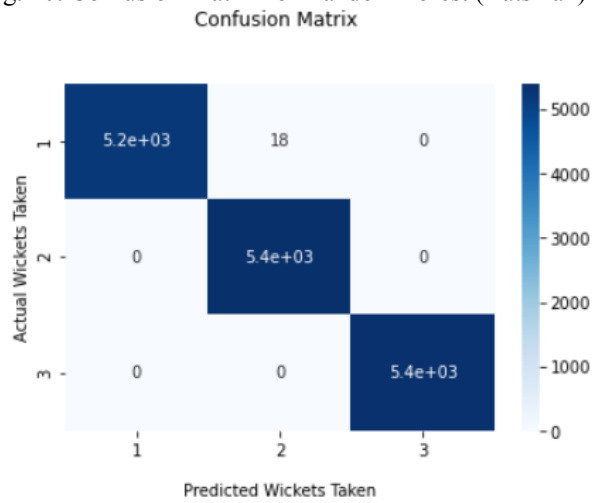


Fig. 11. Confusion Matrix for Random Forest (Bowler)

Results of all the classification models for predicting batsman's performance in the T20 match are analyzed and visualized as shown in 'Fig. 12'.

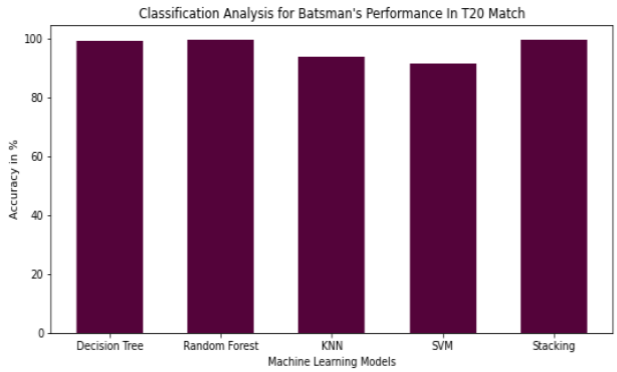


Fig. 12. Classification models analysis of batsman's performance in T20 match.

Results of all the classification models for predicting bowler's performance in the T20 match are analyzed and visualized as shown in 'Fig. 13'.

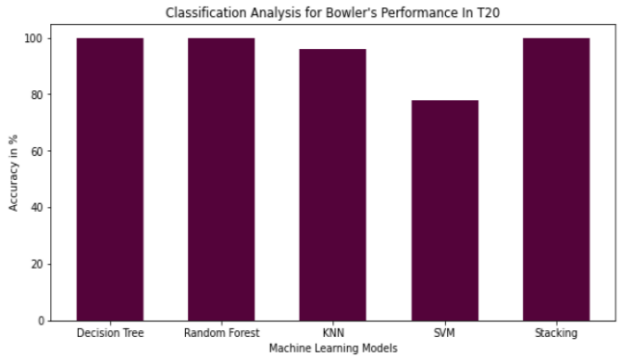


Fig. 13. Classification models analysis of bowler's performance in T20 match

VIII. CONCLUSION AND FUTURE WORK

Nowadays, machine learning is being used in most real-life situations. Therefore, by introducing machine learning in the game of cricket we can find out the batsman's and bowler's performance in the upcoming match. Through this process we will have an idea about the player's performance during a tournament and the team management will be able to pick up the right player. The selection of the right players for each match plays a significant role in a team's victory. An accurate prediction of how many runs a batsman is likely to score and how many wickets a bowler is likely to take in a match will help the team management select the best players for each match. The player's performances depend on various factors such as the location where the match is being played, past records, his current form, average rate, strike rate, runs scored at a particular venue, number of innings played against the opposition teams, etc.

In this project, we modeled datasets based on players' earlier records. Some other features that affect players' performance such as weather or the nature of the wicket could not be included in this study due to the unavailability of data. Five classification algorithms were used and compared. Random Forest turned out to be the most accurate classifier for both the cricket formats with an accuracy of 99.47% for predicting runs scored by a batsman and 99.86% for predicting wickets taken by a bowler in the ODI format and an accuracy of 99.74% for predicting runs scored by a batsman and 99.90% for predicting wickets taken by a bowler in T20 format.

Future work could be done in the following ways:

- As we know Machine Learning and Data Mining are developing at a rapid pace with several new techniques being developed and old techniques being modified to enhance performance, keeping this in mind our work can be expanded to incorporate new methods of classification for outcome prediction.
- More features could be added along with the ones currently considered.
- Classification techniques can be applied to other sports such as baseball, and football as well, although the method of implementation might differ from one sport to another.
- Machine learning may slightly improve predicting the results based on pre-game conditions but at this stage, it cannot be an acceptable solution due to the lack of variables in the dataset, which can be considered one of this research's limitations. For machine learning techniques to be productive, more data including live

data streaming and statistics of players are needed. Considering the dynamics of the tournament, team players' data and statistics are required. It would be advantageous to predict the final score of the innings by analyzing the run rate per over and also checking the probability of winning for each team depending on the actual run rate and the required run rate in the second innings.

ACKNOWLEDGMENT

We would like to take the opportunity to thank and express our deep sense of gratitude to our Guide professor, Dr.Vipul Dalal, Department of Information Technology, VIT for providing his time and knowledge for our project and giving us the opportunity to implement our ideas. We greatly appreciate his prompt and enthusiastic response to our requests for comments, positive feedback, valuable advice, and constructive suggestion for the correction, modification, and improvement which helped towards the completion of the project.

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AET 006

Early Modern: An All-In-One Platform for Old Age Homes

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Abstract— The Old Age Home industry is largely untapped and has the potential for a massive improvement in terms of technological integration. One of the aims of the solution proposed in this paper is to equip senior citizens residing in Old Age Homes with emotional support. This will be achieved by integrating a voice assistant chatbot whose voice can be cloned to that of a loved one. Apart from this, the proposed solution can help in maintaining and tracking the health records of residents, pushing notifications, and scheduling essential daily activities.

Keywords—Old Age Home, Assisted Living, Senior Citizens, Elderly, Chatbot, Voice Assistant, MIS, Social platform

I. INTRODUCTION

The Old Age Home industry is one the most neglected industries present today, despite the philanthropic nature of its profession. There are very few services available for the management of day-to-day functions of an Old Age Home.

Senior citizens reside at such Old Age Homes either voluntarily or due to their misfortunes. Irrespective of their reason for resorting to Old Age Homes, they often encounter loneliness. This at times also leads to depression, making their final years torturous. Furthermore, due to health concerns, they are often unable to socialize with one another physically. Lack of movement and contact with the outside world further deteriorates their physical and mental health. As their age increases, some senior citizens are faced with forgetfulness, and they tend to neglect taking their meals and prescriptions and even sleep on time.

In addition, either due to lack of helpers or neglect by family members, senior citizens on account of not being technologically advanced, are unable to schedule their own appointments with ease. Existing services [1] for the same have a complex user interface that creates confusion, and they are still inaccessible to much of the population; senior citizens end up not going forward with them.

Therefore, there is a need for a system that can help manage the functioning of Old Age Homes, as well as act as a relief for senior citizens from loneliness and neglect.

A. Problem Statement

We aim to design an efficient and user-friendly Chatbot-based Old Age Home management system.

The proposed solution, EarlyModern, is an efficient and user-friendly application making use of a voice assistant chatbot to establish two-way communication between the residents and the management at an Old Age Home. The proposed solution also features an appointment scheduling system, a social platform, reminders for timely prescriptions, meals, and sleep cycles, as well as an emergency contact system.

A user (resident) can access the system and communicate using the chatbot for real-time physical help/service easily using minimum parameters; the USP of this chatbot will be a voice-based assistant who can clone the voice of a loved one and can casually converse with the user.

II. LITERATURE REVIEW

Almost 15 percent of adults over the age of 60 (senior citizens) live in precarious situations and suffer from mental illnesses [2], which makes psychiatric care wanting. With neglect, these numbers start burgeoning and proper care should be taken to mitigate loneliness because many psychiatric illnesses aren't conspicuous [3]. In fact, there are many chatbots developed to emulate a therapist. iHelpr [4] is one of those which helps us access areas that deal with stress, sleep, depression, self-esteem, and anxiety, on our own. Nevertheless, iHelpr needs improvements in two main areas, Intelligence and Handling Errors. A lot of research, in the past, was done on the textual channels and not on the audio or the spoken channel. However, Cortona by Microsoft, Siri by Apple, Google Assistant, and Amazon's Alexa have pioneered the domain of audio [5]. Chatbot with personalized audio for the elderly can revolutionize how loneliness is dealt with and treated by many other apps that are currently in use [6][7]. Another research [8] shows that many students felt more comfortable talking to the chatbot especially about the areas that dealt with anxiety and depression. The main cause behind the comfort was because the students felt "secure" talking to a machine rather than a human.

Further research states that Web-based cognitive-behavioral therapeutic (CBT) was effective and conversational agents are nothing but futile. Woebot [8], a chatbot that receives more than 8 million messages per month, was tested in a randomized control trial. The results were incredulous because the Woebot successfully ameliorated symptoms that caused depression within a span of 2 weeks. Chatbots are of extreme importance in India, primarily because Asia is likely to become the oldest region in the world. While old age homes in India are relentlessly trying to vindicate the needs that the elderly face at the old age homes, there is no medium for

them to communicate and express themselves [9]. Chatbots have proven to be useful in the medical domain as well wherein studies such as [6][10][11][12][13][14] refer further chatbots which motivate users to exercise more and start inculcating good habits into their quotidian lifestyles. Hence, for long, very few have contributed to the area mitigating loneliness which motivates us to develop an application that sheds light on the area.

III. PROPOSED SOLUTION

The proposed system, EarlyModern, is a chatbot-based MIS cum social platform. It aims to monitor the functioning of old age homes while also acting as a means for social interaction among senior citizens. The proposed system displays functionality based on the roles assigned to each individual, which are further described below.

A. Old Age Home Resident

The proposed application interface for Residents consists of four primary features:

1) Appointment Scheduling and Reminders
This feature allows residents to schedule regular appointments for medical check-ups with their consultants. Senior citizens are given reminders of due appointments and are prompted for further consultations. This feature also sends them reminders to take their prescriptions on time when a member of the staff is not present.
2) Emergency Contact
In case of any emergency, residents can make use of this feature to notify contact emergency services and notify their doctors, family, and staff members. Residents will be able to always access the emergency button on the application to expedite getting help when required.
3) Social Platform
This feature acts as a forum for residents to share their thoughts, memories, media and discuss any grievances among themselves. This social platform will serve to assist senior citizens in mitigating loneliness and anxiety.
4) Health Reminders
This feature will allow residents to get timely reminders to drink water and go to sleep on time. The system will also track their water intake, calories consumed, and sleep cycles to make appropriate suggestions for improving their well-being.
5) Chatbot
Residents can make use of the chatbot to communicate with the system. Senior citizens who are unable to or unwilling to access other features of the system via the visual interface can do so through the audio or text interface of the chatbot. Further, the voice used by the system to communicate with the residents can be customized to provide senior citizens company of their loved ones.

B. Old Age Home Staff

The proposed application interface for the Staff consists of the following features:

1) Background Information
The staff members will be able to view the complete background of residents. This includes their medical history, allergies, routine, and contacts of their family members.
2) Appointment Schedules and Reminders
The staff members can view all appointments scheduled by the residents so that they can assist them wherever required. They can also schedule appointments for residents on their behalf. In addition, they will also receive reminders of due appointments and any medication to be given to the residents. Thus, they will be able to minimize the risk of skipped doses.
3) Emergency Contact
If a resident is unable to use the emergency contact feature due to any reason, staff members can do so on their behalf. They can use the emergency button on their respective interfaces to contact emergency services and notify the residents' family members.

C. Medical Practitioner

The proposed application interface for medical practitioners consists of three features:

1) Appointment Scheduling
Medical practitioners can suggest a consultation to residents and can confirm appointments scheduled by them. They will also receive a reminder about due appointments.
2) Medical History
Medical Practitioners will have access to the complete medical records of residents undergoing consultation by them. These include their past surgical procedures, prescription history, past ailments, and their family history. This will assist them in providing the most accurate diagnoses and prevent any further ailments.
3) Emergency Alerts
In the event that an emergency procedure is required, medical practitioners can notify the staff members as well as family members of a resident.

D. Administrator

The administrators can monitor and manage the entire functioning of the old age home. They can add, remove, and edit details of residents, staff, and medical practitioners in the system. They can closely monitor all appointments scheduled and can address any grievances. The administrators can also send notifications through the application to the residents, staff members, and medical practitioners.

IV. SYSTEM DESCRIPTION

A. Technologies Used

For the web application interface designing and validation, we have made use of HTML5, CSS3, React.js, and Material UI. To make the proposed solution accessible to all, we have made use of PWA (Progressive Web Application) technology; thus, it is supported on the web as well as Android and iOS devices. For database storage, we have relied on MongoDB (for easy storage and image uploads). For storing audio files sent by residents' loved ones, we will make use of Amazon S3. For the backend of the

proposed solution, we have used Node.js and Express.js.

We have made use of the DialogFlow API/Rasa chatbot framework for machine learning. NLP (Natural Language Processing) is used for the chatbot system to efficiently resolve ambiguity in language and to add speech recognition (voice input - speech to text). For processing audio clips and adding the voice to the voice assistant chatbot, we have made use of Ableton Live. We have automated this process using Selenium.

For ensuring security we have used SHA 256 (Secure Hash Algorithms) algorithms, rate limiter to prevent DDOS (Distributed Denial of Service) attacks, and JWT (JSON Web Token) for session management.

B. Audio Processing

To customize the voice used by the chatbot according to the voice of the residents' loved ones, audio clips in their voice must be recorded first. The audio clips will consist of a list of words to be recorded by the residents' loved ones. The list consists of different words like Good, Morning, Afternoon, Evening, and Night for the greeting audio along with a list of Months, Numbers, and few phrases. This audio should be recorded with subtle pauses which will make the processing easier. This audio will then be normalized, processed, and gain-staged accordingly. Before the final .wav file is exported and stored into the database, the audio will be mixed and mastered using an AI (Artificial Intelligence)-based audio plugin that removes background noise, if any. It also takes care of excess sibilance, because the plurality of samples provided will be recorded using the built-in microphones of their smartphones which accentuates sibilance, and not using condenser microphones. Finally, all the exported .wav files will be stored in the database such that they can be easily accessed by the chatbot at all times.

V. DISCUSSION

The proposed solution, EarlyModern, will coalesce existing applications [1][6][7][8][11] with distinct uses into a single application acting as a panacea for Old Age Homes.

A. Future Scope

The utility of the proposed solution can be further improved by adding new features such as:

- A private messaging interface with end-to-end encryption for residents to communicate privately among themselves
- A video calling service for residents to communicate with each other or with their family members
- A calorie-monitoring service for medical professionals to track and plan the calorie-intake of residents
- I ntegrating national digital health IDs provided by the government

VI. CONCLUSION

The solution proposed in this paper will not only help in the efficient management of Old Age Homes but will also help in ameliorating loneliness and related mental conditions among senior citizens by giving them company via a voice assistant chatbot.

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AET 007

Image Caption Generator

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Abstract— The recent advances in Deep Learning based Machine Translation and Computer Vision have led to excellent Image Captioning models using advanced techniques like Deep Reinforcement Learning. We are going to implement a Python based project where we will use deep learning techniques of Convolutional Neural Networks and a type of Recurrent Neural Network (LSTM) together. In this project, we take a close look at a few of the core ideas of Image Captioning and its well-known methods before presenting our CNN and LSTM-based implementation with significant changes and optimizations that allow us to run those models on low-end hardware for hand-held devices. It's a difficult problem for a machine to automatically describe objects in an image, their relationships, or the actions being performed using a learned language model, but it has a huge impact in many fields. It could, for example, support or advise people with visual impairments by helping them better grasp visual inputs. The model must be capable of not only solving the computer vision issues of detecting the items in a picture, but also of capturing and expressing the object's connections in natural language. As a result, creating image captions has long been seen as a tough task. Its goal is to imitate a human's ability to absorb and synthesise large volumes of visual data into a descriptive language, making it an appealing AI challenge. Many large tech companies are spending extensively in Deep Learning and AI research, as a result of which the topic of image captioning is being researched by several distinct teams at multiple organizations.

I. INTRODUCTION

Humans have the basic ability to describe an image with a large quantity of information about it with only a fast glance. You saw an image and your brain readily deduced what it represented, but can a computer deduce what it represents? In the domains of machine learning and artificial intelligence, creating a computer system that can imitate human abilities has long been a study objective. Several research advances have been accomplished in the past, including the detection of items from a given image, attribute classification, image classification, and human action categorization.

An image caption generator system is a difficult challenge that involves creating a computer system that can identify an image and provide a description using natural language processing. Understanding higher levels of semantics and conveying the semantics in a human-readable language are among the tasks involved in creating a caption for an image. The computer system must learn the relationships between the items in a given image in order to comprehend higher levels of semantics. Humans usually communicate using natural language, thus creating a system that generates descriptions that are understandable by humans is a difficult task. Understanding visual representations of items, establishing links among the objects, and generating captions that are both linguistically and semantically acceptable are some of the tasks involved in creating captions. Researchers in computer vision spent a lot of time on this and thought it was impossible until today! We can now develop models that can generate captions for images thanks to advances in deep learning techniques, the availability of large datasets, and computer power.

This is what we'll do in this Python-based project, where we'll combine Convolutional Neural Networks and a sort of Recurrent Neural Network (LSTM) deep learning approaches. To understand the context of an image and explain it in a natural language like English, image caption generator uses computer vision and natural language processing techniques. The goal of this research is to use deep learning to identify, recognize, and generate captions. The Flickr 8K dataset will be used for the image caption generator. The benefit of a large dataset is that we can create more accurate models.

II. PROBLEM DEFINITION

The goal of our project is to implement CNN with LSTM to create a workable model of Image caption generator. We will use CNN (Convolutional Neural Networks) and LSTM to create the caption generator in this project (Long short term memory). The image characteristics will be taken from Xception, a CNN model trained on the imagenet dataset, and then fed into the LSTM model, which will generate the image descriptions. The Flickr 8K dataset will be used for the image caption generator. Deep learning, Python, working with Jupyter notebooks, Keras library, Numpy, and natural language processing will all be used.

As a result, we'll combine these architectures to create our image caption generator model. It's also known as the CNN-RNN model. The CNN algorithm is used to extract features from an image. We'll utilise the pre-trained model Xception. LSTM will utilize the data from CNN to assist with producing a depiction of the picture.

III. LITERATURE SURVEY

Domain-Specific Image Caption Generator with Semantic Ontology Seung-Ho Han, Ho-Jin Choi

The task of creating written descriptions for a given image is known as image captioning, and it requires computer vision and natural language processing techniques. Deep learning approaches have been used in recent models to improve performance on this challenge. However, because present methods use open datasets like MSCOCO, which contains broad photos, these models are unable to fully utilize information included in a given image, such as object and attribute information, or construct a domain specific caption. To address these issues, this work proposes a domain-specific image caption generator that creates captions based on object and attribute information and reconstructs captions using a semantic ontology to provide natural language descriptions for a specific topic.

To demonstrate the efficacy of the proposed approach, we quantitatively and subjectively evaluate the picture caption generator using the MSCOCO dataset. The object detector's job is to find some entities in a picture. We utilize a pre-trained model called Mask R-CNN (Convolution Neural Network) to create the object detector. Mask RCNN predicts numerous proposals for a given image with confidence values. The purpose of the attribute predictor is to forecast certain relevant qualities for a given image. The attribute is a term that represents the image. The attribute predictor's main principle is to map picture features and texture features. To get domain-specific captions, we reconstruct general captions using a domain-specific semantic ontology that incorporates relationships between general and domain-specific words.

Image caption generator has been assessed qualitatively and quantitatively in the experiments. The model's weakness is that it does not provide an end-to-end solution for semantic ontology.

Image Captioning - A Deep Learning Approach

Lakshminarasimhan Srinivasan, Dinesh Sreekanthan, Amutha A.

The topic of autonomously producing descriptive words for photographs has piqued interest in natural language processing and computer vision research in recent years. Image captioning is a key task that necessitates a semantic comprehension of images as well as the capacity to generate accurate and precise description phrases. The authors propose a hybrid approach that uses a multilayer Convolutional Neural Network (CNN) to produce image-related vocabulary and a Long Short Term Memory (LSTM) to reliably compose meaningful sentences utilising the generated keywords. The convolutional neural network compares the target image to a vast dataset of training photos before using the trained captions to provide an accurate description. The Bleu metric is a method for measuring the quality of text translated from one natural language to another in order to evaluate the effectiveness of a machine translation system.

The proposed model's performance is assessed using standard evaluation matrices, which show that it outperforms earlier benchmark models. Keras sequential API was used with Tensorflow as a backend to create a deep learning architecture that yielded a BLEU score of 0.683 for our model.

The BLEU, or Bilingual Evaluation Understudy Score, is a statistic for comparing a generated sentence to a reference sentence. A perfect match receives a 1.0 score, whereas a perfect mismatch receives a 0.0 value. The authors plan to use alternate Pre-Trained Photo Models in the future to improve the model's feature extraction. Furthermore, the authors intend to increase performance by employing word vectors on a much bigger corpus of data, such as news articles and other internet data sources.

Topic Guided Attention for Image Captioning

Zhihao Zhu, Zhan Xue, Zejian Yuan

Because of its high performance, attention mechanisms have sparked a lot of interest in image captioning. Existing attention-based models employ feedback from the caption generator to help them figure out which image aspects should be prioritized. The lack of higher-level guiding information from the image itself is a prevalent flaw in these attention creation approaches, which limits the selection of the most useful image characteristics. As a result, the authors suggest a unique attention mechanism called topic-guided attention, in which picture topics are used as guiding information in the attention model to help choose the most essential image elements. They also use different networks to extract picture features and image topics, which may be fine-tuned together in an end-to-end way during training. The results of their experiments on the benchmark Microsoft COCO dataset reveal that their strategy outperforms the competition on a variety of quantitative parameters.

The Encoder-Decoder framework is utilized in the topic-guided attention network for image captioning, where an encoder is used to extract image features first, and then a decoder is used to interpret the encoded image features into captions. In contrast to other systems' encoding processes, this approach extracts three categories of image features: visual features, attributes, and topic.

For extracting the image's visual features, a deep CNN model is utilized, and a multi-label classifier and a single-label classifier are used separately for extracting the image's topic and attributes. They then use topic guided spatial and semantic attention to select the most significant visual characteristics and qualities to send into the decoder using these three pieces of information. They use LSTM as their caption generator in the decoding phase. Unlike earlier approaches, they use the image topic, attended visual characteristics, and attributes in a novel way: the image topic T is only input into LSTM at the first step, giving LSTM a rapid overview of the overall image content. In general, spatial attention is utilized to choose the visual elements with the most information-carrying sub-regions, guided by LSTM feedback information.

This paper proposes a new spatial attention process that incorporates the visual topic as auxiliary guidance while creating attention. The addition of image attributes to the image captioning system improved image

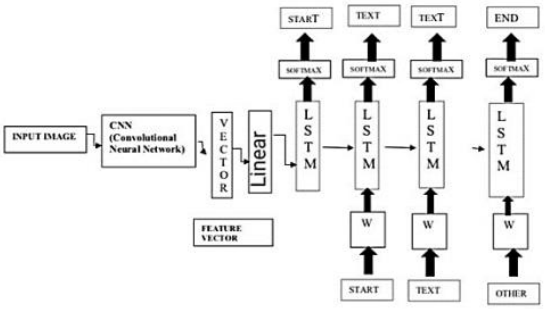
captioning performance by explicitly reflecting high-level semantic information. The authors intend to experiment with novel approaches to combine spatial and semantic attention in a single attention network in the future.

IV. OUR PROPOSED WORK

We will combine Convolutional Neural Networks and a sort of Recurrent Neural Network (LSTM) deep learning approaches. To understand the context of an image and explain it in a natural language like English, image caption generator uses computer vision and natural language processing techniques. The goal of this research is to use deep learning to identify, recognize, and generate captions. The Flickr 8K dataset will be used for the image caption generator. Other large datasets, such as Flickr 30K and MSCOCO, are also available. The benefit of a large dataset is that we can create more accurate models.

Convolutional neural networks are a type of deep neural network that can process data in the form of a 2D matrix. Images are easily represented as a 2D matrix, and CNN is an excellent tool for working with them. CNN is mostly used to classify images and determine whether they depict a bird, a jet, or Superman, among other things. It scans images from left to right and top to bottom to extract significant elements, which it then combines to classify the images. It can handle photos that have been rotated, resized, then rotated again, as well as changes in perspective.

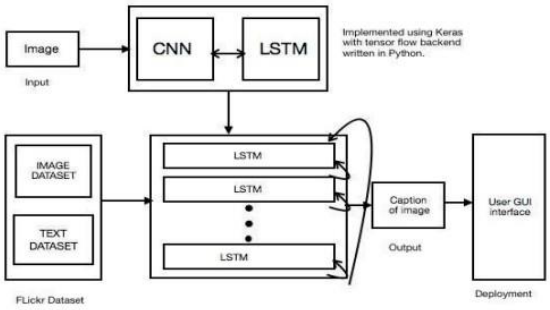
Long short term memory (LSTM) is a form of RNN (recurrent neural network) that is particularly well adapted to sequence prediction challenges. We can guess what the following word will be based on the preceding paragraph. It has outperformed regular RNNs in terms of overcoming the limitations of RNNs with short term memory. The LSTM may carry out relevant information throughout the processing of inputs, and it can discard non-related information using a forget gate.



Here in this model, input image is given & then A convolutional neural network is used to create a dense feature vector as shown in figure. This dense vector, also called an embedding, this vector can be used as input into other algorithms, and it generates suitable caption for given image as output.

V. SYSTEM ARCHIETECTURE

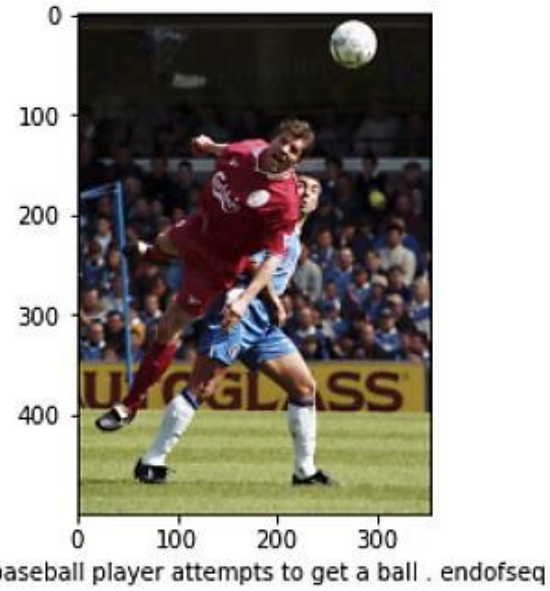
The proposed system of Image Caption Generator has the capabilities to Generate Captions for the Images, provided during the Training purpose & also for the New images as well. Our Model takes an Image as Input and by analyzing the image it detects objects present in an image and create a caption which describes the image well enough for any machine to understand what an image is trying to say.

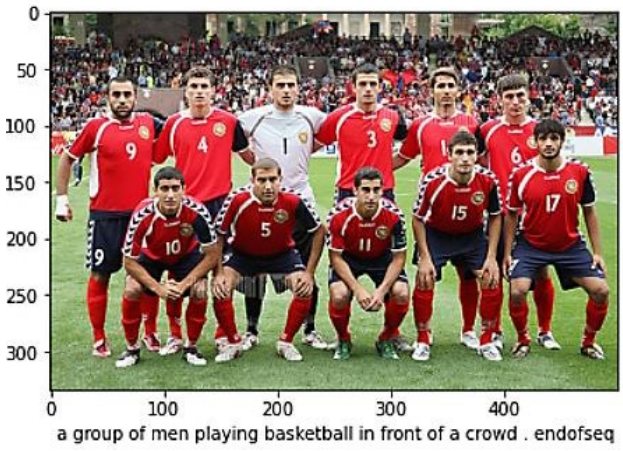


The image is processed with CNN to extract features. We'll utilise the pre-trained model Xception, which will employ CNN information to help create an image description.

VI. RESULTS

Our project is able to generate moderately comparable captions with compared to human generated captions. Our project will be able to generate the following results:





VII. CONCLUSION

In this advanced Python project, we have implemented a CNN-RNN model by building an image caption generator. However, our model will depend on the data, so it won't be able to predict the words that are out of its vocabulary. We will use a small dataset consisting of 8000 images. For production-level models, we need to train on datasets larger than 100,000 images which can produce better accuracy models. Our project on image captioning can be used for a variety of use cases such as assisting the blind using text to speech by real time responses about the surrounding environment through a camera feed, enhancing social medial experience by converting captions for images in social feed as well as messages to speech. Assisting young children in recognizing objects as well as learning the English language. Captions for every image on the internet can lead to faster and descriptively accurate image searches and indexing. In robotics, the perception of environment for an agent can be given a context through natural language representation of environment through the captions for the images in the camera feed.

ACKNOWLEDGEMENT

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AET 008

Building NFT Marketplace using Ethereum Blockchain

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Abstract—The Non-Fungible Token (NFT) request has been growing in recent times. The conception of NFT firstly comes from a token standard of Ethereum, getting to distinguish each token with distinguishable signs. These types of tokens are frequently bound with virtual/ digital parcels as their unique identifications. With NFT's, all pronounced parcels are frequently freely traded with customized values harmonious with their periods, oddities, liquidity, etc. It has greatly stimulated the substance of the decentralized operation (DApp) requests. The total plutocrat used on completed NFT deals has reached 34,530,649.86 USD. The thousandfold return on its adding request draws huge attention worldwide. Still, the event of the NFT ecosystem remains in its early stage, and thus the technologies of NFT's are pre-mature. Beginners may transgress in their wild elaboration thanks to the deficit of methodical summaries

Index Terms—Ethereum Blockchain, Smart Contracts, FT(Non Fungible Tokens) Decentralized Computation, IPFS - Inter Planetary File System, ERC 1155 - Ethereum Request for Comment.

I. INTRODUCTION

The COVID-19 pandemic has pushed digitalization and digitization across all industry sectors and blockchain is taken into account an innovative frontrunning technology with regards to applicability and usefulness in these challenging times. Blockchain technology has enabled access, through the method of tokenization, to assets that, until now, couldn't be traded quickly and simply. Tokenization is one among the cornerstones of Decentralized Finance (DeFi) and a native functionality of multiple blockchain architectures. The properties and features of a token unlock a spread of economic possibilities, besides the most function of using it as fuel for the network itself. A basic definition of a token refers to a digital asset that's created, issued and managed on a Blockchain or Distributed Ledger Technology (DLT) infrastructure, and is meant to be highly secure with a moment transferability property. With the advancement of smart contracts, some built-in functionalities are developed and programmed, which helped push the tokenization process to new heights. From land security tokens that represent fractionalized properties to platform-specific tokens that incentivize the utilization of a specific application, tokens have emerged as a secure and digital alternative for users across the planet to access, trade and store value. The Content Creators and Art industry goes through a paradigm shift with the introduction of Non Fungible Tokens (NFTs), because the space is acquiring an outsized number or artists hoping to maximize the innovation and distribution power that blockchain technology is offering. What digitization first faraway from art, blockchain is trying to bring it back, reshaping the art world with viable tools for provenance, authenticity and distribution. In this paper we'll assess the innovative approach of NFTs in several sectors, with an in- depth analysis of their usability and impact. we'll be that specialize in the features of NFTs to make sure scarcity, traceability and proof of ownership, amongst the foremost essential properties needed to make, store and maintain the worth of an asset.

II. LITERATURE SURVEY

The Non-Fungible Token (NFT) request has been growing in recent times. The conception of NFT firstly comes from a token standard of Ethereum, getting to distinguish each token with distinguishable signs. These types of tokens are frequently bound with virtual/ digital parcels as their unique identifications. With NFT's, all pronounced parcels are frequently freely traded with customized values harmonious with their periods, oddities, liquidity, etc. It has greatly stimulated the substance of the decentralized operation (DApp) requests. The total plutocrat used on completed NFT deals has reached 34,530,649.86 USD. The thousandfold return on its adding request draws huge attention worldwide. Still, the event of the NFT ecosystem remains in its early stage, and thus the technologies of NFT's are pre-mature. Beginners may transgress in their wild elaboration thanks to the deficit of methodical summaries.

Blockchain is frequently described as a data system that stores records while ensuring security, transparency, and transactional decentralization. you'll Consider it as a set of records or a sequence of events. The sorts of blocks that are not under the jurisdiction of a single person authority. A blockchain is a type of distributed ledger. Everyone in the network is completely hospitable. Once Associate in Nursing data is stored on a blockchain, it may be accessed by anybody. It's really difficult to change or modify it[1]. Smart contracts which are digital agents that encode, execute, and enforce arbitrary agreements, are possible with a second generation of blockchains. Smart contract systems make it easy to create a wide range of essential distributed applications (dApps) in a straightforward manner that was previously difficult to do. The most well-known smart contract platform is Ethereum [2].

Before moving to NFT Marketplace will just look what NFT is? The notion of NFT was inspired by an Ethereum token standard that aimed to differentiate each token using

distinct signatures. As its unique identifiers, this sort of token can be coupled with virtual/digital attributes. All indicated properties may be freely sold with customised values based on their ages, rarity, liquidity, and other factors using NFTs. It has boosted the growth of the decentralised application (DApp) market significantly[3]. NFTs are digital asset ownership rights that are securely mapped to blockchain-based tokens. NFTs give a mechanism to indicate ownership or possession of digital goods such as art, music, games, or collectibles, similar to possessing a real work of art (which visitors to a museum may also gaze at without owning) [4].

NFT marketplace is a foundation where several types of activites can take place [5].

- **Mint:** Minting is the process of converting digital art into an NFT by incorporating it into the Ethereum blockchain. Digital art becomes a legitimate NFT validated by the Ethereum blockchain when it is minted, just as a physical currency does after it is minted.
- **Selling:** When a user purchases an item, the purchase price will be transferred from the buyer to the seller and the item will be transferred from the marketplace to the buyer. A listing charge will be established by the marketplace owner. This charge will be collected from the seller and transferred to the contract owner following the completion of every sale, allowing the marketplace owner to earn recurring money from any sale made on the platform.
- **List:** After an NFT is minted, its owner can put it up for auction with a reserve price, which is the lowest price that can be paid. Once then, the auction for the associated item begins only after the first bid is received. When a bid is received in the last 15 minutes of the auction, the sale is extended to 15 minutes.
- **Unlist:** The owner of a listed NFT can unlist their NFT to reverse the consequences of listing and return it to a condition where no auction can be launched.
- **Bidding:** When an NFT is put for auction with a reserve price, anyone who are interested in collecting it can bid more than the previous bids or the reserve price if no bids are received.
- **Settle:** When an auction ends, the winner is identified in order for the auction to be completed and the effects of changing ownership and transferring funds to occur, either the NFT's owner or the auction winner must settle the auction.
- **Transfer:** By transferring ownership of an NFT to another individual, the owner can cede control of the NFT. The owner of the transferred NFT changes after the move.

III. PROBLEM STATEMENT

NFTs serve as proof of ownership for a person. This means they'll be able to profit from the right to own it. However, because the internet is so permeable, possessing an NFT does not necessarily imply exclusive rights, as digital work may be simply and endlessly replicated, but non-fungible tokens allow buyers to authenticate ownership. Simply, think of the wellknown, high-priced painting (Eg: Mona Lisa). You can go to a museum and look at the painting or even photograph it, but you can't take it home with you since you don't own it. However, the artwork on your wall at home is similar to an NFT because it is entirely yours and you can do whatever you want with it. Digital art can be easily and endlessly duplicated so, to solve these problems we aim to Design a platform to Buy and Sell NFT.

IV. ETHEREUM

In Vitalik Buterin's article, Ethereum was proposed to overcome numerous shortcomings of Bitcoin's programming language [6].

The most significant features include full Turing-completeness, which means that Ethereum supports all forms of computations, including loops. Then Ethereum supports the transaction's state, as well as various other enhancements to the blockchain structure. Ethereum is a blockchain that includes a Turing complete programming language. It has an abstract layer that allows anybody to build their own rules for ownership, transaction formats, and state transition mechanisms. This is accomplished through the use of smart contracts, which are a collection of cryptographic rules that are only performed if specific criteria are satisfied [7].

In terms of decentralised and distributed apps, it's a huge step forward. Trustability, cooperation, organisation, identity, quality, and transparency are all advantages of blockchain technology. In simple words, decentralisation means that a service or application is installed on a network in such a way that it offers no complete data and execution management to any server. No one in this cluster has the ability to change or delete past transactions; instead, each server has a current copy of data and execution logic. Any server or node on a network that is distributed is connected to every other node, either directly or indirectly. The term ledger is related with an accounting term, and it may be thought of as specialised data storage and retrieval[8].

Externally owned accounts (EOA) allow users to submit transactions directly to them, while Contract accounts allow a contract to call another contract by sending an internal transaction depending on the contract's code. Every account has two keys: a private key and a public key. Each account address is derived from the final 20 bytes of the public key and is required for each transaction [9].

V. IPFS - Inter Planetary File System

IPFS is a peer-to-peer distributed file system that was created to complement HTTP, which now dominates the Internet. IPFS connects all standby and idle storage devices to the same file system, creating a worldwide unified storage system. The key notion is that IPFS employs a content based address rather than an IP-based address, which means that users browse for material by checking the file hash without having to authenticate their identity[9]. It combines principles from earlier peer-to-peer networks, as well as DHTs, BitTorrent, Git, and SFS, to create a new peer-to-peer network. IPFS makes a substantial contribution by combining proven approaches into a larger system than the sum of its parts. IPFS introduces a fresh new feature.

VI. PROPOSED SYSTEM

The system follows the following steps while performing NFT Marketplace:

1. Login with Metamask: Metamask is a cryptocurrency wallet that allows you to store and trade Ethereum and other ERC-20 tokens. It is installed as an extension to your Chrome or Firefox browser rather than being registered on a website.
2. Create NFT and mint them: When a user puts an item for sale, the ownership of the item will be transferred from the creator to the marketplace.
3. Buy/Sell NFT on the market place: When a user purchases an item, the purchase price will be transferred from the buyer to the seller and the item will be transferred from the marketplace to the buyer. A listing charge will be established by the marketplace owner. This charge will be collected from the seller and transferred to the contract owner following the completion of every sale, allowing the marketplace owner to earn recurring money from any sale made on the platform.
4. Creator Dashboard: A dashboard to view all your created NFT and NFT that are bought
5. Deploy on Ethereum: Deploying our smart contracts on Ethereum test networks which serves as the core part of our system where minting and mapping of buyers and sellers will take place.

VII. METHODOLOGY

An NFT marketplace is similar to an ecommerce site. NFT developers have been actively building marketplaces for these files as their popularity develops. Some contemporary marketplaces provide as generic trading platforms. Example:- Digital Artworks, Music, Clips, GIFs, Photos, Tweets, Games, Domains, Tokens, Licenses and etc.

The approach for solving the problem is to identify the requirements of the software and then work on the features of the platform We divided the whole project into 4 parts- frontend, backend, Data Storage and Blockchain. For Frontend we are using next.js and for Backend we are using node.js The core part of the project lies in the smart contracts, we have created Two smart contracts namely NFT. sol and NFT_Marketplace.sol . NFT.sol is a smart contract to create a token for a digital asset made under ERC-721 standard. NFT_ Marketplace. sol consist of the core logic of our marketplace where in mapping of buyers and sellers will take place. Whenever new NFT would be minted its ownership would be with NFT_Marketplace.sol and once that NFT is being sold on the open market it's ownership will be transferred from NFT_Marketplace.sol to Buyer of that NFT. This whole logic is being handled by NFT_Marketplace. sol. For the Data Storage of images and the metadata related to it is being stored on the IPFS (Inter Planetary File System) via IPFS client server authentication. We used Hardhat as a tool for compiling our smart contracts and connect it to public blockchains via RPC's (Remote Procedure Call) and deploy our smart contracts. We are using Ropsten test network which is a public test blockchain and it's operating currency is ethers. By using the public RPC of the network, we deployed our smart contracts on it, so all the minted NFT data as well as transaction data is being stored on the blockchain

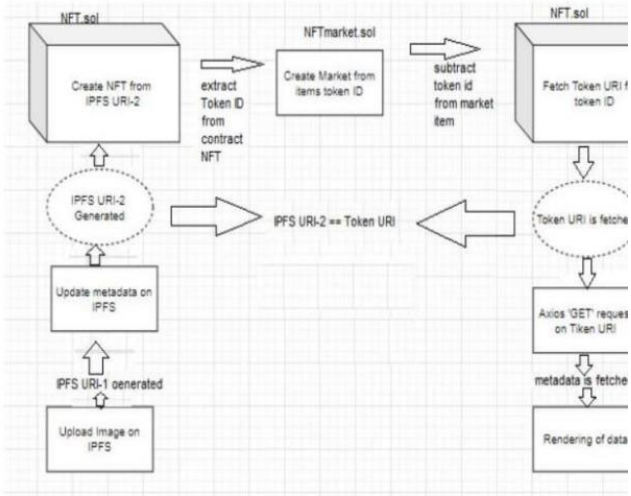

Figure 1 NFT marketplace Block Design

VIII. OBJECTIVES

Objectives of our project are:

1. Maintain safety of user's asset's: Using Metamask wallet we would be implementing a Proof-of-activity (PoA) which is a blockchain consensus algorithm used in cryptocurrencies and similar systems. It is used to ensure that all transactions occurring on the blockchain are genuine, as well as to ensure that all sellers arrive at a consensus.
2. Product Listing Monetization Model: A listing fee is the best way to compensate sellers who are selling high-ticket products. While the commission-based revenue model only pays out if a sale is completed, it ignores income or fees from low-performing or less popular items. That is where the product listing model excels, as it allows for- profit on every ad or product posted on the marketplace platform.
3. User-friendly The NFT marketplace website is simple to use, making it a welcoming environment for beginners.
4. Decentralization: The Decentralized nature of the blockchain implies the following functions in the E-Commerce marketplace system.
   - Nothing is kept centrally.
   - All transaction data is copied and distributed over a network of computers.
   - Whenever a new block is added to the blockchain, each computer on the network updates its blockchain to reflect the change.
   - Only one copy of the information is kept in the event of a hack

IX. RELATED WORKS

Our project "NFT marketplace is similar to the Major Marketplaces. We went through a lot of research on both these platforms and identified some of the key features and some of the drawbacks of the platforms. We thought of solutions to these drawbacks that will be implemented in our system. NFT marketplaces are separated into two types: open marketplaces, where anybody may join as a creator without restriction, and closed marketplaces, where only invited individuals can register as creators. Although open marketplaces have lower "premium" values than exclusive platforms, it would be great if everyone went through the minting and listing stages in the open market

first, then built their careers as NFT artists to be admitted to exclusive platforms.

SuperRare

Since 2018, PIXURA Inc has operated SuperRare [10], an exclusive NFT platform. Although it was a more open and accessible platform in the early days of NFT, as NFT cultures grew in popularity, it has become a more elite and exclusive community in recent years.

Key features

1. Need to apply for the creator invitation by submitting your profile and portfolios.
2. JPEG, PNG, GIF and MP4 are supported.
3. Super Premium!

Cons

1. You also need to submit your 1-minute application video to capture your self-introduction.
2. Application is reviewed in one or two months after submission and often takes longer time.
3. SuperRare also charges buyers 3% transaction fee as well as charging creators 15% commission per NFT sale.
4. Very difficult to join.

Rarible

Rarible is also one of the most dependable major NFT marketplaces, allowing developers to mint NFTs using both Rarible's original token, "RARI," and ERC721[11]. Image, video, and audio formats are all supported. Key features

1. Rarible has its own "RARI" token. This can be used to not only sell or buy NFTs on the platform, but also to propose or vote on changes, moderate community members, curate featured artworks, and promote members through community or art grants. As a result, it acts as a virtual "stock" that allows users to participate in platform administration.
2. The page's user interface is both collector and creator friendly, so you'll have more opportunities to find your favorite works of art.
3. Large market, User-friendly website design.

Cons

1. Expensive and multiple-time gas payment required

OpenSea

In terms of NFT sales, OpenSea[12] is the market leader. OpenSea offers a wide range of digital materials available on its platform, and signing up and browsing the broad choices is completely free. It also helps artists and creators, and it provides a simple approach for creating your own NFT.

The platform's moniker is fitting because it supports over 150 different payment tokens.

Key features:

1. Easy to create your own NFTs.
2. Zero gas fees with new Collection Manager feature.
3. Pick royalties up to 10%.
4. iOS mobile app.

Cons:

1. Royalties low compared to Rarible.
2. No support for fiat currency such as USD.

X. RESULTS

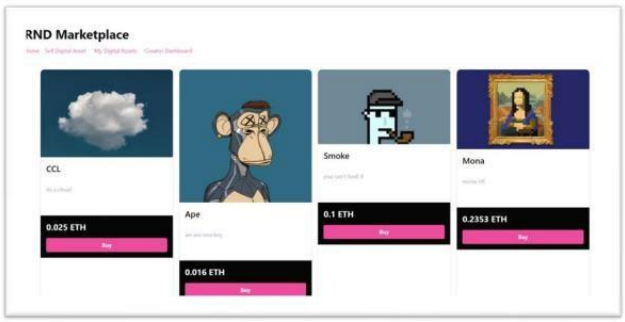

Fig: Home Page Of NFT Marketplace

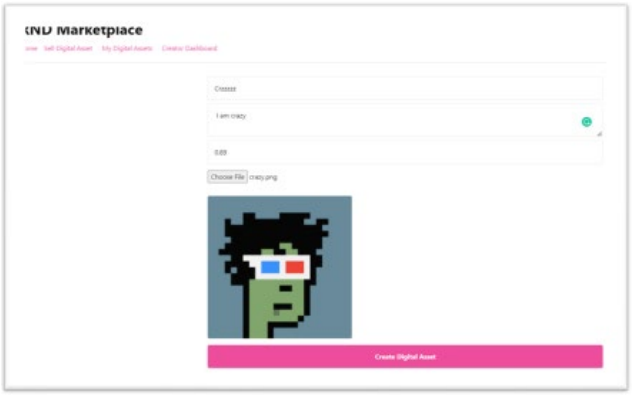

Fig: Minting NFT

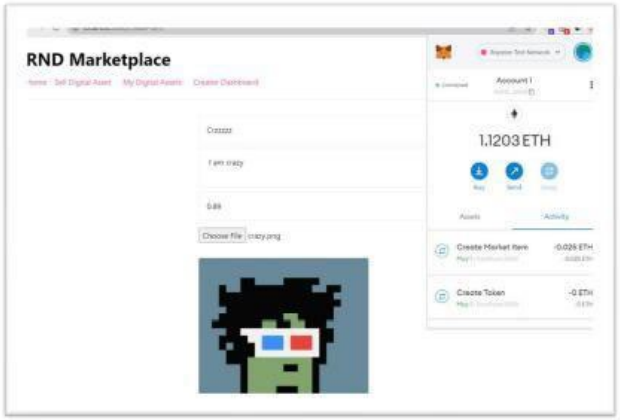

Fig: Minting NFT with Account 1

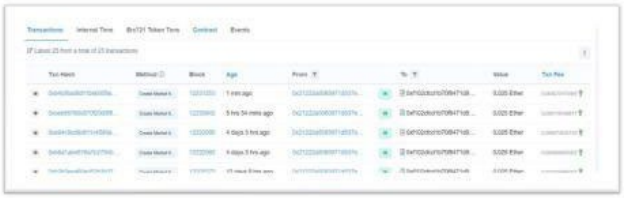

Fig: Transaction Details of Minting NFT from Account 1

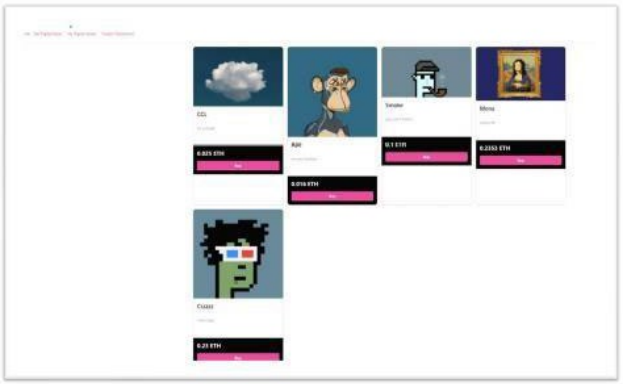

Fig: Minted NFT

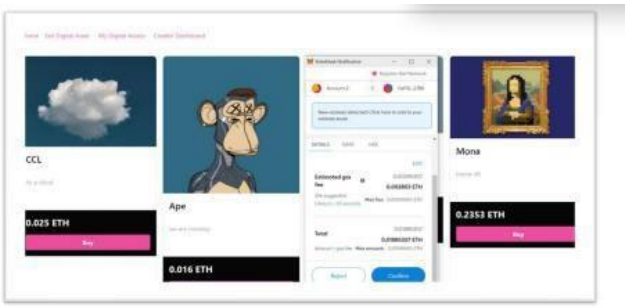

Fig: Buying NFT From Account 2

Fig: Transaction Details of Buying NFT From Account 2

Fig: My Digital Assets of Account 2

XI.CONCLUSION

The proposed architecture utilizes the decentralized network of Ethereum Blockchain. The NFT marketplace is a cutting-edge platform for trading, selling, and purchasing digital works. With cryptocurrency's expanding popularity and value, it's reasonable to predict that NFT markets and the entire blockchain network will remain in demand in the long term, which is why it's so important now and in the future.

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AET 009

Developing Neelkanth Game Using Unreal Engine

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Abstract—Our desktop-based, Game, "Neelkanth", is made from the concept of a very famous Book, "Shiva: The Immortals of Meluha", by Amish Tripathi, where he has shown the protagonist, Shiva, amongst the normal people, as a human, with some of his special powers. With that in mind, our group has made a game on our Indian culture. It will be an Action-Based Game, which will be created based on the Environment given in the book.

This game will depict Shiva (Neelkanth) who battles evil with his mighty axe. This is a fictional story based on Lord Shiva who is shown as a human who comes from Mount Kailash in the Himalayas near Tibet.

I. INTRODUCTION

The aim was to develop an action-based game with various difficulty levels. Here, people will be able to know more about ancient Indian-Culture and have a very fun game to play. It should have a better interaction while playing, appealing graphics and good animations to give the user full gaming experience and boost personal skill sets, prepping them for the industry world.

Neelkanth is an Action-based RPG game, built on the concept of a very famous book by Amish Tripathi, "Shiva: The Immortals of Meluha", using Unreal Engine, Blender and many more such software for different assets. There are a total of 6 waves, with each wave the difficulty level increases. To show Indian culture we have named the game on the basis of Indian-Culture of Gods. Lord Shiva consumed the poison that originated from the sea, when God (Devas) and Demons (Asuras) churned the ocean in order to get Amrita. This poison that emanated during the "Samudra Manthan" made his throat blue in colour. This is how he was named as Neelkanth. And on the basis of this legendary story, we named our project the same as well.

II. LITERATURE SURVEY

A survey taken by us showed that these 3 skills are few of the many most important skill sets a company looks into before hiring through aptitude tests and programming tests. In 2017, the game development industry generated $0.4 billion profit. This figure grew to $0.6 billion the following year and $0.8 billion in 2019. By 2028, this figure is estimated to reach $53.44 billion showing significant development. Game Development is a very trendy and booming industry. There are over 15000 game developers and 275 game development companies in India. [1]

In the software development industry, software games are gaining importance because they are not only used for entertainment, but also for serious purposes that can be applicable to different domains such as education, business, and health care. Serious games are designed to have an impact on the target audience like entertainment games, but they are combined seemingly with a practical dimension too. Both must be attractive and appealing to a broad target audience.

A. Comparison between unreal engine and Maya

When assessing the two solutions, reviewers found Unreal Engine easier to use and administer. However, reviewers felt that Maya was easier to do business with overall. Finally, reviewers felt that the products are equally easy to set up.

- Reviewers felt that Unreal Engine meets the needs of their business better than Maya.
- When comparing the quality of ongoing product support, reviewers felt that Unreal Engine is the preferred option.
- For feature updates and roadmaps, our reviewers preferred the direction of Unreal Engine over Maya.

B. Comparison between Unity and Unreal Engine

Comparison between Unity and Unreal Engine		
Parameters	*Unreal Engine*	*Unity*
Definition	Source available game engine.	Cross-platform game engine.
Developed by	Epic Games.	Unity Technologies.
Programming Languages	It uses C# for development.	It uses C++ or JavaScript for development.
Usages	Used to develop games for PC, mobiles. consoles and more.	Used to develop games for PC, mobiles. consoles and more.
Features	The source code is open source.	The source code is not open source.
Pricing	It is free	The basic version is free
Learning Curve	Hard to Learn	Easy to Learn

So, over these parameters we decided to use Unreal engine for development of our game as it is open source, product support is good, having multiple features over them like roadmaps, good graphics quality, good support for beginners with various tutorials and community. [5]

The quixel bridge is taken for asset import as it provides a wide range of assets. The blender is decided for

character design because of its support to develop characters and various features and it is also open source.

III. METHODOLOGY

According to recent statistics, learning has become difficult for children as and how the level of education increases. There are many ways of learning, from Chromatic learning where they use coloured inks to remember, to photographic memory. With that keeping in mind, we wanted the upcoming generation to be better at being good in memorising patterns and probability, and hence does come Neelkanth in play, where the game spawns various enemies, in different combinations, with different locations, helping users boost their logical reasoning, muscle memory, and probability calculations as well.

A. Game Concept

Neelkanth is an Action-based RPG game, playable on PC, and is built with a 3D environment. The game dates quite centuries back around 1900 BC, which is now called Indus Valley civilization, where demons and gods existed and there was rule of king Daksha, a successor of Lord Ram. A great empire which flourished under Lord Ram is now under the threat of extinction. One side is the threat of Chandravanshis with triple the force of the army, another side is the dying Saraswati River. The Chandravanshis and Nagas have joined hands, Nagas are the sinister demons to obliterate Meluha. In order to protect Meluha, a prophecy has been made where, "When all enemies have allied against Meluha covering the three parts of the empire, a hero will emerge from the depths of North to protect the Empire and flourish it beyond the imagination. The symbol of the protector will be his blue throat and will be known as 'Neelkanth, The Destroyer of Evil'."

B. Proposed System

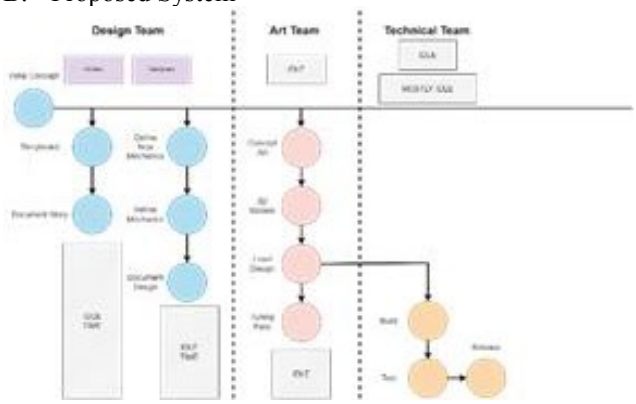

Figure 1 Game Development Process

We have used waterfall model of software development life cycle to develop out game. The steps are,

- Asset creation in the production phase is the foundation stage where we created the various assets and then used them in the game implementation phase.[8] The first step is to create assets for any game. One of these assets is audio creation. An audio-processing library for game development is available in the engine itself. It includes common audio-processing routines and sound-interaction Web games. For audio processing, open-source libraries are available, especially for games. Audio and interface design are examples of game assets. [1]
- Storyboard production is the most important phase of game production, it involves development of game scenarios for level solutions and incorporation of artificial intelligence planning techniques for representing the enemy spawning feature of the game through a flow chart. Finally, we explored scene editor software for game scenes. The approach was based on blueprints, C++, and already available assets online.[5]
- The studies classified under this category proposed various types of platforms for the project. Development platforms provide a ready-made architecture for server–client connectivity and help developers create games quickly. Open-source development platforms are available, we have used platforms like Unreal Engine, Blender, Quixel, Bridge, etc. The second part of the process involved analysis of the entire game structure and extraction of game parameters for later customization. Finally, the tools could be used for game customization. We have provided a basic animation based on our game design and development, highlighting the important aspects of rapid game development.[8]
- Game semantics can be classified under formal language description for programming languages. Very little work has been reported in this area, and very few games semantic descriptions of languages have been published.[9]
- A game engine is a kind of special software framework that is used in the production phase for creating and developing games. Game engines consist mainly of a combination of core functionalities such as sound, a physics engine or collision detection, AI, scripting, animation, networking, memory management, and scene graphs. It divided script engines into two types. The first type is the high-level script engine that includes packaging and refining of the script engine. The second type, the low-level script engine includes feature packages associated only with the front-end. Recently, developers have been using previously developed or open-source game engines to economize on the game development process, so did we, by using Unreal Engine, a free, open-source platform. Various researchers have proposed script-based, design pattern-based, and customizable game engines. In the Game Development Software Engineering process life cycle, game engines automate the game creation process and help a developer to develop a game in a shorter time.[5]
- The foundations of game theory are used in game development because it is a branch of decision theory that describes interdependent decisions. Most studies in this category described different aspects of game implementation technologies on various types of platforms. We have used programming skills, 2D/3D animations and graphics, sound engineering, project management, logic design, interface design, and AI techniques. Various kinds of game implementation technologies can be found in the Literature Survey. The study also described the accessories that can be used for implementation:

application platforms, game engines, and various types of plug-ins, proposing an interactive computer-based game framework for the implementation process. The framework includes steps from design through implementation that are based on game theory foundations and focus mainly on game models and strategies of play. The proposed framework includes architectural design and specifications, a proposed game overview, a game start-up interface and difficulty scaling, game modelling, the game environment and player control, and a free-style combat system.[10]

IV. IMPLEMENTATION

After describing the methodologies used behind this project, the important part was to implement them. The following chapter explains how the game was made using various 3D software's.

A. Character Creation Using Blender

We started with a 2D drawing of our character before you open Blender, using paper right in the program. It didn't have to be elaborate, but it did need outlines for its major features like the head, body, and facial features that protrude, like the nose, making sure to have at least a front view and a side view.

After that, we loaded our 2D drawing file into Blender and used it to set the background picture of the cube as one of our character outlines. It's just like attaching a file to an email or uploading a file on an online job application website. The drawing will pop onto the 3D planes, and we then set it on the 3D axes so that it rests on the planes like it would in real life.

Once we segmented the background picture of our character, we subdivided the cubes into shapes. Using the quad view we created a mesh in the shape of our character outline and set each background picture as one of our character outlines using the mirror modifier, which fills the opposite view symmetrically at the same time, reducing half the work.

Next, we did add clothing and accessories to our character model in Blender, building upon how we created our original character shape. By creating new layers that are copies of what we had already made, we were able to move the outlines of our new layer to reflect how clothes and other coverings drape over our character without needing to start from scratch.[7]

B. Using Quixel Bridge

By using quixel bridge we downloaded the suitable textures and various assets such as trees to create the environment in our Unreal engine.[7]

C. Designing the Game play using Unreal Engine

a) Creating the nvironment: We created a cave with ome plants and light so that a stage is set for the game.[3]

b) Creating Blueprint: We created blueprint for the main menu for the smooth flow of the navigation in the game. [6] We also created the blueprint for weapon pickup, character movement, NPC movement. The Weapon pickup blueprint is shown in figure 2 and main menu in figure 3.[4]

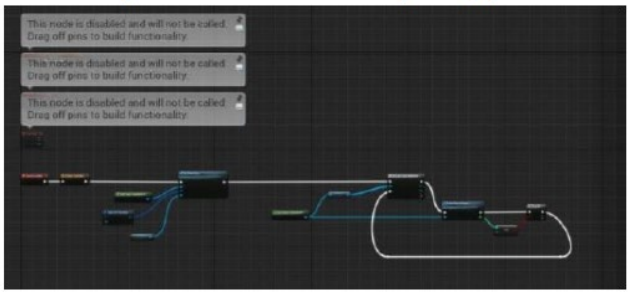

Figure 2 Weapon Pickup blueprint

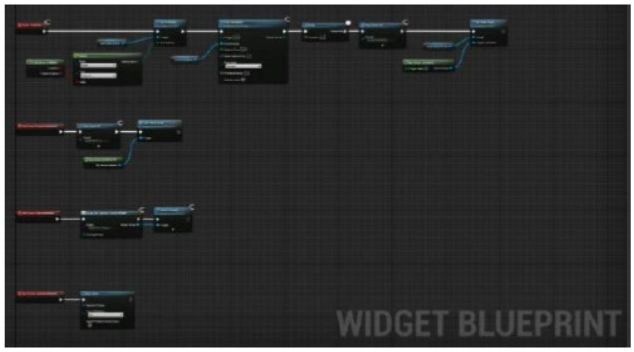

Figure 3 Main Menu Blueprint

c) Creating Behaviour Tree: The Behaviour tree is designed to give our character, NPC(Non Playable Character) and boss to behave according to various events.[4] The character's movements and what will happen if it dies or if user presses some keys how it will behave is designed(See figure 4.). The behaviour tree of NPCs is based on the events of game like character kills them how will they behave or if they spot the character what they should that time (See figure 5). And the boss behavour is similar to NPC as both are the enemy in the game excpet for some changes like attack pattern or damage dealing or defence (see figure 6).

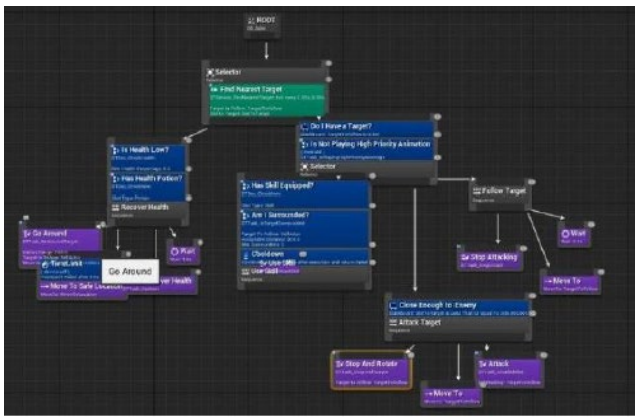

Figure 4 Character Behavior Tree

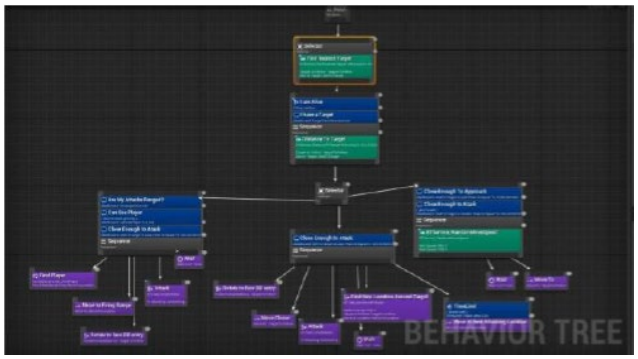

Figure 5 NPC Behavior Tree

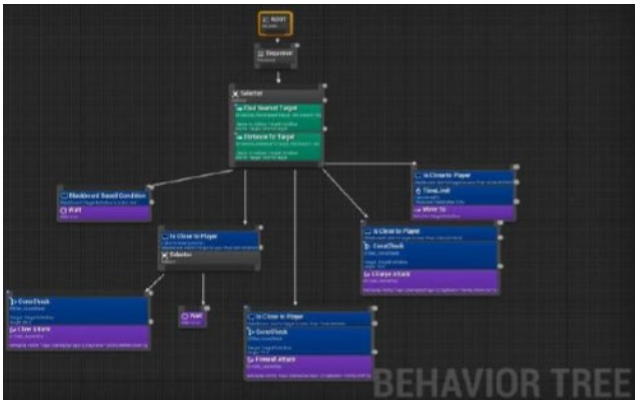

Figure 6 Boss Behavior Tree

V. RESULT

The game has 10 waves where each wave is of 60 seconds. If a player is unable to clear the wave within 60 seconds he dies. If he clears, then the remaining time is added into the time bonus. As the waves levels increases the difficulty of the game also increases. The main enemy of this game is goblins which have different levels. These goblins have 4 levels with different powers.

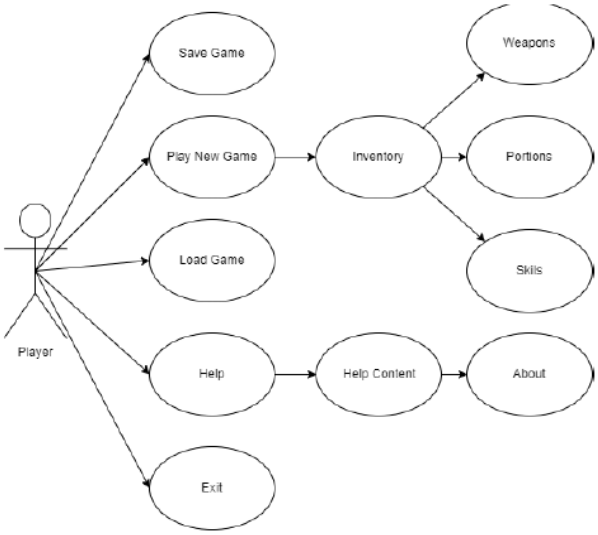

Figure 7 Game Flow

The game controls are W,S,A,D for moving front, back, left and right. Space bar is for rolling in the ground to dodge the enemy attack. Tab opens the inventory which have three sections, there are three slots for weapons, one slot for skill which we can choose from three different skills, and last one is for potions which we can choose from three different types of potions they are Health potion, Mana potion and Health + Mana potion. There are many weapons which we can buy but we can only store 3 weapons in the inventory. In order to purchase various items, we use souls in this game which is obtained by killing the enemies. The screenshot of the game is attached below.

Figure 8 Main Menu

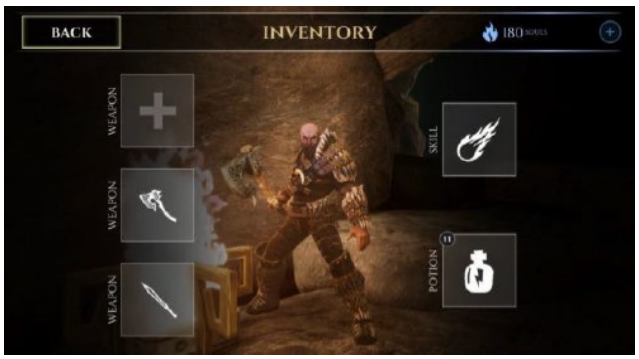

Figure 9 Inventory

Figure 10 Game play

Figure 11 Game Over

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AET 010

Charity Donation System using Blockchain

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Abstract: It is very common for organizations to receive anonymous donations. Centralized financial services are prone to corruption. There is a need to expand the distribution of resources. This can be achieved through blockchain. It is a transparent, distributed and distributed technology that operates without a central control element. The main purpose of the system is to eradicate corruption in organizations that legitimize people's black money or regulate resources. The system will be separate, not owned or used by an individual or organization but rather shared between users. We have created a blockchain-based Donation System that can streamline the resources used by a particular organization. The user can create any new campaigns and others will be able to donate money to the organization in the form of ether. Proposed system makes people real owners of resources and brings transparency to the entire Charity Donation System. Thus, making wrong and illegal use of money donated to organizations will be minimized to a great extent and thereby, corruption will be reduced with the use of this blockchain system, solving problems in many nations.

Keywords: Blockchain, Ethereum, Smart Contracts, Cryptocurrency, Consensus.

I. INTRODUCTION

Charity is an important part of a democratic society. It is well-known that there are many incidents in this world that cause terrible losses, whether related to wealth or health and causing severe damage every year. In order to recover from the various types of losses many victims need help from charities that can provide financial assistance for basic needs. Now people love to dedicate themselves to the community. Charity, therefore, is the fastest growing sector in the modern world and has shifted from its traditional organizational system to a crypto-currency-based system. The traditional system around the world suffers from various problems such as lack of transparency, mistrust between donors and charity organizations. There is a need to allow donors to track their donations and deliver openly in social support. Blockchain is a remarkably transparent and dedicated platform for storing these different types of services based on helping the needy. We will therefore propose a blockchain-based charity donation system that serves as a platform for donating money in form of cryptocurrency(Ethereum) to other need users who have requested a donation and all this happens under high security and full trust. The purpose is to ensure that tracking of a person's contribution, and keeping money safe. This will help address the decline in public trust in charities. With blockchain, donations will be much higher publicly. The giver will be able to track his or her donations to help the poor, and beyond. The Donation System uses a blockchain to record everything that is done. Due to such properties of blockchains for data consistency and resistance, it further enhances project transparency and accountability.

II. LITERATURE SURVEY

In this paper, we explore existing fundraising suggestions in a few domains and identifying research spaces. The issue of the openness of the donation system has long been debated. Emphasis on transparency, on the other hand, introduces privacy issues to donors and recipients, other people who want to hide donations or money receipts. To reduce unintended consequences, a donation system that ensures transparency and anonymity is essential. We have created a system that protects our personal information using a one-time blockchain-based account system. The created system has the potential to contribute to the development of a culture and environment for sustainable and safe giving. Blockchain technology is currently being used in a variety of industries. The use of blockchain technology allows you to make the process of giving and receiving money more transparent. It is necessary to build a single donation tracking platform that will track all information about donations, and donors. The system uses blockchain technology to provide donors, charities, and recipients with transparent accounting for services. The donation forum should have a clear donation pathway, which allows community users and donors to track and monitor where, when, and to whom donations are made. This paper proposes a decentralized system, based on the Ethereum blockchain. It enables social enterprises to run programs in a transparent manner through smart contract-based incentives to ensure that their impact is independently authorized and accessible to all. This makes it easier for donors (charities, influential investors, and small donations) to track their transactions and, as a result, restore their faith in charity organizations.

III. PROBLEM STATEMENT

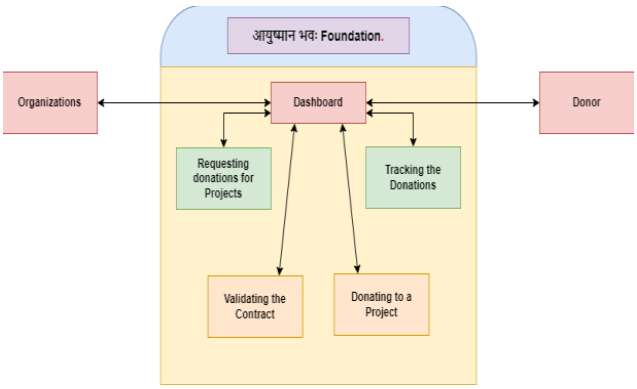
The traditional system around the world is facing various problems such as lack of transparency, mistrust between donors and charities. There is a need to allow donors to track their contributions and contribute freely to community support. Blockchain is a transparent and remarkably dedicated platform for storing these types of services based on helping the needy. We will therefore propose a blockchain-based donation system that serves as a donation platform for other users in need of donation and all of this happens under high security and full trust.

IV. PROPOSED SYSTEM

The proposed system overcomes the drawbacks of traditional charity donation system. The donors will be able to track their donations and hence maintaining transparent, secure and trustful platform for charity donations by minimizing the frauds and third-party interference .

Objectives of Charity Donation System:

1. **Trust:** To establish trust between the various categories of organizations that help the poor as donors and members of the charity.
2. **Authenticity:** By verifying and validating the various stakeholders and the user increases transparency and trust in the field of charities.
3. **Security:** Providing safe and secure services for charity that help the community by reducing fraud and interference.
4. **Decentralization:** The division of the system helps the organization to keep the activity undisturbed and unadulterated by any other member who maintains security and transparency.
5. **Immutability:** Once the data is stored on blockchain, it cannot be changed.



The system consists of users that play a major role which is classified as the donor, organizations/beneficiary. These users will be account holders in the blockchain network and each of them can be uniquely identified in the network through their 160 bit account address. They can access their accounts, perform and sign transactions using 256 bit private key.

The system's functioning is depicted for two sorts of actors (donor and charity organization/beneficiary)

A. **Organization/Beneficiary:** These represents the entity that work for social cause. Proposed charity donation system allows them to raise their requirements as per specific format over the system.

B. **Donor:** The donor will browse at the projects of charities and chooses one to donate. The system will check the donor account balance. If the balance falls below a certain limit, the user will be prompted to make a deposit. Only if the balance is sufficient then the contribution can be done.

The Proposed System consists of Technologies such as Ethereum Cryptocurrency, Consensus Algorithm, Ethereum Virtual Machine, Smart Contracts, Metamask, transaction, and Ethereum network.

A. **Ethereum:** Ethereum is a platform powered by blockchain technology that is best known for its native cryptocurrency, called ether, or ETH, or simply Ethereum. The distributed nature of blockchain technology is what makes the Ethereum platform secure, and that security enables ETH to accrue value.

B. **Consensus Algorithm:** Consensus is the backbone of the Blockchain and a key feature of any blockchain platform. It plays an important role in ensuring the network security, integrity, and performance. The consensus algorithm is responsible for providing the distributed consensus mechanism in the blockchain that essentially governs the order of the blocks. A critical component of this layer is the proof protocol (e.g., proof of work and proof of stake) that is used to verify every single block, which ultimately is used to achieve the required consensus in the system. The most popular consensus algorithms are Proof of Work [POW] and Proof of Stake[POS]. POW is widely used consensus algorithm.

C. **Ethereum Virtual Machine:** EVM provides a runtime environment for each node to execute their instructions. It translates the smart contract into a set of instructions that are executed by the nodes/computers. For each transaction, there is gas fee associated with payments to miners who verify and add transactions to the blockchain network and must be paid by the sender account who initiates the transaction.

D. **Ethereum Network:** Our system is deployed on local test network (Ganache). An unauthorized or open network, not controlled by any organization, anyone can join the network, and all users are equal; they can read and write without limits. These blockchain network is considered to be completely decentralized. Transparency is the most significant advantage of the public network. However, there some of the disadvantages of the public Network and that includes slow performance compared to other networks, scalability issue though some steps are already taken to solve this problem such as off-chain.

E. **Smart Contracts:** Smart Contracts is basically a set of rules that most parties agree on in a blockchain network. It helps to make transactions transparent that avoids third party use and brings about decentralization in the system. These rules are executed in the form of digital code. They can only be deployed once in a blockchain network and cannot be modified. The proposed system executes smart contracts which consists of following functions:
   a) function createProject: used to enter all mission details.
   b) function Contribute: used to check whether deadline is passed or not and make donations.

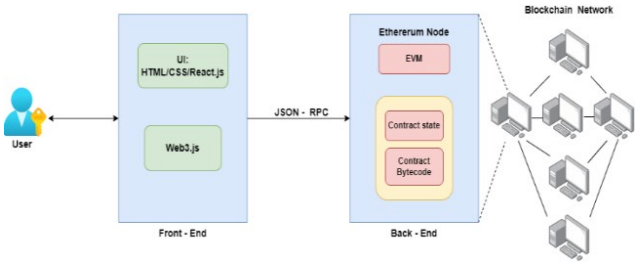
c) function claimFunds: once the goal amount is reached, the creator can claim the goal amount.
d) function getRefund: if the goal amount is not reached, the creator of mission can initiate refund to the donors who donated towards the failed mission.

F. **Metamask:** Through a suitable web browser or the mobile app's built-in browser, MetaMask lets users to save and manage account keys, broadcast transactions, transfer and receive Ethereum-based coins and tokens, and securely connect to decentralised apps.

G. **Transaction:** As the proposed system is implemented on Ethereum blockchain, it executes each function of smart contracts in the form of transactions. Following is the structure of transactions:

- From: It is the 160 bit address of sender which initiates the transaction
- To: It is the 160 bit address of the receiver which receives the transaction. It is null when new smart contract is deployed.
- Nonce: It represents the number count of transaction and is initialized from 0.
- Data: It contains all interactions with the contract. While newly deploying contracts it contains contract's byte code.
- Gas Price: The miner charges the sender a specified gas unit for each step while processing a transaction. So, the gasPrice is the cost of each gas unit in wei (1wei =10^-18Ethers)

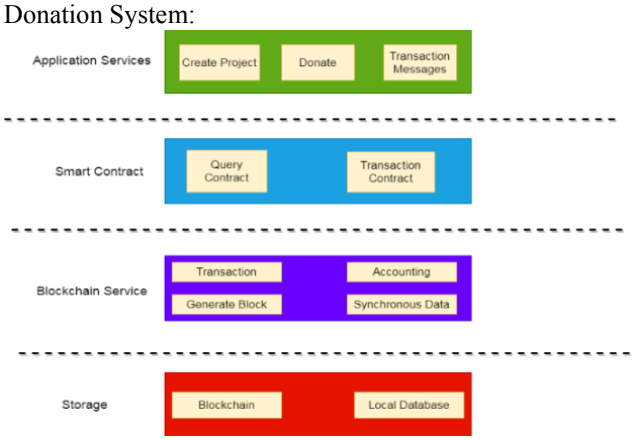
V. SYSTEM ARCHITECTURE



The System Architecture consists of two major parts – front end and back end:

1) **Front -End:** The frontend is the User Interface of the system which is capable to interact with Ethereum blockchain system. The front end is developed using HTML, CSS and React JS. React is a JavaScript library for building user interfaces. React is used to build single-page applications. React allows us to create reusable UI components. Second component used in front-end is Web3js. web3.js is a collection of libraries that allow you to interact with a local or remote ethereum node using HTTP, IPC or WebSocket.
2) **Back-End:** The back-end of the website is developed using solidity smart contracts and it consists of the Ethereum node connected to the blockchain network. Each node consists of an EVM that translates smart contract to set of instructions and converts them to bytecode and then deployed to the blockchain by the miners in the network. The user accesses the backend services by connecting to Ganache – a personal blockchain.

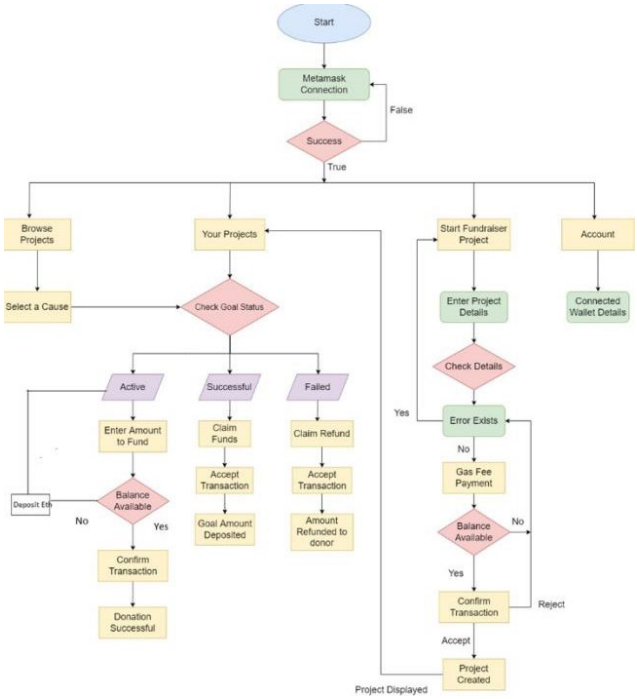
Following is the modular architecture of Charity Donation System:



As shown in the figure, we split the system into 4 layers:

1. Application Service Layer: It consists of range of application such as entering mission details, donate, view missions, status of missions.
2. Smart Contract: Scripts and smart contracts are included in the smart contract layer. It contains query techniques, transaction processing, and other information.
3. Blockchain Service: The blockchain service layer performs the charity platform's distributed accounting operations, such as package block, get transaction consensus, broadcast block, and synchronise data to a local database.
4. Storage: It contains all the synchronised data.

VI. METHODOLOGY



Proposed Blockchain based Charity Donation System has total 5 different functions such as:

1. **Start Fundraiser Mission:** This page allows the organization to enter all necessary details related to mission such as title, description, goal amount and mission deadline (in minutes).
2. **Account:** This page will display the connected wallet account details(160 bit) of the current connected user.
3. **Your Project:** This page will display all the missions raised by the current connected account user(Organization). The mission can have status such

as Active(Mission deadline is not over and is open for donations), Successful(Mission whose goal amount is met and deadline is reached) or Failed(Mission whose deadline is over and goal amount is not met). It also has options such as Claim Funds (if goal amount and deadline is met) where the goal amount is deposited in organization's Metamask wallet.

4. **Your Contributions:** This section contains all the payment made by the current connected user to its own mission. It also contains Refund option (if goal amount and deadline is not met) where the donated amount will be refunded back to the donors to their respective Metamask wallet.
5. **Browse Projects:** This page contains all the missions created by the current connected account and by other organizations. The current user can donate towards any mission mentioned in this page irrespective of creator of mission.

VII. RESULTS

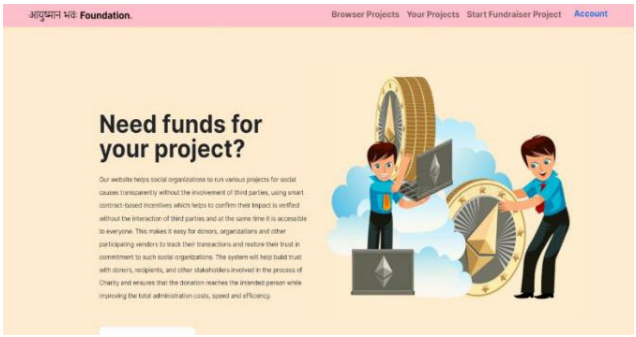


Fig. Homepage1

Fig. Connected Wallet Details

Fig. Create Project

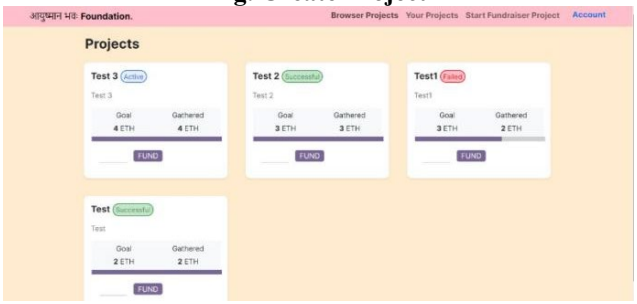


Fig. All Projects

VII. CONCLUSIONS & FUTURE WORK

We have proposed a program that uses Blockchain and ethereum for the poor to make it more visible through a decentralized system. Moving to cities has made many people very anxious about other people and this has made many people indifferent. But at the same time there are also people who want to ultimately make illegal money into the system. This program will provide both authenticity and better security. Also, it will provide a reliable system and will make the whole process more transparent. This will help eliminate mediators between donors and service providers. Because the system does not depend on third party sources to transfer funds, the speed and cost of hosting services are reduced. The scope of Blockchain technology is limited due to the unconsciousness of the Cryptocurrency value. In a situation where the banking economy may collapse, Crypto-Currency is the only viable option. The system can be extended to a global environment. The government can build their own digital currency for managing all the transactions which will ultimately build trust among peoples by eliminating corruption and providing full transparency. A high level of clarity and social accountability can calm donor minds and encourage them to donate while also strengthening the reputation of giving generously.

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AET 011

Solar Grass Cutter

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Abstract- These days we are facing the problems like pollutions, power cut problem etc. In order to overcome these problems, we have thought about the device, which can be performing its functions without causing any of these problems. So, we have thought of doing the project on cutting grass, this uses the renewable source of energy for its operation like solar energy. This project aims at developing a portable solar operated grass cutting device, as there is power shortage. So we have decided to make a solar energy operated device. Solar panel is connected to the battery. This device will help in building of ecofriendly system. Current technology commonly used for cutting the grass is by the manually handled device. In this paper used novel technology. So in this paper we are trying to make a daily purpose robot which is able to cut the grasses in Lawn. The system will have some automation work for guidance and other obstacle detection and the power source that is battery and a solar panel will be attached on the top of the robot because of this reduces the power problem.

I. INTRODUCTION

Nowadays, pollution is the major issue in the universe. In case of Gas powered lawn mowers due to emission of gases it is responsible for pollution. From time immemorial, the sun has been the major source of energy for life on earth. We can use the solar energy for giving power to the new high tech robotic grass cutters. Traditionally, lawn mowers are often clunky pieces of machinery that involves a lot of strength and energy to use. Man power is also required to look after them. As technology is improving day by day these traditional grass cutters should be replaced by the efficient, power saving and smart ones. Automated Solar Grass Cutter is a fully automated grass cutting robotic vehicle powered by solar energy that also avoids obstacles and is capable of cutting grass without the need of any human interaction. So the traditional grass cutters are to be replaced by daily purpose robot which will be capable of cutting the grass in lawn without human intervention. The system will have some automation work for assistance and other obstacle recognition. The system will have a power source that is battery and a solar panel will be attached on the top of the robot. Cutting grass cannot be effortlessly accomplished by elderly, younger, grass cutter moving with engine which creates noise pollution due to the loud engine, and local air pollution due to the combustion in the engine.

Along with motor powered grass cutter, electric grass cutters are also risky and cannot be easily used by all. Also, if the electric grass cutter is corded, moving could demonstrate to be challenging and unsafe. So it is more efficient to use a solar power grass cutter which will be smart and which consumes less power. The trial product will be charged from sun by using solar panels. The design of solar powered agricultural equipment (e.g. grass cutter) will include direct current (D.C) motor, a rechargeable battery, solar panel, a stainless steel blade and control switch. The automatic grass cutting machine is going to perform the grass cutting operation by its own which means no manpower is mandatory. This will be better because man power is not essential in managing cutter on those hot summer days, where you will prefer not to be out in the sun. The remote will permit the user to control the speed and direction of the grass cutter.

II. EASE OF USE

Mowing the lawn with a standard motor powered lawn mower is an inconvenience, and no one takes pleasure in it. Cutting grass cannot be easily accomplished by elderly, younger, or disabled people. Taking into account this context we first considered a remote controlled robotic lawn mower. The first expected outcome for this project is the creation of a lawn mower that will cut via remote control, and then adapt that design to create a mower to operate autonomously The primary goal was to create a reliable and efficient robotic lawn mower that is not expensive to build and performs well. The purpose of this project is to alter the already built lawn mower in such a way that minimal effort will be required to perform the task of mowing grass. This

incorporates designing all of the features necessary to perform all the tasks posed for this lawn mower to accomplish. Once a final design has been created to the standards agreed on by the group, parts for the mower will then have to be obtained. The final design will incorporate communication between both hardware and software components. The two main aspects of the project needed to be accomplished was the overall safety of the machine itself and the effectiveness to efficiently cut grass. The next objective was to automate the mower so that the user is taken out of the picture, and the user's only task is setting up the device initially. Another area which was considered was an idea which could be innovative and resource saving .For this purpose we considered the use of solar energy which earlier seemed to be a difficult task. When surveyed it was realized that solar panels are easily available and can be easily accommodated into the project. Only thing that was required was an alternate source of power with availability to be recharged .Thus, emerged up a project which satisfies the renewable concept as well as easy to use.

III. REVIEW OF LITERATURE

For designing of Automatic Grass cutter, we referred various literature, papers, etc. The review of previous method used to give below: In this lawn mower uses a solar based energy source, which is easier to use, more advantageous comparing to other energy source especially for gas-based source of power. But our grass cutter is not based on solar because of its cost and may create some complexity during working. So, we avoided solar powered lawn mower. [4] In this hydrogen-based lawn mower, the advantage of powering a lawn mower by hydrogen rather than by gasoline is mainly ecological. We not used this for our grass cutter because it is very old method, and many overcome produced from this type grass cutter. [2] The self-powered design objective is to come up with a mower that is portable, durable, easy to operate and maintain. It also aims to design a self-powered mower of electrical source, a cordless electric lawn mower. [1] The heart of the machine is a battery powered dc electric motor. It is also useful method for our lawn mower. It is similar to our grass cutter using display and keypad. The present technology commonly used for trimming the grass is by using the manually handle device. In this project we have automated the machine for trimming the grass. [2] The device consists of linear blade which is operated with the help of the motor of the power supply for the motor is by using battery. The battery can be charge by using power supply and solar panel. In case of any obstacles in the path it is sensed by using an IR sensor.[3]

IV METHODOLOGY

The design contains a microcontroller, multiple sensors, and a solar charging system. Adding these elements together, we get our robotic lawn mower. The sensors are the eyes of our Robot Initially, we had an idea what type of sensors we wanted to use. We used only an ultrasonic sensor to detect if the robot was heading into an object. Safety is the main concern when designing a robot with blades. We wanted our robot not to start operating if it was being held in the air by the user. Knowing that the user would be randomly holding the robot we needed a sensor to detect orientation. The power the system there are many options. With recharging batteries, there are various chemistries but we decided to go with the one that work best with solar charging. The nickel-metal hydride (NiMH) was found to be the best because given a low charging current, it will not overcharge. Sizing the battery will depend on what we are powering, specifically the motors. Like batteries, there is a range of motors to choose from. We went with two 7.2V DC motors with integrated gear heads. The needed torque did not need to be a lot because we were going to have a small prototype. These motors have 100 oz-in torque which is plenty for our design. The block diagram of automatic solar grass cutter design is shown in figure 1. Determining where to place our sensors is crucial to the overall effectiveness of our design. The solar panels were to be placed horizontal on the robot because to achieve maximum sun exposure. The microprocessor must be in the robot to protect it from the natural elements. ur ultrasonic sensor will be mounted directly in front of the robot for detection.

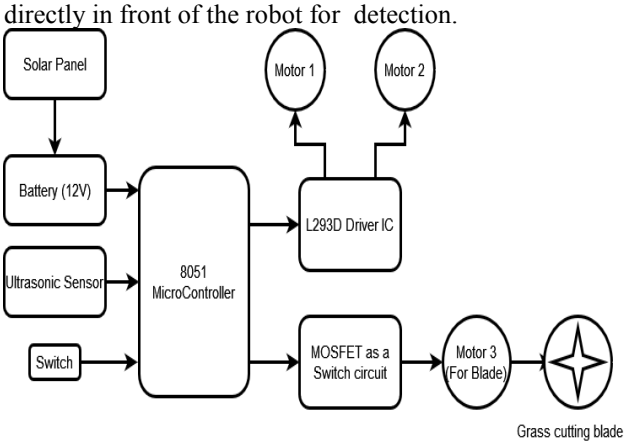

Figure 1. Block Diagram

The Solar Grass Cutter Project is based on a locomotive grass cutter robot which is self-driven when once manually started. Its autonomous nature is due to self-charging by solar panel and obstacle avoidance using ultrasonic sensor. The grass cutting blade is mounted on shaft of highspeed motor for having good cutting rate. The Solar grass cutter is 8051 based system which is powered by 12V Battery. The battery used is self-charging and it can be used while charging using solar panel. The motion is programmed to be linear till an obstacle is encountered. Here obstacle is detected using ultrasonic sensor. Whenever obstacle is encountered it will change its path and turn left and continue to move in forward direction. While turning, to prevent from having the obstacle or the blade itself to harm, the blade drive pulse is stunted till the turn is completed. Even after the turn is completed it will first monitor for any obstacle and if not found it will start the blade motor to cut grass and move linearly till the next obstacle is detected. So with the help of boundary wall acting as obstacle the grass cutter can be made to mow the entire grass field while avoiding the real obstacles and self-sustain on solar energy. In this way the Solar Grass

Cutter is an autonomous system which works once its user has started the system and completes its job.

COMPARATIVE STUDY

FACTOR	CONVENTIONAL GRASS CUTTER	AUTOMATIC SOLAR GRASS CUTTER
Pollution	Causes more Pollution	Clean and Pollution Free
Effort	More effort	Less effort
Maintenance required	More	Less
Remote control	Not Available	Available
Noise	More	Less
Efficient	Less	More

CONCLUSION

Our project entitled Manufacturing of solar powered grass cutter is successfully completed and the results obtained are satisfactory. It will be easier for the people who are going to take the project for the further modifications. This project is more suitable for a common man as it is having much more advantages i.e, no fuel cost, no pollution and no fuel residue, less wear and tear because of less number of moving components and this can be operated by using solar energy. This will give much more physical exercise to the people and can be easily handled. This system is having facility of charging the batteries while the solar powered grass cutter is in motion. So it is much more suitable for grass cutting also. The same thing can be operated in night time also, as there is a facility to charge these batteries in day light. The mechanism which we used ie scotch yoke mechanism does not given excepted efficiency. This efficiency can be increased by using some other mechanism. and speed of motor is reduce because we have used heavy material and this material can be replaced by using light weight material .and design of blades should be done based on types of grass is used to cut. The project which we have donesurly reaches the average families because the grass can be trimmed with minimum cost and with minimum time Finally this project may give an inspiration to the people who can modify and can obtain better results.

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AET 012

Smart Chess Board

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Abstract- Chess is a very fun and mind-expanding game, created centuries ago also known as 'Shatranj'. Though it's beneficial to the mind and played by millions of people around the world, chess isn't enjoyable to everyone. To some, this classic game can be boring, frustrating and just too time-consuming. This is where the motivation of the Smart Chess Board came to mind. Keeping this basic idea in mind we have decided to make one simple Semi Human Engine where the machine will not have any pre-built features instead of will just be storing the data of the previously played chess grandmasters and will be provided by Convolution Neural Network (CNN) after training data set. The classical way of studying chess was by reading the chess book written by some famous Title Holders like Bobby Fischer, Garry Kasparov etc. where they have mentioned their previous games and the various positions and tactical moves but in the world of technology, it would be better than we can take help of machines instead of reading. The main idea of this project is to utilize and make the human brain as sharp as a machine which will indirectly improve the chess game where we can use this technology to get a better version of ourselves in the game and to sharpen our techniques and it can be utilized where the human brain cannot process the complicated position but it can be solved by studying and practicing with the machine. We can predict and we can learn the same for our betterment.

I. INTRODUCTION

Nowadays, many children and early adolescents are more addicted to electronic media and computer games compared to traditional games. For instance, children are losing interest in playing traditional board games such as chess game, and tend to neglect them. Chess is defined as a game of "perfect information", because both players are aware of the entire state of the game world at all times, just by looking at the board, you can see which pieces are alive and where they are located. So, what if one player out of two is the computer itself, in short, it will be like "Human vs. Computer". Because a similar match has been played between Garry Kasparov (considered one of the greatest players in the history of chess) vs. IBM's Deep Blue (Chess Engine) in the year 1996. This scenario gave our team motivation about developing our very own chess bot that will play against human beings. How did the chess bot sum up with all the legal positions against each move had made our team more curious? Looking forward when we came to deal with the project, there were a lot of things we were unaware of. Like the video capturing devices that are used for capturing the chessboard on which the actual gameplay takes place, various platforms should be connected in synchronization for smooth communication between them. The main importance of this project will be it will always enhance the thinking quality of the human being (opponent) to think twice before playing any move.

II. EASE OF USE

Chess is a very technical game where knowledge about the gameplay is a must for any player who is playing this game. Many engines are present which will showcase the gameplay of great players with which they had competed. But the main aim is to understand the rules of the gameplay without that just observing the gameplay between the two players is not that beneficial for any learning player. Keeping this in mind we are here with our system and chess engine which will help out every type of user who plays on our system. Before the game starts the user gets a brief idea about the game like the pieces with their legal moves and some tactical moves which will help them in winning the game. As we know we all are human beings and we are not always accurate with the knowledge that we had gained in past, so it is obvious that while playing the game the users make many errors so to avoid any errors and to get the knowledge about the same the system notifies the users when they encounter with an error. The engine has been designed in such a way that will entertain the playing mind of the user. Predicted moves of chess pieces shown on the board while playing help the user to think twice before playing any move. Along with the legal moves, the coordinates of each box

on the board also play a very vital role, so the user should also know the coordinates of the whole chessboard. With all these important parameters kept in mind an innovative idea of developing a simple system that ensures and delivers a very easy way of approach for the users has been developed.

III. REVIEW OF LITERATURE

For the designing of Smart Chess Board, we referred various literatures, papers, etc. [1] The idea behind the overall control algorithm is the following: the game starts with the player's move. The camera mounted on the top and connected via a standard USB port to a PC, capture the movement. Then the motion detection algorithm based on Canny edge-detection is used in order to detect the moves of the chessboard piece and to interpret the current positions of pieces on the chess board. The GUI of the developed application captures the data. The main input into the algorithm is provided by the web cam which is placed orthogonally to the chess board. The first problem with the captured images is that their brightness and contrast is depending on the environmental conditions. This issue is important because in the following steps consecutive frames should be compared to each other. In our case we have applied the grayscale conversion of the image. Afterwards algorithm foresees spatial transformations in order to correct the image distortion. In the next phase board segmentation is performed and afterwards, chess move detection algorithm is applied. In order to find out the direction of chess move the current frame is compared with the previous one without chess piece on it. Computer generates moves that form a tree to a certain depth and searches for the best move. A common algorithm that is used for calculation of the best move is min-max. In this algorithm each player tries to maximize his advantage and to minimize the advantage of the opponent. To reduce the calculations during the search, alpha-beta pruning is used. The idea is to explore only useful variations, by fixing on each node a maximum or minimum evaluation. Those are computed by using the evaluations that have already been computed.[2] Unlike the conventional chess engines, genetic algorithm can be used to skip the brute force and actually improve the AI to such a potential that it can surpass a human at the game. This is tested out in this paper with the help of chess as well as checkers. The algorithm starts with a population, and with each generation, the fitness improves, which improves the chances of a computer winning against a human. In the initial stages of chess engines, only 1-ply searches were possible, but due to the algorithm's evolutionary nature, now it is possible to make tens of plies searches in a tournament game.[3] A web camera was positioned over the center of the chess board and was directed downward. Distance between camera and the board was 1.15m and did not block the view for the two players. Camera resolution was set to 800x600px with 1fps frame rate. Simulink was used to capture the video, process images, identify pieces and to produce final result. Several board types, sizes and environments were tested to determine the accuracy and robustness of the system which are considered as the factors effecting the performance. Following factors were identified as having major effect on the performance.

- Texture / Pattern on the chess board

Early chess games were played on a board which had 64 black and white squares. But at present there exists many boards with different patterns on them. This made the identification of chess pieces more complex. Board that was tested in early experiments had a texture of wood. Black squares were dark brown with strokes of darker circles. White squares were light brown with stronger broken lines. Although this may appeal to a human player, it lowered the accuracy of identifying white pieces on white squares. Accuracy of identifying other combinations were unaffected by the texture. Most accurate and suitable board was a board with two complementary color squares without any texture or pattern.

- Color of the Squares

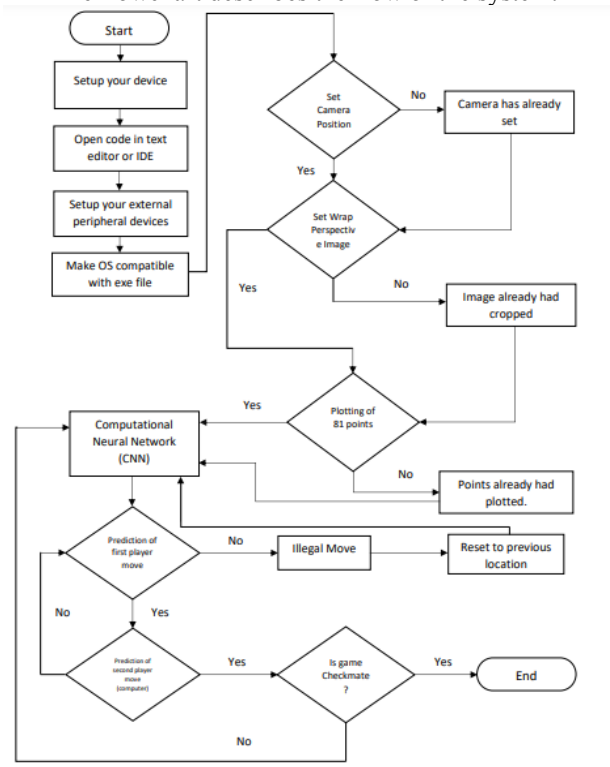
Accuracy was highly affected by the color of squares on the chess board. Notably shining black squares reduced the accuracy of detecting black pieces on them. Among the boards selected from the market, dark brown - light green color boards had the highest degree of accuracy. Since camera was mounted directly over the board, most pieces produced almost identical circular patches on the image, making it impossible to identify the type of the piece.

- Lighting Condition

Lighting of the board was a vital factor. Most suitable light source was found to be a diffused white light source directly above the board. In most of the standard games this conditioned is met. Worst case was a pointed light source from a side of the board. Shadow and glare created by such a light source were sometimes misinterpreted as chess pieces.

IV. METHODOLOGY

The flowchart describes the flow of the system.



As mentioned in Figure 1. the very basic stage of the project is capturing the chessboard. This capturing is done through the image capturing device (i.e. ICD). Multiple devices can be used for capturing like wired and wireless devices. After that this device will pass the image to the image processing block and the output of this block will give an image as output in Binary Image Format (i.e. Images whose pixel values have only two possible intensity values '0' for black and '1' or '255' for white).
This format is further passed to the segmentation field which works to simplify the representation of an image into something more meaningful and useful to analyze. After that, the chess coordinates are given to the movement controller through one path and from another path the sub-image format (i.e. main image is broken down into many sub-images and processed individually and combined with others and sent to the CNN (i.e. Convolution Neural Networks, it is a class of an artificial neural network most commonly used to analyze visual images). The output of the CNN block gives the 'prediction' which gets combined with the 'chess coordinates' for the movement of the arm controller which eventually gives the command for the execution of successive moves from the computer's side after the human had played his turn.

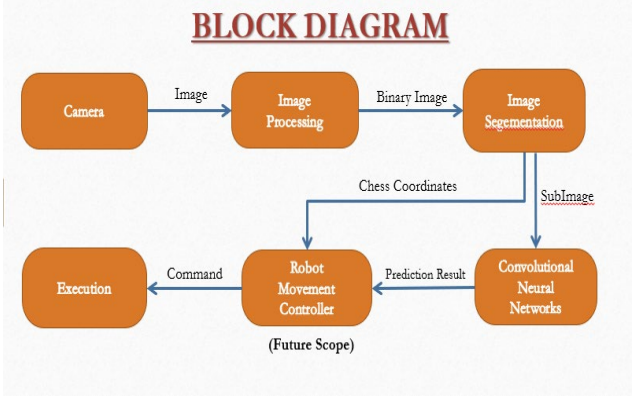


Figure 1. Block Diagram

The entire project works in four stages:

1. Image Capturing Device captures a frame of the board where all the chess pieces are located at their base position and the data gets recorded on the data set. (Shown in Figure 2. and Figure 3.)

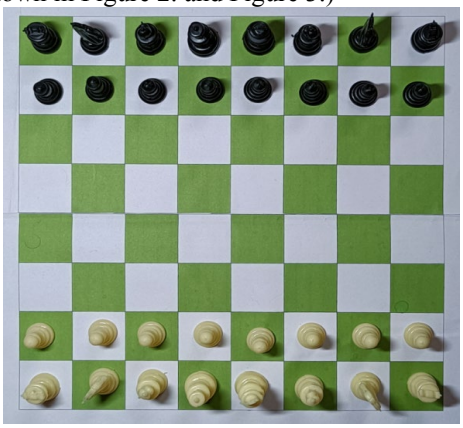


Figure 2. Basic Frame Capturing

Figure 3. Set chess pieces with base locations

2. After the move played from the human side, again capturing device captures the frame and data in the data set gets updated.

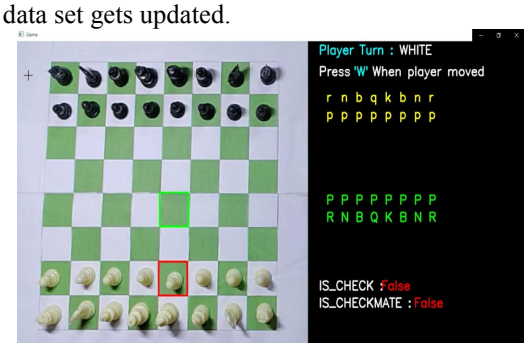


Figure 4. Player 1 move's captured

3. After the data gets updated coming to the computer's end, the chess engine works on the opponent's move, works on the permutations and combinations of movement and responds with the best legal move against the human opponent's move.

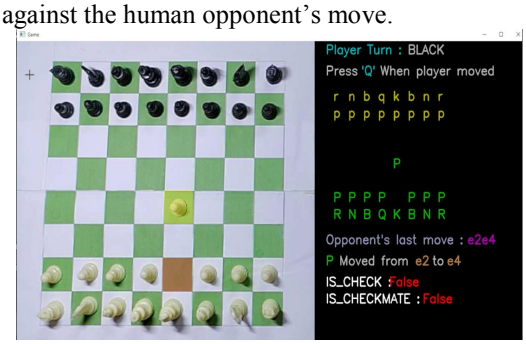


Figure 5. Player 2 move's captured

4. To physically complete the move from the computer's end the data is synchronized with a movable arm controller (future scope) which plays and completes the move from its end. In this way, the game goes on till the opponent's king gets a 'checkmate'.

5. To overcome the drawbacks of a physical game, we also developed virtual engine gameplay which includes every permutation and combinational move of each piece shown in Figure 6.

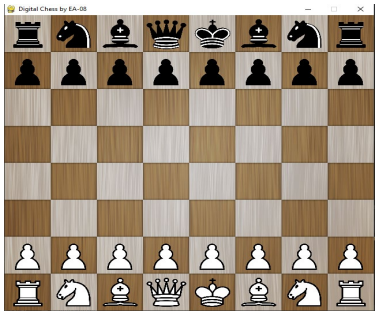


Figure 6. Chess Engine

6. Some classical moves of chess gameplay are also verified through this engine which is shown in Figure 7. And Figure 8.

Figure 7. En Passant Rule

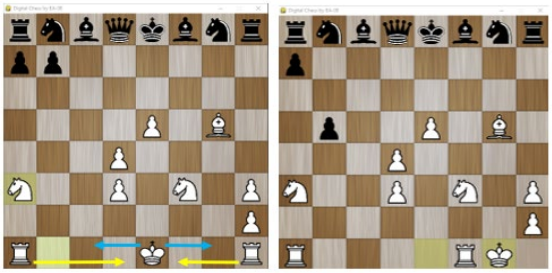


Figure 8. Castle Rule

7. To keep a record of users who had played this game we also developed a back-end database using the XAMPP Application (Figure 9.) where the user's data along with their feedback are stored so that we can enhance our game better and deliver the users a better experience of chess gameplay.

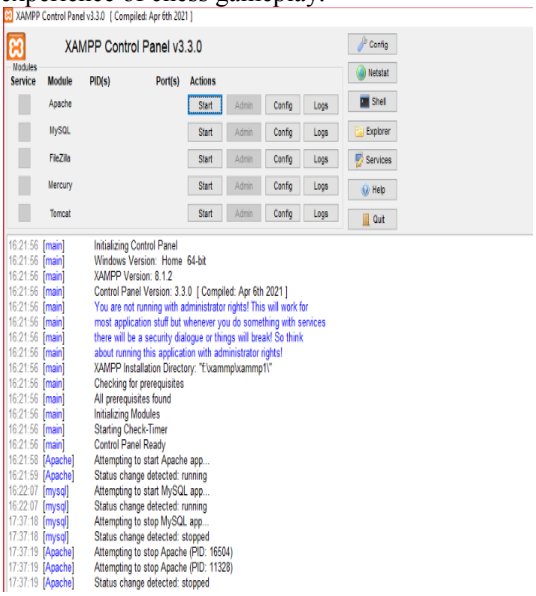


Figure 9. XAMPP Application

CONCLUSION

Till now our team has learned a lot from this project. The usage and communication of different platforms with each other which we used the for our project have been understood. Through the project, we got to learn about chess board visualization from real life to machine vision.

Getting connected to the capturing device through the IP address is a new concept that we learn through the image, training the machine to get proper corner points after calibration and calibrating all squares on the chessboard through the capturing device's image were some of the important key highlighted fields which we have work for a smooth experience of gameplay between human and machine. Further, maybe this human vs. machine may get an advanced level version of machine vs. machine which will set a point in the field of technology and gaming.

A lot of errors have occurred during the designing of the machine's program which we overcome through the Internet sources. These were some of the weak points which were occurred during the progress of the program.

Talking about the strengths of the project it can be used as a testing parameter of one's intelligence against the machine. One can overcome his/her backfoot prints (wrong move) which lay them down to failure while playing with the machine. This chessboard can be used as a study tool to analyze the working of a respective person's move. It can also be used in the gaming field as one side will be played by the machine and one will be played by human (i.e. Human vs. Machine).

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AET 013

IOT Based Solar Power Monitoring

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Abstract:-Internet of things is an emerging technology that efficiently and effectively improving our daily life activities. It reducing the cost of living by automating the manual processes. It integrates physical objects and devices via internet for synchronized communication. Currently the cost of electricity is reaching the sky so we need some sources that can produce electricity naturally without any cost. Here, solar panels and solar plants take place for producing electricity in natural manner with sun light. Mostly the solar systems are configured in rural or agricultural areas where electricity mediums are still not available. These systems are manually operated by humans. So there is need of efficient approach which automatically monitor the current, voltage and other parameters of solar systems and provides real time statistics to users. This research paper proposes an IOT based approach for solar power consumption and monitoring that allow the users to monitor a solar panel through their mobiles or any device. The system can display Current, Voltage and Temperature on LCD, the ongoing project has been upgraded by adding a battery that can be charged through the solar panel and can be used simultaneously for other purposes also a cooling system has been added that prevents from over-heating and removes the dust from the solar panel. The parameters can be monitored through phone, Pc's or laptops.

I. INTRODUCTION

The Internet of Things (IoT) is one of the most important technologies of everyday life, which helps people live and smarter. An IoT is a device, which is used to enable the connection between machine and the cloud. This technology helps to exchange the data between the connected devices on the available network. Through the internet, the user can acquire the data and control the devices from any place all over the world. The need for using IoT technology in this solar power monitoring system is as the range of sun's radiation is not fixed and may vary according to the location, time and climatic conditions, the solar panels which are exposed to the sun always need to be monitored.

The solar panels can be monitored from any location by using IoT technology. In today's world, electricity is one of the most basic needs in everyone's life. There are two ways available for the generation of electricity one is by using renewable sources and the other one is by using non- renewable sources. Solar power is said to be an imperishable power source. Therefore, to overcome the issues related to scarcity of electricity an IoT based solar power monitoring system is being proposed. Solar power has become very trendy as it is available in abundance and solar power generation is also cheaper in the conversion technology. The proposed system describes an IoT based solar power monitoring system. In this system the sunlight is converted into electricity by solar cells which are present in solar panels. We use an Arduino. Current voltage parameters are measured by using sensors. The values of current and voltage are shown on the LCD display. An IoT device is also connected to the sensors through which the parameters are displayed on the display can be monitored from anywhere by using an available network.

II. REVIEW OF LITERATURE

[1] For designing of Power Monitoring system, we referred various literature, papers, etc. Solar power has become more popular in the world as it is available in plenty amount with minimal impact on the environment. Though, the solar power generation becomes cheaper with advances in the conversion technology. An IoT is a device which can communicate the between the machine and the Cloud. The use of IoT enabled us to fetch the data from cloud wirelessly. Monitoring of system parameters is vital in any solar power generation system. The important solar photovoltaic system parameter of i.e. current, voltage and temperature is sensed by various sensors real-time monitoring. A Remote monitoring of Solar Photovoltaic systems has many challenges such as it has to deals with, tracking the panel voltage, current and temperature and Real data of the solar system is to be synchronized time to time. For this node mcu is used which communicates between the machines and transfer the data over think speak cloud. The proposed system has flexibility by using hi-tech GPRS to connect the Solar PV to a cloud server. [2] In general remote monitoring systems have to fetch, analyze, transmit, manage and feedback the remote information, by utilizing the most advanced science and

technology field of communication technology and other areas. It also merges comprehensive usage of instrumentation, electronic technology and computer software. Prevalent monitoring PV system approaches present poses some problems like low automaticity and poor real-time. These problems can be averted with an efficient remote environment information monitoring and controlling system. This system should include automatic diagnosis techniques the PV station.[3] This IoT (Internet of Things) is achieved by wireless sensor networks, 2G/3G/4G networks, GSM, GPRS, RFID, WI-FI, GPS, microcontroller, microprocessor, etc. Empowering advancements for the Internet of Things are considered and gathered.They are classified as follows: • Advance that empower "things" to accept contextual information. • Advance that empower "things" to process the relevant data, and • Innovation to enhance security and protection. Accepting the information and processing that relevant data can provide an understanding which is needed to build the "intelligence" into "things". This is the highlighted feature which differentiates IOT from standard internet.

III METHODOLOGY

The main objective of this research is to design and implement a Solar Power Monitoring System using IOT that is capable of monitoring the Solar power conditioning unit which consist of solar panel and provides the facility to charge the battery bank either through solar or grid and stores data in the cloud database through an easy manageable web interface (ThingSpeak). This will decrease the maintenance cost and will increase efficiency of the system. This system mainly consists of embedded system GSM module network. In proposed system, host network and embedded system forms a core of IOT system. In this network we used an GSM module to connect Solar panels to the Internet via cloud computing. The proposed system is used for monitoring of solar energy using IoT. Arduino is a micro controller which is used to read the sensor values. Current sensor and voltage divider are connected to the Arduino. Arduino is connected to GSM module through SIM. GSM module is working as a server. The data from the Arduino is display on the web page through GSM. The system consists of temperature sensor, current sensors, voltage sensors, voltage regulator, cloud setup, measurement and other sensors. This also includes microcontroller-based data processing of data acquired from the sensors. Solar power plant monitoring will enhance future decision-making process for large scale solar power plant and grid integration of such plants. Microcontroller plays a very essential role in this process to intermediate between input modules and output modules. Once the system is successfully designed and simulated on the software it will be ready for fabrication and the online control system using IOT will be ctured.

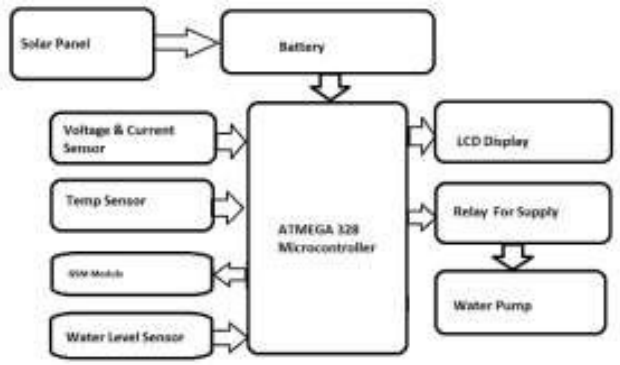

Figure 1 Block Diagram

CONCLUSION

The proposed system stores the voltage and current parameters and keeps updating the new values. By tracking the solar photovoltaic system continuously, the daily or monthly analysis also becomes simple and easy. It is also possible to detect any errors occurring in the system if there is any uncertainty in the generated data by tracking the solar panels that are operated at the maximum capability.

In this project an IoT based Solar power monitoring system is designed to obtain the maximum output power from the solar panels. After the conversion of light energy into electricity through solar panels, the current and voltage parameters are recorded using sensors. The amount of voltage and current received are shown on the LCD display with the help of IoT technology. As there is a GSM module connected to the sensors, we can view the readings in our mobile device by connecting to the Wi-Fi network.

Whenever the readings or data changes it is automatically updated in our mobile. By using IoT technology we can monitor the working of solar panels and there may be a chance to detect the problem when anything goes wrong.

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AET 014

Real Time Drowsiness Detection System

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Abstract- Drivers who don't take regular breaks once driving long distances run a high risk of getting drowsy, a state that they usually fail to acknowledge early enough according to the specialists. Studies show that around one quarter of all serious accidents occur as a result of sleepy headed drivers in want of a rest, which means that somnolence causes additional road accidents than drunk driving. In this paper, so as to implement a computer vision-based recognition system of driving fatigue. Additionally, to police investigation human face in numerous light-weight sources and therefore the background conditions, and pursuit eyes state combined with fuzzy logic to work out whether or not the motive force of the physiological development of fatigue from face detection. Driving fatigue recognition has been valued extremely in recent years by several students and used extensively in varied fields, for instance, driver activity pursuit, driver visual attention.

Keywords—Web Cam, Raspberry pi, Gmail Alert, Audio Alert, Web portal, Fatigue detection

I. INTRODUCTION

In recent years, as a result of the necessity for public transportation, cars and motorcycles have grown at a fast rate. The explanations of traffic accidents become a lot more complicated, the general transport system has been inadequate. It has become a well-liked topic of many analysis units in recent years. The driver's fatigue recognition system may be a part of ITS (Intelligent Transport System) vehicles, an active safety system. There are a variety of safety devices utilised in vehicles to guard the motive force at the moment, for example, seat belts, airbags, brake systems and laborious sheet metal, etc. However, these devices invariably act when the accident happens. There is less equipment to warn drivers before the accidents happen. However, some signs sometimes exist before several accidents occur. Driver fatigue recognition system hopes to warn drivers once they are tired, and avoid traffic accidents caused by fatigue. In the driving drowsiness recognition system, we mainly establish the driver's drowsiness level by blinking period, blinking interval or head swing.

II. RELATED WORK

This paper describes a real-time online prototype driver-fatigue monitor. It uses remotely located charge-coupled-device cameras equipped with active infrared illuminators to acquire video images of the driver. Various visual cues that typically characterize the level of alertness of a person are extracted in real time and systematically combined to infer the fatigue level of the driver.[1] The development of technologies for detecting or preventing drowsiness at the wheel is a major challenge in the field of accident avoidance systems. Because of the hazard that drowsiness presents on the road, methods need to be developed for counteracting its affects. Driver inattention might be the result of a lack of alertness when driving due to driver drowsiness and distraction.[2] The usage of driver drowsiness detection system will help in evading the significant mishaps. This paper presents a system to identify driver's drowsiness and raise an alarm to wake him. It is an attempt to avoid an accident caused by the inevitable sleep as early as possible by alerting the driver when he falls asleep.[3] In addition to detecting human face indifferent light sources and the background conditions, and tracking eyes state combined with fuzzy logic to determine whether the driver of the physiological phenomenon of fatigue from face of detection. Driving fatigue recognition has been valued highly in recent years by many scholars[4]

III. PROPOSED MODEL

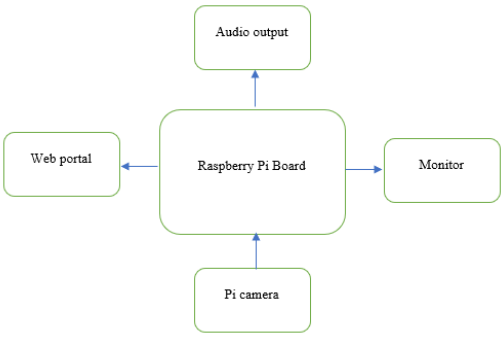

Figure 1: Block Diagram

The above diagram showcases various important blocks in the proposed system and their high-level interaction. Drowsiness detection consists these of individual modules. (a) Video acquisition, (b) Dividing into frames, (c) Face detection, (d) Drowsiness Detection, (e) Location tracking. There is an external hardware component namely, a Camera for video acquisition. The functionality of each of these modules in the system can be described as follows:

i. Video acquisition: Video acquisition mainly involves obtaining the live video feed of the automobile driver. Video acquisition is achieved, by making use of a camera.
ii. Dividing into frames: This module is used to take live video as its input and convert it into a series of frames/ images, which are then processed.
iii. Face detection: The face detection function takes one frame at a time from the frames provided by the frame grabber, and in each and every frame it tries to detect the face of the automobile driver. This is achieved by making use of a set of pre-defined Haarcascade samples.
iv. Eyes and yawn detection: Once the face detection function has detected the face of the automobile driver, the eyes detection and yawn detection function tries to detect the automobile driver's eyes and lips. This is achieved by making use of a set of pre-defined Haarcascade samples.
v. Drowsiness detection: After detecting the eyes and lips of the automobile driver, the drowsiness detection function detects if the automobile driver is drowsy or not, by taking into consideration the state of the eyes, that is, open or closed, and the blink rate as well as the frequency of yawn up to continuous 10 seconds.
vi. Location Tracking: When the driver is detected drowsy, we calculate the latitude and longitude of the area in which the driver is present at that time and store the latitude and longitude coordinates in the database server. Using the longitude and latitude coordinates we can track the location of the driver where he is drowsy on the map.

IV. EXPERIMENT SETUP

A. Hardware

i. Raspberry pi
A tiny laptop can act as processor of the system here we're victimization raspberry pi three module, consist of one gb ram, supported laptop vision techniques , The Raspberry Pi 3b+ Model options one.4GHz 64-bit quad-core processor, a Secure Digital (SD) card slot that acts as memory for pi, four USB ports to attach hardware devices, a port to13 support LAN, GPIO(General-purpose input/output) pins to support input and output and power instrumentation.

ii. Pi cam
With the help of pi cam the system could reach more than 15 frames per second for face and eye tracking. Thus, it can be concluded that the proposed approach is a low cost and effective solution method for a real-time of driver drowsiness detection. Video acquisition mainly involves obtaining the live video feed of the automobile driver. Video acquisition is achieved, by making use of a camera.

iii. Speaker
Speakers are used to connect to a computer to generate sound, which are one of the most common output devices. Some speakers are designed to connect with any kind of sound system, while some can be hooked up only with computers. The primary objective of speakers is to offer audio output for the listener.

B. Software

iv. Noobs
NOOBS or New Out of The Box computer code is employed for initializing Raspberry Pi for the primary time. this can be the best means potential to put in Raspberry Pi anyplace. It needs no extra access for network or any imaging computer code. to line up Raspberry Pi, we'd like the NOOBS nothing file that is to be downloaded.

v. SD card
An SD card, short for Secure Digital card, may be a form of removable memory card accustomed browse and write massive quantities of knowledge in an exceedingly wide range of mobile physics, cameras, sensible devices, and more.

vi. VNC viewer
In computing, Virtual Network Computing (VNC) may be a graphical desktop-sharing system that uses the It transmits the keyboard and mouse input from one pc to a different, relaying the graphical-screen updates, over a network. VNC is platform-independent – there are shoppers and servers for several GUI-based operational systems and for Java. Multiple clients might connect with a VNC server at constant time.

vii. Open CV
OpenCV is an open source library for the pc vision, machine learning, and image process and currently it plays a significant role in data processing that is incredibly vital in today's systems. It is used to spot objects, faces, or perhaps handwriting of an individual. Once it integrated with varied libraries, like NumPy, python is capable of process the OpenCV.

V. EXPERIMENT RESULT

A.

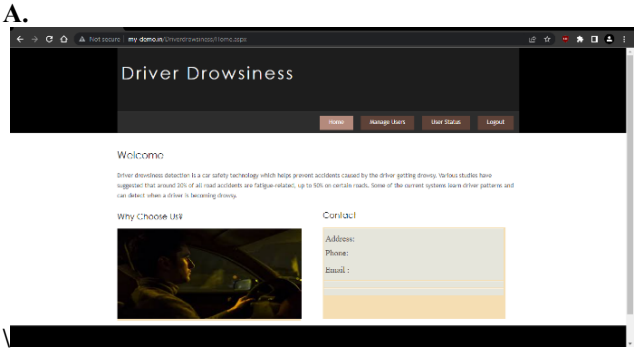

Figure 2: Web portal

B.

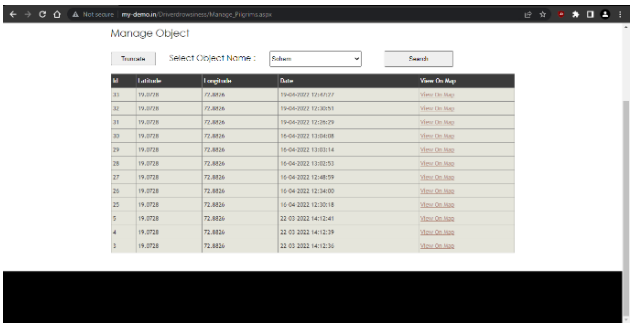

Figure 3: Location and time of detection

C.

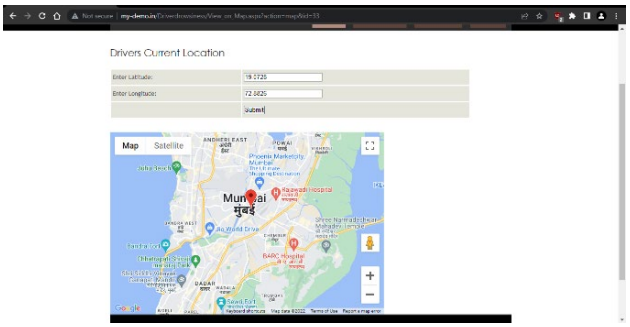

Figure 4: Map view of detection

D.

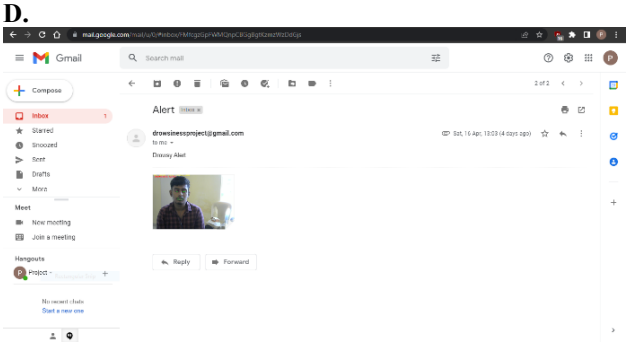

Figure 5: Gmail alert

VI. CONCLUSION

As a conclusion the framework will achieve an unfaltering state where with the help of this system many lives could be saved. The framework cognizant clients who are familiar with the framework and comprehend its focal points and the fact that it takes care of the issue of stressing out for individuals having fatigue related issues to inform them about the drowsiness level while driving. Currently, the number one selling product in the market is the market is nothing more than a reed switch to detect head angle tilt. This product is extremely limited and not very effective. The product made by BMW and integrated into their high-end cars to detect driver fatigue behavior is slightly more effective is detection but lack proper notification to warn a driver. The current market and technologies are in its infancy mode. New technologies keep emerging using different techniques.

VII. FUTURE SCOPE

The model can be improved incrementally by using other parameters like blink rate, yawning, state of the car, etc. If all these parameters are used it can improve the accuracy by a lot. We plan to further work on the project by adding a sensor to track the heart rate in order to prevent accidents caused due to sudden heart attacks to drivers. Same model and techniques can be used for various other uses like Netflix and other streaming services can detect when the user is asleep and stop the video accordingly. It can also be used in application that prevents user from sleeping.

ACKNOWLEDGMENT

This project “Real time drowsiness detection system” would not have been possible without the kind support and help and encouragement of our professors We would like to extend our sincere thanks to PROF. GIRISH GIDAYE who consented to be our project guide. We are highly indebted to PROF. GIRISH GIDAYE for his guidance and constant supervision as well as for providing the necessary information regarding the project and also for his support in completing the project.

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AET 015

Smart Security System ForAgricultural Fields

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Abstract-Surveillance plays a major role in many fields be it at home, hospitals, schools, public places, farmlands, etc. It helps us to monitor a certain area and prevent theft and also provides proof of evidence. In the case of farmlands or agricultural lands, surveillance is very important to prevent unauthorized people from gaining access to the area as well as to protect the area from animals and not let them vandalize it. Various methods aim only at surveillance which is mainly for human intruders, but we tend to forget that the main enemies of such farmers are the animals that destroy the crops. This leads to the poor yield of crops and significant financial loss to the owners of the farmland. This problem is so pronounced that sometimes the farmers decide to leave the areas barren due to such frequent animal attacks. This system helps us to keep away such wild animals from the farmlands as well as provides surveillance functionality.

I. INTRODUCTION

The goals of this project are to make the optimum use of mobile communication technology by utilizing the worldwide system for mobile communication (GSM) and providing a short message service (SMS). This technology assists us in keeping wild animals out of rural areas while also providing surveillance capabilities. The smell of rotten eggs has been discovered to deter wild pigs and deer from destroying crops, so farmers manually spray the rotten egg solution on their fields. Lights and firecrackers are used to scare away the wild elephants who destroy the crops. This project is focused on the use of animal surveillance. In addition to providing protection, this system distinguishes between an intruder and a person using image processing, various PIR sensors are deployed in the area to detect any motion and hence turn ON a camera Buzzer sound, lights(during night conditions), and a Speaker entering the farmlands and destroying the crops, a method used to prevent the wild animals from time monitoring. It involves automation of certain when movement is detected, thereby providing real (for human intrusion) which have been found useful to ward off the wild animals.

II. LITERATURE REVIEW AND DISCUSSION

The motive for designing and executing the superior improvement in embedded devices for Crops in farms are over and over ravaged with the aid of nearby animals like buffaloes, cows, goats, birds, fireplace, etc. This results in huge losses for the farmers. It is now not feasible for farmers to barricade complete fields or precede the field 24 hours and protect it. Hence here we present a computerized crop safety system for animals and fire. This technique makes use of a motion sensor to discover wild animals drawing near the sphere. In such a case the sensor alerts the microcontroller to require action. The microcontroller now sounds an alarm to woo the animals away from the sector further and sends an SMS to the farmer and he makes a call, in order that the farmer may fathom the difficulty and come to the spot just in case the animals don't recede by the alarm. Agriculture is the science and artwork of cultivating plants. Agriculture performs a most important position inside the economic development of our us of a and this can be the first occupation from a few years. to extend the productivity of the crops and attenuate the expenses of agricultural practices we adopt smart agriculture techniques using IoT. The sensors are placed at different locations within the farm, by which the parameters is controlled using remote or through internet services and by interfacing, the operations of the sensors are performed with microcontrollers As new technologies have been introduced and utilized in the modern world, there is a need to bring advancement in the sector of agriculture also. Various Research has been undergone to enhance crop cultivation and is widely used. To enhance crop productivity efficiently, it is necessary to monitor the environmental conditions in and around the field. The parameters that have to be exactly monitored to enhance the yield are soil characteristics, weather conditions, moisture, temperature, etc., Internet of Things (IoT) is being utilized in a number of real-time applications. The introduction of the Internet of Things (IoT) along with the sensor network in frame refurbishes the traditional way of farming. Online crop monitoring and the use of IOT helps the farmers to stay related to his subject from somewhere and anytime. Various sensors are used to screen and collect records about the area conditions. Collectively the about the farm circumstance is disbursed to the farmer thru GSM technology. The agriculture sector is the backbone of the Indian economy. Security is no longer in phrases of sources solely however additionally agricultural products wish protection and safety at the very preliminary stage, like protection from attacks of rodents or insects, in fields or grain stores. Such challenges should even be taken into consideration. Security systems that are getting used nowadays don't seem to be smart enough to produce real-time notifications after sensing the matter. The mixture of typical methodology with present-day technologies as the Internet of Things and Wireless Sensor Networks can cause agricultural modernization. Keeping this scenario in our mind we've got designed tested and analyzed an

'Internet of Things' based device which is capable of analyzing the sensed information and then transmitting it to the user. This gadget will be controlled and monitored from far off region and it is carried out in agricultural fields, and grain shops for protection purposes.

III. METHODOLOGY

Proposed system includes the ESP 32 Camera Module as the main controlling hardware unit which is the microcontroller used. The system should work for displaying the video streaming; hence a Smartphone is used for the display. Arduino NANO is connected to GSM module as an external microcontroller was required to send messages to the user notifying about the intruder. PIR sensor detects motion and sends signal to the buzzer which starts to play by default. The farmer can choose to trigger the speaker which will play a pre recorded audio by the farmer. There is also a button on the smart phone to trigger the speaker which plays a predefined audio. The LDR if detects light will not switch on the light whereas at night when light wont be detected the LDR will switch on the Light for better streaming of the Video and Capturing Image.

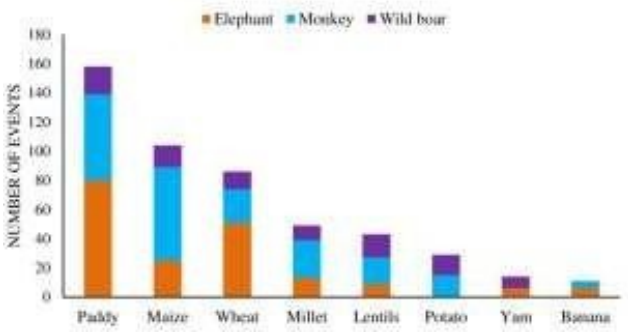


Figure 1: Graph Showing Damage of different crop fields, fruit gardens by different wild animals.

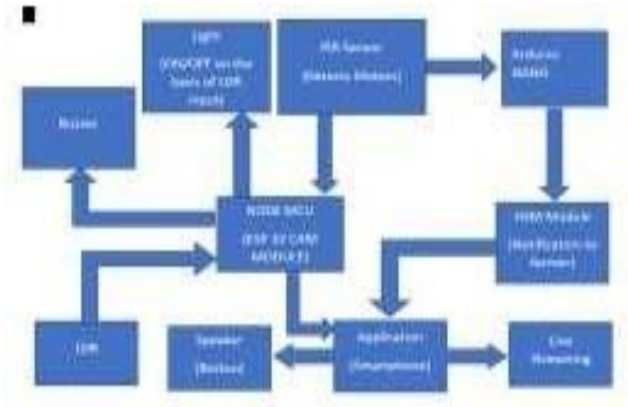


Figure 2: Block Diagram

IV. SPECIFICATIONS

i. **PIRSensor**

PIR sensors detect motion and are virtually always used to determine whether a human has entered or exited the sensor's range. They're small, cheap, low-power, simple to use, and they don't wear out. As a result, they're often found in home and business equipment and gadgets. PIRs are made up of a pyroelectric sensor that can detect infrared radiation levels. Everything emits a small amount of low-level radiation, and the hotter something is, the more radiation it emits. A motion detector's sensor is actually divided into two sections. This is because we want to detect mobility (change) rather than average IR levels. The two sections are connected by wires they balance each other out. The output will swing high or low if one part sees more or less IR radiation than the other.

Features:

When triggered (motion detected), the digital pulse is high (3V), and when idle (no motion detected), the digital pulse is low (0V). Resistors and capacitors on the PCB determine pulse lengths, which vary from sensor to sensor. Most modules (which include a 3.3V regulator) require a 5V-12V input voltage, however 5V is ideal in case the regulator has different requirements.

ii. **Speaker**

Speakers are electromagnetic waves that are converted into sound waves by transducers. A device, such as a computer or an audio receiver, provides audio input to the speakers. This input can be analogue or digital in nature. The analogue electromagnetic waves are simply amplified and converted into sound waves by analogue speakers. Because sound waves are analogue, digital speakers must first convert the digital input to an analogue signal before generating the sound waves.

iii. **Buzzer**

Buzzer is a loud noise maker. Most modern ones are civil defense or air- raid sirens, tornado sirens, or the sirens on emergency service vehicles such as ambulances, police cars and fire trucks. There are two general types, pneumatic and electronic. DC MOTOR Motor is a device that creates motion, not an engine; it usually refers to either an electrical motor or an internal combustion engine. In most common DC motors , the external magnetic field is produced by high-strength permanent magnets. The stator is the stationary part of the motor - this includes the motor casing, as well as two or more permanent magnet pole pieces. The rotor (together with the axle and attached commutator) rotate with respect to the stator. The rotor consists of windings , the windings being electrically connected to the commutator. The above diagram shows a common motor layout -- with the rotor inside the stator (field)magnets.

iv. **GSM Module**

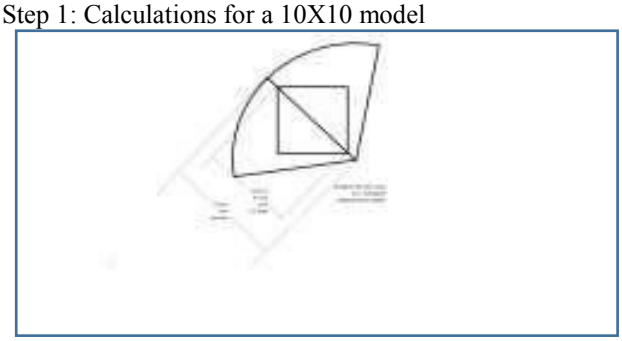
They can perform all of the functions of a mobile phone through a computer, including making and receiving calls, sending and receiving SMS, and sending and receiving MMS. Typically, these are used for computer-based SMS and MMS services. The Global System for Mobile Communications (GSM) is an acronym for Global System for Mobile Communications. It's a set of standards produced by the European Telecommunications Standards Institute (ETSI) to specify second- generation (2G) digital tools. The AT commands are demonstrated in the GSM/GPRS module. They can perform all of the functions of a mobile phone through a computer,

including making and receiving calls, sending and receiving SMS, and sending and receiving MMS. Typically, these are used for computer based SMS and MMS services.

v. ESP 32 Camera Module
The ESP32-CAM is an Ai-Thinkers Original ESP32 CAM WiFi + Bluetooth with OV2640 Camera Module, which is built on the ESP32 chip and includes the ability to use a camera. It's perfect for a variety of IoT applications. The ESP32- CAM has a compact, cost-effective camera module that can function as a stand-alone system.We connected the camera to the computer and streamed the photographs and movies that were captured.

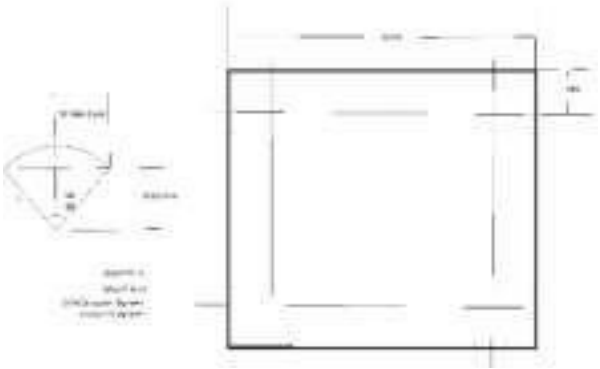
V. RESULTS

Step 1: Calculations for a 10X10 model



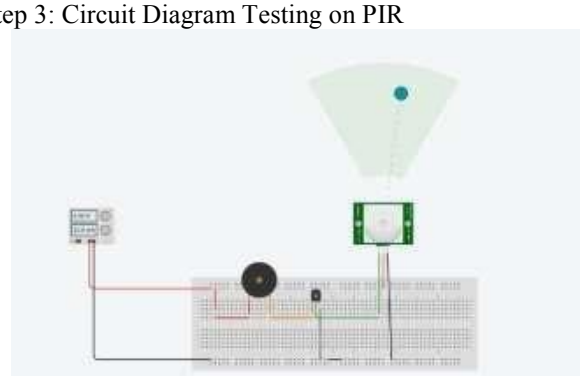
The area covered by PIR sensor that has been placed diagonally to the 10X10 square shaped land is far greater than area of farm.

Step 2: Calculations of an ideal farmland of 1X1 acre.



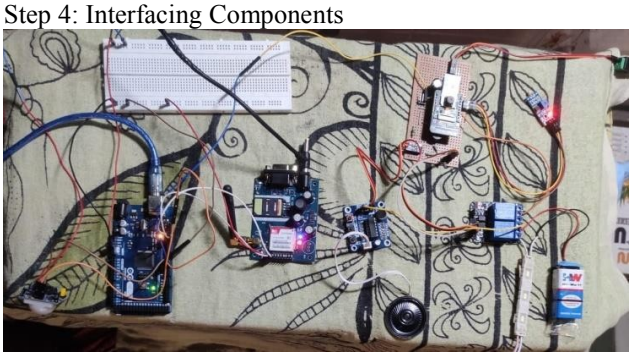
Using above diagram and calculations it is easy to compute number of pir sensor required for 1 acre land.

Step 3: Circuit Diagram Testing on PIR



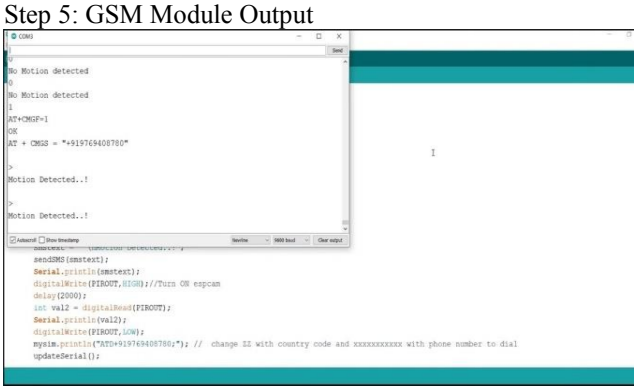
This is the software implementation of motion detection and alarm using PIR sensor and Buzzer..

Step 4: Interfacing Components

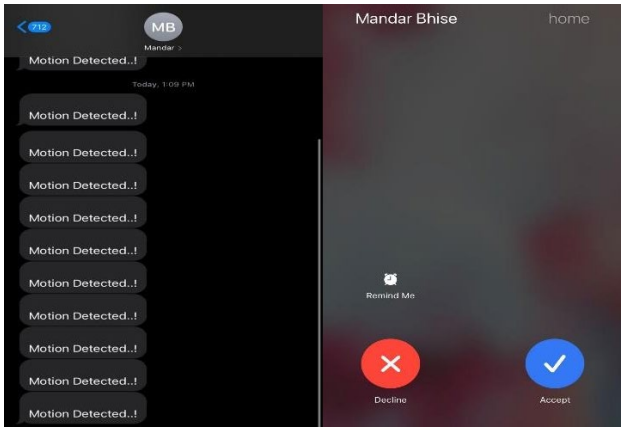


This Picture shows overall circuit connection of our project.

Step 5: GSM Module Output



Serial monitor output of sms and call notification using GSM



Sms and call notification on cellphone

Step 6: Application Interface

This is the application interface of our project.

Get IP is used to get the IP address of a network to which our system is connected and it will live stream when motion is detected. Relay ON/OFF buttons are for speaker.

VI. FIGURES AND STEPS

Fig 1	Graph
Fig 2	Block Diagram
Step 1	Calc 10X10 Model
Step 2	Calc (Farm) 1X1 Acre
Step 3	PIR Testing
Step 4	Component Interfacing
Step 5	GSM Output
Step 6	Application Interface

VII.CONCLUSION

Farmers encounter severe animal threats in rural parts of India. It requires urgent attention as no effective solution has come into use till date for this problem. Hence, this venture conveys an incredible social significance as it intends to resolve this issue. Although the project does not completely do the needful by reducing the problems faced by the farmers, but it ensures farmers to not suffer from the loss of crops by alerting them in prior about the attack of animals. It is the primary duty of every citizen is to prevent the Agricultural farmlands. Many crop fields are often destroyed easily by the wild animals. Hence, our proposed work has used PIR sensor and ESP 32 Camera Module to efficiently detect the movement of the intruders. As the camera is used, the animal entry can be easily monitored by the farmer. The system does not wait for the farmer to reach the field to prevent the animal from damaging the crops. Instead, the machine emits an a pre recorded sound while triggering the buzzer by default to startle the animal and cause it to leave the farmland. To protect farmlands from predators, the device is successful and functional.

VIII. ACKNOWLEDGEMENT

We are pleased to present “Smart Security System for Agricultural Fields” as our project and take this opportunity to express our profound gratitude to all those people who helped us in completion of this project.

We thank our college for providing us with excellent facilities that helped us to complete and present this project. We would also like to thank the staff members and lab assistants for permittingus to use computers in the lab as and when required.

We express our deepest gratitude towards our project guide Prof. Manoj Suryawanshi for his valuable and timely advice during the various phases in our project. We would also like to thank him for providing us with all proper facilities and support as the project co- coordinator. We would like tothank him for support, patience, and faith in our capabilities and for giving us flexibility in terms of working and reporting schedules. Finally, we would like to thank everyone who has helped us directly or indirectly in our project.

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AET 016

"IOT Based Air Quality Monitoring System"

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Abstract— Air pollution has become a common phenomenon everywhere. Specially in the urban areas, air pollution is a real-life problem. A lot of people get sick only due to air pollution. In the urban areas, the increased number of petrol and diesel vehicles and the presence of industrial areas at the outskirts of the major cities are the main causes of air pollution. The problem is seriously intensified in the metropolitan cities. Also, the climate change is now apparent. Many European countries have aimed to replace petrol and diesel vehicles with the electric vehicles by 2030. Even India has aimed to do so by 2025.The use of coal for electricity generation is now going to be a thing of past. IOT based air quality monitoring systemusing MQ sensors, arduino, LCD I2C are usedto display the air quality in ppm. It will send an alarm when the air quality goes below a certain level, whilst there is enough amount of the dangerous gases that are found in atmosphere. It also detects s02, co2, smoke, benzene, alcohol and nh3 in the air. Air Quality is measuredin ppm on the liquid crystal display for further monitoring and action.

Keywords- Arduino, SO2, CO2,Air Q uality Monitoring

I. INTRODUCTION

The Air Quality Indicator (AQI) is calculated and supported on air pollutants like CO and NO2 compounds that consume opposing possessions happening the atmosphere and human health. The Air Quality Indicator may be a range that represents the very finest meditation of a specific air unused matter at a particular time. We propose an air quality as wel as air pollution monitoring system that allows us to monitor and check live air quality as well as air pollution in an area through Internet of Things (IoT). It uses air and gas sensors to sense presence of harmful gases/compounds in the air and constantly transmit this data. In addition, system keeps measuring air level and reports it. The sensors interact with Arduino Uno (Microcontroller) which processes this data and transmits it over the application. In addition, authorities can keep a watch on the air pollution near schools, and hospitals areas.

Many national agencies make use of air quality monitoring stations with expensive and specialized EPA-rated instruments at fixed locations. Although these stations can provide accurate air quality measurements, their prohibitive costs (on the order of tens of thousands dollars per station) means that it is not viable to deploy themon a large scale.[1]

II. AIR QUALITY MONITORING

A. Basic Requirement

The basic need for living beings is air of good quality. According to the reports 90% of people breathe contaminated air. Most people are dying due to air pollution. Air pollution causes many diseases such as lung cancer, respiratory problems, heart diseases etc. Global warming is a serious problem which also caused due to air pollution. Due to global warming temperature of earth increasing by which the glaciers are melting rapidly it is not good for environment[2].

B. Sensors Used In the Project:

We have used 4 Sensors in this project namely MQ135 , MQ2 , and MQ6

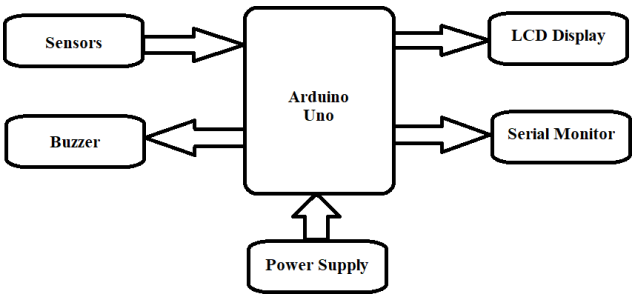
III. BLOCK DIAGRAM , FLOW CHART AND METHODOLOGY

A. Block Diagram

The major components of project have been mentioned in the above section. We are monitor the Air over a serial monitor & LCD using sensors and trigger an alarm when the air quality goes down beyond a certain level, means when there is sufficient amount of harmful gases are present in the air like CO_2, smoke, alcohol, benzene and NH3. It is shown the air quality in PPM on the LCD as well as serial monitor so that we can monitor it very easily. we have used sensors which are the best choice for monitoring Air Quality as it can detect most harmful gases and can measure their amount accurately. In this Internet

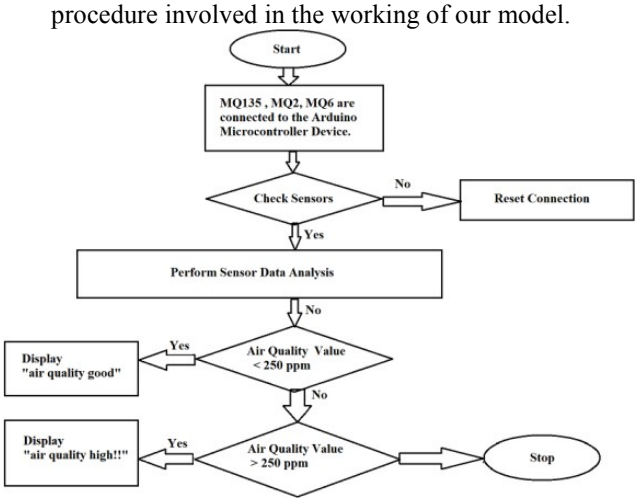
of Things (IOT) project, we can monitor the pollution level from anywhere using computer.

In this system we are using Arduino UNO. The sensor for monitoring the air pollution is MQ-135,MQ2,MQ6. MQ2 Detect Smoke, MQ135 detects alcoholic gas via liquid sanitizer, MQ6 detects LPG gas through lighter and the Arduino sketch is written, compiled and loaded to the Arduino board using Arduino ID.



B. Flowchart

The flowchart drawn below describes the step by step procedure involved in the working of our model.



C. Methodology

PHASE - 1: Detection of Air Pollutant Level

An IOT based air pollution detection kit is developed. It deals with thcollection of data from sensors connected to Arduino, and the information is display in LCD in PPM

PHASE - 2: Creating the interface

This stage involves the clarification of the various components

PHASE - 3: Execution and Testing

The various components are interfaced together and the project deliverables are built with the help of different circuit designs. The testing, debugging and troubleshooting of the design is performed to test the performance of the design under various conditions. Some Common Mistakes

IV. CIRCUIT DIAGRAM AND WORKING

A. Circuit Diagram

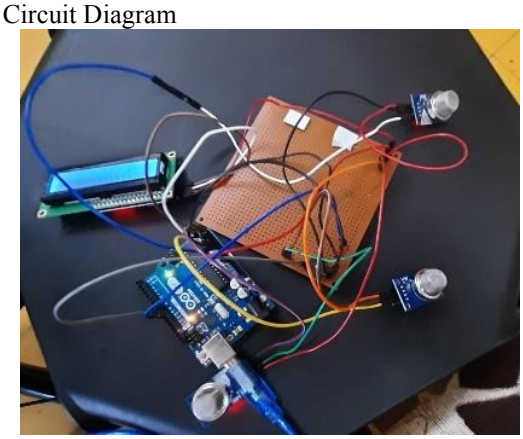


Figure 1: Proposed Circuit Diagram

Buzzer pin is connected to the pin 8 of Arduino; LED pin is connected to the pin 9 of Arduino; GND is connected to the pin GND of Arduino; Sensors and Speaker is connected with the Arduino; VCC pin is connected to the pin 5v of the Arduino; GND pin is connected to the GND of the Arduino; MQ135 is connected to the A0 pin of the Arduino; The MQ- 2 sensor is connected to the to the A2 pin of the arduino , MQ- 6 sensor is connected to the to the A1 pin of the Arduino , MQ-4 sensor is connected to the to the A3 pin of the Arduino and LCD is connected with Arduino; VCC & GND pin is connected to the 5 V & GND of the Arduino; RS pin is connected to the Arduino pin 12; E pin is connected to the Arduino pin 11.

B. Working

We have connected the sensors with the Arduino. Connected the VCC and the ground pin of the sensor to the 5V and ground of the Arduino and the Analog pin of sensor to the A0 of the Arduino. Connected a buzzer to the pin 7 of the Arduino which is start to beep when the condition becomes true. MQ2 Detect Smoke, MQ135 detects alcoholic gas via liquid sanitizer, MQ6 detects LPGgas through lighter and the Arduino sketch is written, compiled and loaded to the Arduino board using Arduino IDE. When we connect it to Arduino then it senses the gases, and we get the Pollution level in PPM (parts per million). MQ135 gas sensor gives the output in form of voltage levels and we need to convert it into PPM. Sensor is giving us value of less than 250 when there is no gas near it and the safe level of air quality is 250 PPM and it is not exceeding 250 PPM[8]. When it exceeds the limit of 250 PPM, then it starts cause Headaches, sleepiness and stagnant, stale, stuffy air, then the LCD and serial monitor is displayed “Good Quality Air”. Whenever the value is increased 250 PPM, then serial monitor is displayed “Level High”. After uploading code, the value is being less than 250 PPM, then the LCD and is displayed “Good Quality Air”. After uploading code, the value is increased 250 PPM, then the LCD displayed “Level High”.

V. RESULTS

This table shows that the air quality health. It is divided into three parts like as Good Quality Air and High Level Air. It detects the air pollution level and indicates the risk through LCD. When the updated data compared to the base data then it shows the result accordingly to this scale. The compared data is between it shows that health risk is low and indicate open window, when it rises up to beyond 250 ppm it shows that the pollution in the air (AQ Level HIGH) is considered dangerous for human being and I take some steps quickly and when value less than the threshold voltage(less than 250) then it shows AQ Level Good and their no pollution in the air. After uploading the code, we get,

By MQ135(Threshold=250):

Figure 2a: Before Detection

Figure 2b: After Detection

Air Quality Indicator Range (PPM)	Result	Health Impacts
0-250	AQ Level Good	Minimal impact
250 Above	AQ Level High	May cause minor breathing discomfort to sensitive people.

By MQ2(Threshold=60):

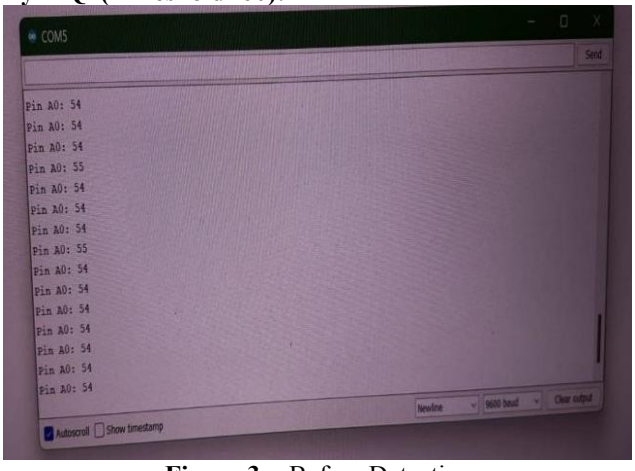


Figure 3a: Before Detection

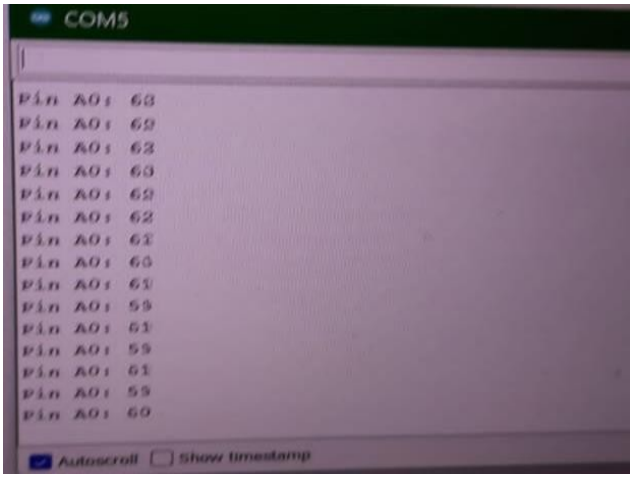


Figure 3b: After Detection

Air Quality Indicator Range (PPM)	Result	Health Impacts
0-60	Smoke Detected	Minimal impact
60 Above	Smoke Not Detected	May cause minorbreathing discomfort to sensitive people.

By MQ6:

Figure 4a: Before Detection

Figure 4b: After Detection

Air Quality Indicator Range (PPM)	Result	Health Impacts
Not detected	No LPG leakage	No impact
Detected	LPG leakage	Damage your heart causing irregular heart beat

ACKNOWLEDGMENT

First of all, we take this opportunity to thank our college "Vidyalankar Institute of Technology" for giving us opportunity to work on this collaborative project "IOT Based Air Quality Monitoring System". We would like to express our deep gratitude to Prof. Dr Arun Chavan Head of Department of Electronics Engineering for his support and guidance. We express our gratitude towards our project guide Prof. Uma Jaishankar. Last but not the least we would like to thank our family and friends for their support during completion of our project.

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AET 017

Solivagant: A Tour guide Analyst

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Abstract— The purpose of this project is to recommend the travelers the name of the tours based on their preferences, by analyzing the other travelers reviews together with the rating value to improve the prediction accuracy. Users do not rate adequate tours to enable collaborating filtering-based recommendation, which can lead to an issue called as cold start problem. To solve this issue the following contributions are made in this project like: 1. Project combines Collaborative Filtering with Aspect Based Sentiment Analysis to overcome cold start user problem, while ensuring high accuracy. 2. Context like traveler type, user's location and user's preference are included as an additional information for personalized recommendation. 3. Several experiments are conducted on TripAdvisor datasets and the result shows that proposed hybrid framework is competitive against classical approaches. This project includes various elements like semi-supervised clustering algorithm is used to group the features of the same vocabulary into nine, predefined categories known as tour aspects. Lexicon based approach is used to find the sentiment orientation towards each tour aspects based on the defined context. Item-based filtering technique is used to predict the unrated items/aspects. Thus, context-based approach increases the recommendation results.

Keywords—recommendation, Sentiment, datasets, filtering technique, clustering.

I. INTRODUCTION

Recommender systems help people to make better decisions in a world filled with choices. Nowadays, recommender systems are being widely used in different services covering vast area of applications. Following boom in tourism industry and data technology during the past decade, the travel recommender systems have attracted considerable attention of researchers. As a tourist, most of the times, it is really confusing to decide where to go and to select among a large number of possible destinations, especially for unseen and unfamiliar places. Hence, information retrieval and decision support systems are widely recognized as valuable tools in this context. In this respect, tourism and travel recommender systems have become a hot topic recently and attracted the attention of both researchers and companies.

A well-suited domain for this research, that makes use of recommender system is a Tour Industry. Tour which suits ones requirements in terms of price, service, quality, location and others is very complex task. Recommendation Systems play a major role by filtering the places which suit the users interests and requirements. Since the recommender systems in most cases are targeted towards individuals, it is a problem to recommend items to a new user you barely know anything about, or a new item you do not know which type of user will like. This is known as the cold-start problem. To address the cold start problem context-aware recommender systems have been introduced. Despite the abundant studies on contextual-aware recommendation, most of current information retrieval systems only pay attention to query collections while browsing context information and the textual content of user-generated reviews are largely ignored. Contextual information from travellers review, is a mode of traveller, like a "Business", "Couple", "Solo", "Family" and "Group" , user's location and user's preferences. The main goal in this thesis is to make personalized tour recommendations by applying text mining technique on the user's reviews and subsequently combine the result with the CF technique to ensure the high accuracy recommendation so as to overcome the cold-start-problem. We define traveller type, user's location and user preference as the main context. As an example, recommendations will be different based on context and user preference. Like for a Family, "Food" and "cleanliness" are the main preference but for a single male traveller, facilities like "pool" and "Gym" carry greater preference. We not only consider different rating parameters but also apply feature based sentimental analysis on user's reviews. However, textual reviews can be particularly useful when travelers do not provide enough ratings. For example, Trip Advisor allows travellers to rate tours on several optional dimensions such as cleanness and service. When the rating of a dimension is missing from the traveller, it can be filled by extracting the traveller's opinion from textual reviews. Extracting opinions from text is said to be sentiment analysis/opinion mining.

A Hybrid based Recommendation System is designed based on user's context, ratings and their reviews. Mainly in recommendation system, hybrid approach combines content based filtering and collaborative filtering(CF) but in this paper we are alternating the hybrid approach where recommendation results will be more improved by incorporating aspect based sentiment analysis with collaborative filtering approach. Cold-start-problem can be solved and gives high performance recommendation result by using context based information and applying hybrid based approach.

We obtained the data from the Tripadvisor.com. The details of each tour is stored in a database, which includes tour general information, it's reviews and ratings. Item based CF technique is used to predict the unrated features of a tours. Also lexicon based approach is used to determine the sentiment orientation towards tour features and semi-supervised clustering is used to build the vocabulary of tour aspects. As Using the context based information for tour searching gives more accurate recommendation.

II. LITERATURE REVIEW

User behavior can be analyzed by exploiting the user generated contents available abundantly on the internet. Recommendation system[1] is an efficient tool that manages to filter this abundant information according to the user's preference and interest. Traditional recommendation system uses Collaborative filtering technique to recommend any products or services. But the main issue faced by this technique is cold start problem which is defined as cold start user or cold start item [2], and has been captured by many researchers i.e where no rating information is yielded when a new user register the system or not much information is found about the new item to recommend. This gives rise to different methods and techniques associated with CF technique. Hybrid approach, where CF technique integrates with the aspect based sentiment analysis tries to resolve the issue of cold-start-problem making use of contextual information from travelers textual reviews, thus resulting a better performance.

Collaborative Filtering

Collaborative filtering brings together the opinions of large interconnected communities and recommends items to individual users by the known rated items.

In [3] paper shows an excellent survey of the various CF approaches.

Huming et.al, [4] describes tour recommendation system based on collaborative fil- tering method of clustering and Rankboost algorithm, which can avoid the cold-start and scalability problems existing. They found a cluster center of k users based on historical ratings and generate recommendations according to the cluster's user preferences.

Jannach et.al, [6] compares different models of regression and have constituted agger-gation functions which analyzes differently with respect to users and items. They use SVM and conclude that a support vector machine will perform better than linear least squares regression models if used for learning a combination of user and item. They also constitute that when weights are given, specific regression models performs the best.

William Wei et.al, [7] propose an approach which combines collaborative filtering with data classification technology to generate recommendations. The main idea is to find a new user a group in which previous similar user's preferences are available and recommend tours according to similar user's preferences. The approach has three steps: find a group for the new user based on three criteria and process tour average ratings in that group, compute the Euclidean similarity between tour average ratings and the user requirement and finally generate tour recommendation list based on the final ranking scores for each tour.

Sharma et.al, [8]proposed a method that take many different criteria for each item. Multi Criteria Recommender Systems approach used require many previous users to first rate items with respect to these criteria. It is virtually impossible to have user ratings for every different dimension for each item. Thus does not solve cold start problem. To determine the rating of a Tour from previous users with respect to different parameters the paper uses various Natural Language Processing approaches on a Tour Review Corpus and builds a user-item-feature database.

Aspect based Sentimental Analysis

Khan, Khairullah et.al, [9] gives the detail study about the opinion mining. The study deals with subjectivity analysis and lexical resource generation. This study exploits opinion representation, opinion mining models and opinion components by retrieving opinions from primary sources like social networks and web blogs.

Through sentimental analysis a notation of personal scale, based on the observation that different users gives different ratings to their reviews to improve the polarity classification analysis, which provides personal recommendation is explained in [10]. Text reviews are used to build a user profile, but cold start problem is not concentrated.

Gang et.al, [11] proposed an emerging pattern mining technique where the tour man- agers analyzes the travelers concern from emerging tour features w.r.t response to improve their strategic planning, marketing and product development.

Muangon et.al, [12] proposes a framework of feature-based opinion mining by using scores which essentially relies on the usage of two main lexicalizing levels, features and polar words. An approach for extracting features and polar words from textual opinion is based on syntactic pattern analysis. The evaluation is performed with existing opinions and compared the statistical resulted scores with the existing scores of each tour. Scoring method is based on lexical analysis and gives the top polar words from the reviews.

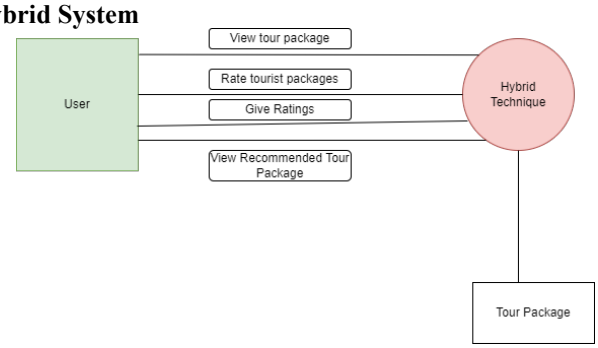
Lin et.al, [13] studies how to utilize user's browsing behavior of reading tour reviews on mobile devices and apply text-mining techniques to identify user's preferred aspects on tour and to construct user interest profiles to make personalized tour recommendations. The aspect-based sentiment analysis is related to unsupervised approach.

Duan et.al, [14] presents how to mine the online user reviews that is used as both quantitative aspects and textual content from multi-dimensional perspectives. Sentiment analysis technique decomposes the reviews into five dimensions for measuring and capturing service quality dimensions. This dimensions are then assimilated into econometrics models to get the overall evaluation of the content generating behavior.

M.K Dalal et.al, [15] This paper presents a semi-supervised approach for mining online user reviews to

generate comparative feature-based statistical summaries that can guide a user in making an online purchase. It includes various phases like preprocessing and feature extraction and pruning followed by feature based opinion summarization and overall opinion sentiment classification. Multiword with decomposition strategy is used for feature set extraction.

Hybrid System



Wu Yao et.al, [16] proposed probilistic model FLAME: was introduced addressing the problem of Personalized Latent Aspect Rating Analysis. A unified probabilistic model called Factorized Latent Aspect Model (FLAME), explains the advantages of collaborative filtering and aspect based opinion mining, combination of both solves the problem of latent aspect rating. Probilistic model learns the user's personalized preferences on different aspects from their past reviews, and predicts user's aspect ratings on new items by collective intelligence. Phrase-level sentiment analysis are used to excavate product's explicit features and user's corresponding opinions.

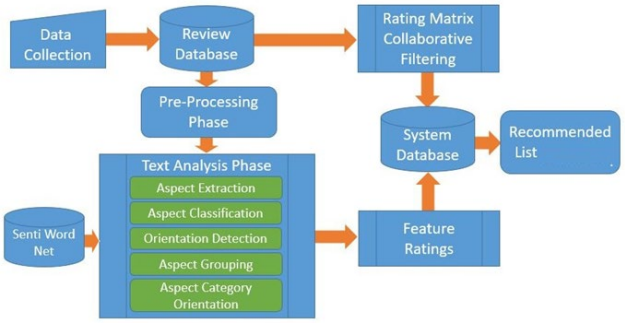
Kavinkumar et.al, [17] created a recommendation system using user based and item based collaborative filtering. In addition to the combined collaborative filtering techniques author propose a framework which includes a feedback analysis to improve the recommend- dation system. Proposed the feedback analysis at two levels. One is external feedback where the comments are gathered from public platforms like social media and automobile websites. The other is internal feedback i.e. the feedback is taken from users who have been provided with recommended items. But main drawback of this Hybrid system is that if technical words occurred, then recommendation becomes difficult.

CWK Leung et.al, [18] describes a rating inference approach to include the text reviews in Collaborative Filtering algorithms. A relative-frequency-based method is used determine the sentiment orientation and strength of opinion words and then aggregate this orientation to conclude the average sentiment used by user. Paper also solves an issue of data sparsity by integrating textual reviews into CF algorithms.

Kai Zhang et.al, [19] author proposed an hybrid approach where collaborative filtering combines with the content based filtering to overcome sparsity issue. Paper focuses on user preference analysis along with the intent if the trip. Diversity techniques is used to optimize the tour recommendation list. Drawback is that Preference factor model rely more on feature extraction technique to give better recommendation.

III. SYSTEM ARCHITECTURE

A. Block Diagram



B. Module Description

Data Collection

First the datasets were collected from Tripadvisor.com and stored in a database. Database contain tour's general information, user's reviews and overall rating of an tour as well as aspect based rating.

Pre-processing

First the datasets were collected from Tripadvisor.com and stored in a database. Database contain tour's general information ,user's reviews and overall rating of an tour as well as aspect based rating.

Text-analyzing

The proposed framework sequentially mines product's aspects and user's opinions, groups representative aspects by similarity, and generates an output summary. The framework is divided into four major tasks by using the processed reviews as an input and then perform the four tasks to produce the final output summary.

IV. IDENTIFICATION OF PROJECT FROM STUDY

Feasibility study

The very first phase in any system developing life cycle is preliminary investigation. The feasibility study is a major part of this phase. A measure of how beneficial or practical the development of any information system would be to the organization is the feasibility study.

The feasibility of the development software can be studied in terms of the following aspects:

1. Operational Feasibility.
2. Technical Feasibility.
3. Economical feasibility.
4. Motivational Feasibility.
5. Legal Feasibility

Operational Feasibility:

The site will reduce the time consumed to maintain manual records and is not tiresome and cumbersome to maintain the records. Hence operational feasibility is assured.

Technical Feasibility:

At least 166 MHz Pentium Processor or Intel compatible processor.
At least 512 MB RAM.
14.4 kbps or higher modem.
A mouse or other pointing device.
At least 50 GB free hard disk space.
Microsoft Internet Explorer 4.0 or higher.

Economical Feasibility:

Once the hardware and software requirements get fulfilled, there is no need for the user of our system to spend for any additional overhead. For the user, the web site will be economically feasible in the following aspects:
The web site will reduce a lot of paper work. Hence the cost will be reduced. Our web site will reduce the time that is wasted in manual processes. The storage and handling problems of the registers will be solved.

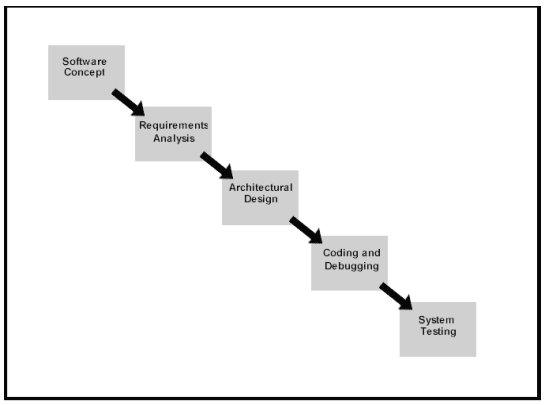
Legal Feasibility:

The licensed copy of the required software is quite cheap and easy to get. So from legal point of view the proposed system is legally feasible.

V. STEPS TOWARDS IMPLEMENTATION

System deployment life cycle:

The System Development Life Cycle is the process of developing information systems through investigation, analysis, design, implementation, and maintenance. The System Development Life Cycle (SDLC) is also known as Information Systems Development or Application Development.



The first step is to identify a need for the new system. This will include determining whether a business problem or opportunity exists, conducting a feasibility study to determine if the proposed solution is cost effective, and developing a project plan.
This process may involve end users who come up with an idea for improving their work. Ideally, the process occurs in tandem with a review of the organization's strategic plan to ensure that IT is being used to help the organization achieve its strategic objectives. Management may need to approve concept ideas before any money is budgeted for its development.
Requirements analysis is the process of analyzing the information needs of the end users, the organizational environment, and any system presently being used, developing the functional requirements of a system that can meet the needs of the users. Also, the requirements should be recorded in a document, email, user interface storyboard, executable prototype, or some other form. The requirements documentation should be referred to throughout the rest of the system development process to ensure the developing project aligns with user needs and requirements.

Professionals must involve end users in this process to ensure that the new system will function adequately and meets their needs and expectations.

After the requirements have been determined, the necessary specifications for the hardware, software, people, and data resources, and the information products that will satisfy the functional requirements of the proposed system can be determined. The design will serve as a blueprint for the system and helps detect problems before these errors or problems are built into the final system. Professionals create the system design, but must review their work with the users to ensure the design meets users' needs.

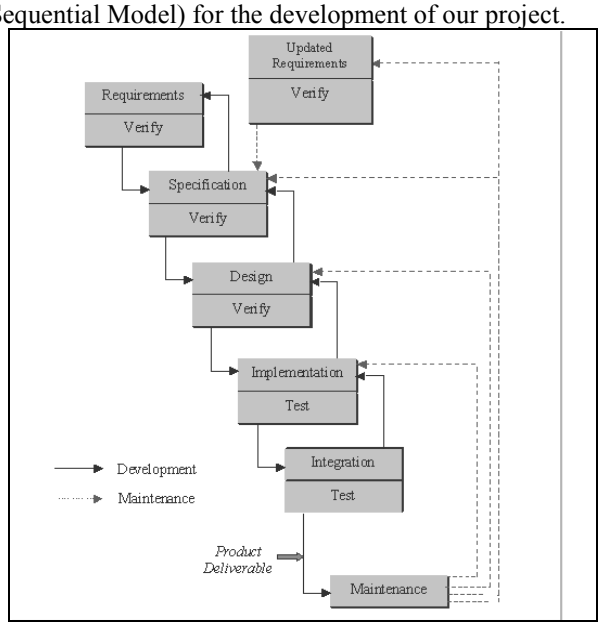
Coding and debugging is the act of creating the final system. This step is done by software developer.

System must be tested to evaluate its actual functionality in relation to expected or intended functionality. Some other issues to consider during this stage would be converting old data into the new system and training employees to use the new system. End users will be key in determining whether the developed system meets the intended requirements, and the extent to which the system is actually used.

Inevitably the system will need maintenance. Software will definitely undergo change once it is delivered to the customer. There are many reasons for the change. Change could happen because of some unexpected input values into the system. In addition, the changes in the system could directly affect the software operations. The software should be developed to accommodate changes that could happen during the post implementation period.

The Iterative model:

We've used the Iterative model (The Linear Sequential Model) for the development of our project.



The model consists of six distinct stages, namely:
In the requirements analysis phase

(a) The problem is specified along with the desired service objectives (goals)
(b) The constraints are identified

In the specification phase the system specification is produced from the detailed definitions of (a) and (b) above. This document should clearly define the product function.

In the system and software design phase, the system specifications are translated into a software representation. The software engineer at this stage is concerned with:
Data structure
Software architecture
Algorithmic detail
Interface representations
The hardware requirements are also determined at this stage along with a picture of the overall system architecture. By the end of this stage should the software engineer should be able to identify the relationship between the hardware, software and the associated interfaces. Any faults in the specification should ideally not be passed 'down stream.

4. In the implementation and testing phase stage the designs are translated into the software domain

- Detailed documentation from the design phase can significantly reduce the coding effort.
- Testing at this stage focuses on making sure that any errors are identified and that the software meets its required specification.

5. In the integration and system testing phase all the program units are integrated and tested to ensure that the complete system meets the software requirements. After this stage the software is delivered to the customer [Deliverable – The software product is delivered to the client for acceptance testing.]
6. The maintenance phase the usually the longest stage of the software. In this phase the software is updated to:

- Meet the changing customer needs
- Adapted to accommodate changes in the external environment
- Correct errors and oversights previously undetected in the testing phases
- Enhancing the efficiency of the software

Observe that feed back loops allow for corrections to be incorporated into the model. For example a problem/update in the design phase requires a 'revisit' to the specifications phase. When changes are made at any phase, the relevant documentation should be updated to reflect that change.

V. CONCLUSION

We proposed a hybrid recommendation approach by analysing the user's behaviour using both textual content and rating data of user's reviews. Mainly project is designing a Rec- commendation System based on tour industry domain where traveller reviews are mined to determine the sentiments of a traveller towards the tour aspects which helps to analyse the user's preference. Therefore to increase the performance of recommendation, I have consider- erred both rating of a tour features as well as its sentiment orientation. Also by collecting demographic information of the new user, context based hybrid recommendation helps to solve the issue of cold start problem.

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AET 018

Object Detection, Distance Measurement and Path Planningfor Autonomous Ground Vehicle

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Abstract— In the last twenty years, the self-driving cars have obtained a huge importance in the research domain, they are expected to take places of humans in different fields by performing several missions. The Project mainly focuses on the software aspect of autonomous ground vehicles which include three parts which are object detection, distance measurement and path planning for the autonomous ground vehicle (agv) in an indoor environment.

Keywords— Self-Driving, Autonomous, Indoor, Vehicles. Introduction

Autonomous vehicles are cars (but also trucks, buses and other) where human drivers are not required to take control and safely operate the vehicles, combining sensors and software to control, navigate and drive the vehicle. To allow self-driving vehicles to take over the street there is a trend by automakers to gradually add technologies like cruise speed control, driving assistance etc. that collaborate with drivers in both driving and maintaining the car itself.

Currently there are no legally operational and fully autonomous vehicles in the world. However partially autonomous vehicles, such as cars with various assistance like automation, parking assistance and certain degree of automatic steering are making inroads. Although it is still infancy, autonomous driving technology is becoming increasingly common and could transform our transport system.

I. LITERATURE REVIEW

YOLO is one of the most optimal Object detection algorithms and is faster than the R-CNN algorithm used for the same purpose. Object detection is a fundamental area for autonomous vehicles because learning the surrounding is important. YOLOv3 is used to find objects in an image, and it works faster with Graphical Processing. [1]

The purpose of this study is thus to review the existing research done on Autonomous Ground Vehicles, in order to find the gaps and develop new dimensions to be studied. Secondary data is used from different sources mainly e- journals to conduct meta-analysis on selected papers. Further research can be done to include those research issues, which have not been covered so far [2].

A notable project in this field is from the Google driverless car project which maintains a test fleet of autonomous vehicles that had driven 300,000 miles (480,000 km) with no machine-caused accidents as of August 2012. By April 2014 700,000 autonomous miles (1,100,000 km) were
logged. By December 2016, 2,000,000 miles (3,219,000 km) had been self-driven.
The papers and e-journals reviewed for this research delve into topics which involve object detection, distance management and SLAM techniques. Even with the number of increasing information on Autonomous vehicles. These reviews helped us in understanding, what were the fundamentals that are required for an autonomous ground. This Aided us in setting up the three fundaments of an autonomous ground vehicle.

II. PROPOSED SYSTEM

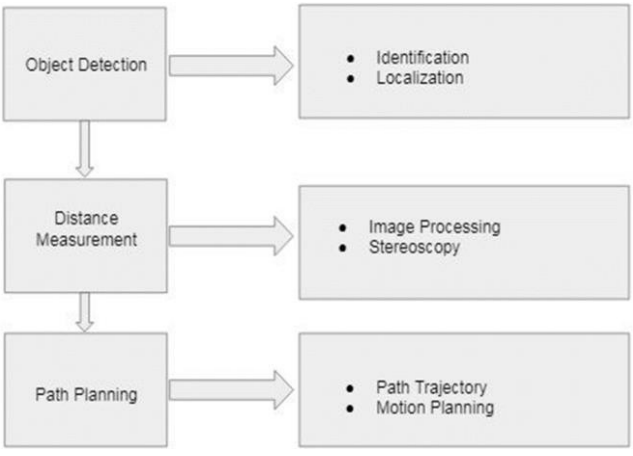

Figure 1: Sequence Diagram

There are three important and fundamental parts in which are depicted in the sequence diagram. Object

detection which includes identification and localization of the image captured. Distance measurement which is used to know about the surrounding more and to keep the path objectless and less accident prone. Path planning is a major aspect because it generated the safest and easiest path for the robot to follow.

This focuses towards building the software aspects in a python-based environment using OpenCV for object detection and distance measurement, the first and second fundamental aspect of autonomous vehicle. OpenCV is a computer vision platform.

For Path Planning and Simultaneous Localization and Mapping, the tools used are Robot Operating system and its 3-Dimensional simulation techniques.

YOLOv3 (You Only Look Once) is a real time object detection algorithm which identifies specific objects in videos, live feeds, or images. YOLO uses a feature learned by deep convolutional neural network to detect an object.

Open CV is a library of programming functions mainly aimed at real-time computer vision. It was originally developed by INTEL and later supported by willow garage then Itseez. The library is cross platform and free for use under the opensource license.

ROS or Robotic operating system is an open-source robotics middleware suite. Although ROS is not an operating system but a collection of software frameworks for robot software development. It provides services designed for a heterogenous computer cluster.

Simultaneous Localization and Mapping is the computational problem of constructing and updating a map of an unknown environment while simultaneous keeping track of an agent's location within it. SLAM Algorithms are based on computational geometry and computer vision and are used in robot navigation, robot mapping and odometry for virtual reality or augmented reality.

The dataset which was used is borrowed from kitti.org and was a stereo camera input dataset which had images from cameras which are placed side by side for better field of view and is used to measure the distance from the camera to the objects.

III. RESULTS

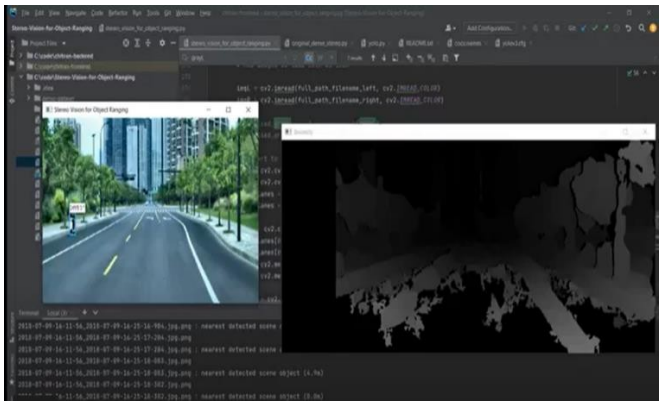

Figure 2: Object Detection and Distance Measurement on a normal device with less powerful GPU

The above picture (ref. figure 2) is the output from OpenCV which displays object and distance from the sample picture. The time taken to process each frame was about 3 seconds.

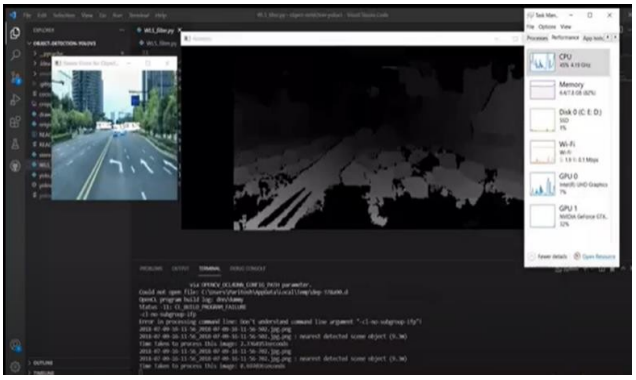

Figure 3: Object Detection and Distance Measurement on a Gaming device with Good GPU

The above picture (ref. figure 2) is the output from OpenCV which displays object and distance from the sample picture. The time taken to process each frame was about 0.65 second.

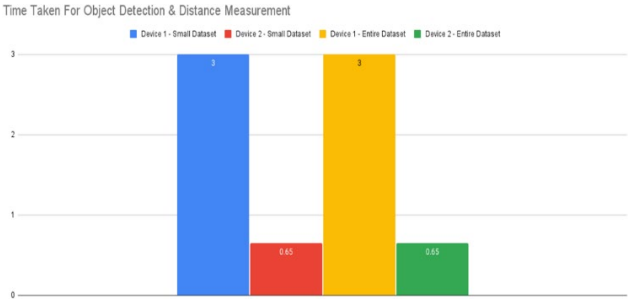

Figure 4.1: Frame rate during sunny weather

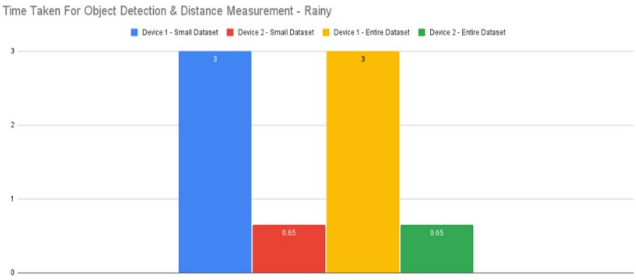

Figure 4.2: Frame rate during rainy weather

Figure 4.1 and 4.2 compares the frame rate during different weather conditions which show little to no deviation during harsh weather.

IV. CONCLUSION

The use of OpenCV and Python for Object detection and distance measurement proved to be an efficient practice. The increased GPU performance also helped reduce the running time. It is efficient and safe when compared to other conventional methods. Using RRT algorithm for path planning has given us faster runtime. Autonomous Ground Vehicles are a step up from the traditional vehicles as it reduces human error. The proposition of autonomous ground vehicles is a technological marvel even when it has not yet fully developed to replace traditional vehicles.

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AET 019

RFID And Iot Based Smart Car Parking System

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Abstract— The Internet of Things connects billions of people and things in the real-world environment. Among most research, current research is mostly on smart car parking systems. An ultra- modern city has several vehicles on road, which induces most of the traffic and which could not be controllable. Introducing such a smart car parking system reduces traffic in major cities and could help to make the city smart. The increasing number of vehicles on the road and mishandling of available parking spaces, leads to congestion and traffic problems. This paper introduces the concept of using RFID and Cloud based technology in car parking services in cities. It provides a solution using RFID concept with Internet of Things (IoT) connected with cloud-based systems. These features provide the nearest parking space for the user. In order to provide a user- friendly environment website is being developed that gives information to the user about the availability of parking spaces. RFID and IOT based Smart Car Parking System is a simple project that offers an efficient car parking management system with the help of RFID and IOT Technology. Smart Car Parking System is an integrated system to organize cars in public areas.

Keywords— PARKING, IOT, IR SENSOR ,RFIDIntroduction (Heading 1)

I. INTRODUCTION

In order to be smarter, the cities use technologies to enhance their daily routine to develop the standard of life. With a larger number of families exceeding the whole number of vehicles, the parking scenario is falling in need of this requirement within the country. According to a recent survey there will be a rapid increase in the vehicle population to over 1.6million around 2035. Around a million barrels of the world's oil is being burnt daily. In present-day cities finding an available parking spot is often difficult for drivers, and it tends to become harder with an ever- increasing number of personal car users. This case is often seen as a chance for smart cities to undertake actions to enhance the efficiency of their parking resources thus resulting in a reduction in searching times. Problems per parking and tie up are often solved if the drivers are often informed prior to about the supply of parking spaces at and around their intended destination. Recent advances in creating low-cost, low-power embedded systems are helping developers to make new applications for the Internet of Things. Thus, a smart parking system is the key solution to scale back the waste stage of the fuel, the answer to the issues that are being raised. Smart parking is often an answer to reduce user's time and efficiency also because the overall cost of the fuel burnt in search of the parking zone. Creating an efficient and proficient parking system in real-time remains an enormous challenge for any multi-level public parking facilities. When the user enters within the car park, the RFID card allotted to the registered user is scanned. This allows the user to urge the knowledge of the parking zone via LCD display or also through web application. The scalable and robust nature of Cloud Computing allows developers to make and host their applications.

II. METHODOLOGY AND IMPLEMENTATION

A. OVERVIEW

- To develop and implement RFID and IOT based car parking systems for subscribers in a parking area.
- To replace the old and ineffective parking system.
- To be able to monitor and update the free parking slots on the LCD and on the web page.
- To provide security for unauthorized subscribers .
- Priority on booking of slots isn't enabled therefore the booking of slots for multiple users at the identical time isn't configured.
- Pre-booking of slots which minimizes the traffic cannot be established with the help of only RFID concept and certain quantity isn't clearly configured

B. Design

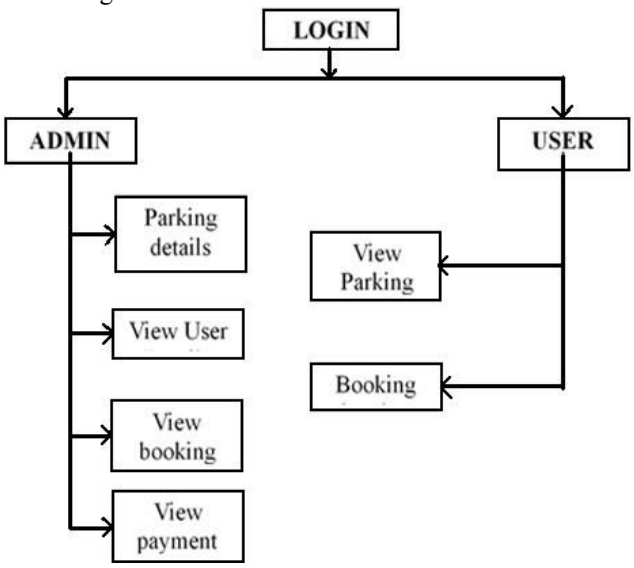

Figure 1. System Architecture/Block Diagram

Finding a place to park vehicles in a densely geographical area would waste time and consume fuel during attempting to find a parking zone. Hence there's a necessity for assistive technology, which might communicate the provision of parking slots to the registered users. With the employment of RFID, the reader module scans it, and the implementation proceeds. Number of free and booked slots are graphically displayed in LCD and Web Page, WIFI module is employed for communication between Webpage and Reader module.

C. Flowchart

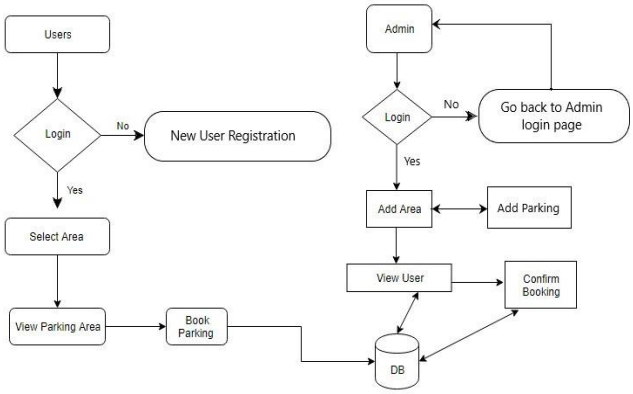

Figure 2 Flow chart of booking of parking slot

III. HARDWARE REQUIREMENT

1) Node MCU ESP 8266 Wi-Fi Module: - the NodeMCU (Node Micro Controller Unit) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espressif Systems, contains the crucial elements of a computer: CPU, RAM, networking (WiFi), and even a modern operating system and SDK. That makes it an excellent choice for Internet of Things (IoT) projects of all kinds

2) Servo Motor (SG90): - The Servo Motor Micro SG90 work well for basic servo experimentation and can be used in applications where small size is a virtue and that don't require a huge amount of torque, but they are still pretty strong. Gears are nylon which is the case with most lower cost Servos.

3) Infra-Red Sensors: - An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. While measuring the temperature of each color of light (separated by a prism), he noticed that the temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature) gives off infrared radiation.

4) 16x2 LCD Display (I2C): -This I2C 16x2 Arduino LCD Screen is using an I2C communication interface. It means it only needs 4 pins for the LCD display: VCC, GND, SDA, SCL. It will save at least 4 digital/analog pins on Arduino. All connectors are standard XH2

5) RFID Module (RC522): - The RC522 RFID Reader module is designed to create a 13.56MHz electromagnetic field that it uses to communicate with the RFID tags (ISO 14443A standard tags). The reader can communicate with a microcontroller over a 4-pin Serial Peripheral Interface (SPI) with a maximum data rate of 10Mbps. It also supports communication over I2C and UART protocols. The module comes with an interrupt pin. It is handy because instead of constantly asking the RFID module "is there a card in view yet? ", the module will alert us when a tag comes into its vicinity.

6) Piezo Buzzer: -Piezo buzzer is based on the inverse principle of piezoelectricity discovered in 1880 by Jacques and Pierre Curie. It is the phenomena of generating electricity when mechanical pressure is applied to certain materials. The vice versa is also true. Such materials are called piezoelectric materials.

IV. SOFTWARE REQUIREMENT

The main software used throughout the project was Arduino and Cayenne IOT Platform

Arduino IDE: The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino board. The source code for the IDE is released under the GNU General Public License, version. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU tool chain, also included with the IDE distribution. The Arduino IDE employs the program avrdude to convert the executable code into a text file in

hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

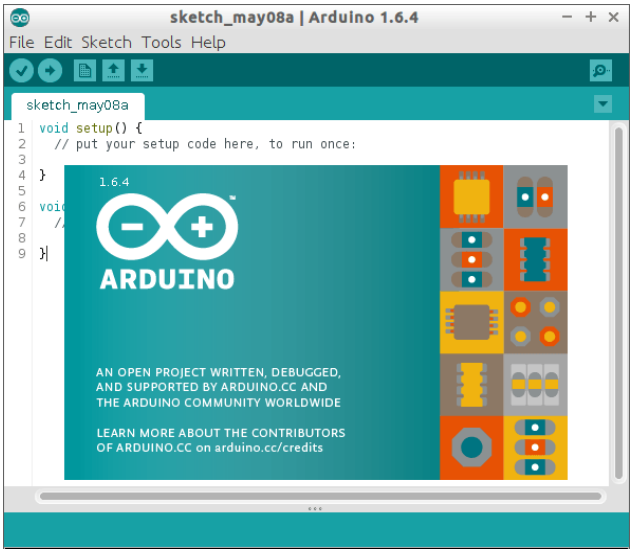

Figure 3. Screenshot of Arduino IDE Software

Cayenne IOT Platform: -

a) The cayenne platform provides a user-friendly platform for IOT companies to connect sensors and view data intelligently.
b) It provides an application also for users to get the information about their interconnected devices in IOT.
c) Now we use this platform to know the status of parking area

Figure 4: Cayenne IOT platform

Stage 1:- When car enters the parking area RFID Reader Module that is present at IN gate will detect the passing vehicle (tag) and the gate will be opened if user is authenticated. If the user is new, then he will have to register first and then only he will be allowed to enter the parking space.

Stage 2:- In front of the parking area, there will be an LCD display that is used to show the status of the parking slots, whether the parking is available or not. By looking at the LCD panel the person easily know which slot is empty

Stage 3:- The operation of exit side will be same as that of the entrance. When the car is leaving the parking area, the RFID Reader Module that is present before the OUT gate will detect the passing vehicle and the gate will be opened automatically.

Stage 4:- The main advantage of the current system is the user will register in CAYENNE application/website. From this application/website also the user can see the status of parking area. In this application it will show the information of parking slots individually.

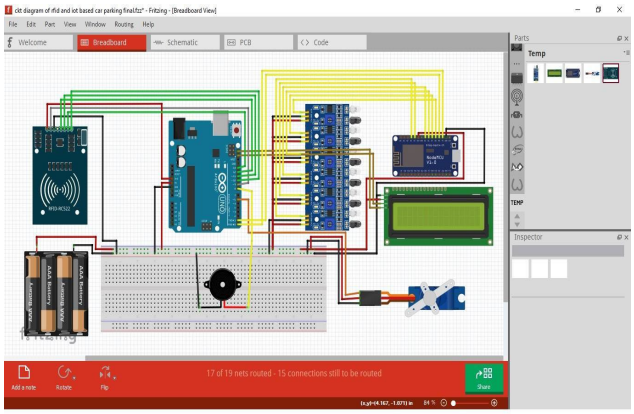

Figure 5. Circuit Diagram of RFID based Car Parking System

V. RESULT

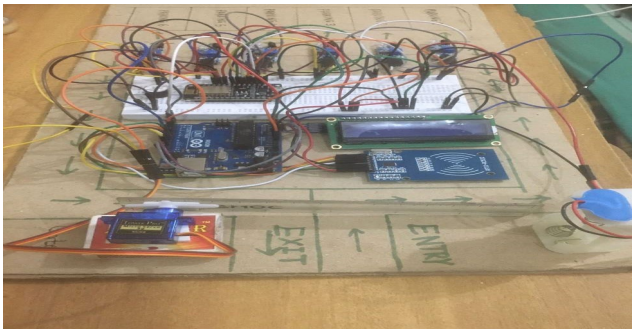

Figure 6: Hardware Set up

Figure 7: LCD Display

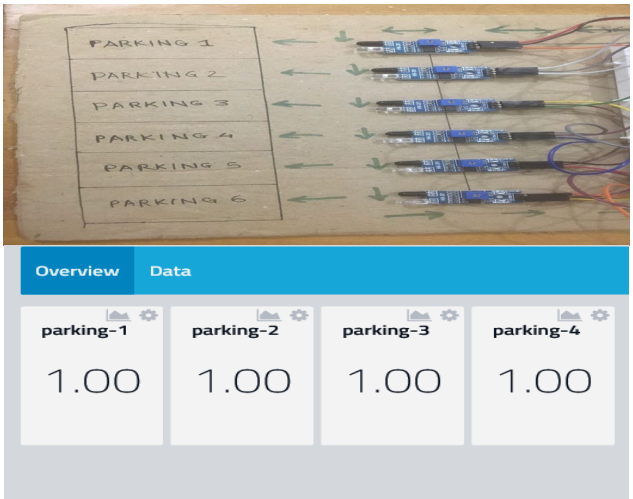

Figure 6. Implementation of Hardware and Working Screenshots

VI. CONCLUSION

The concept of Smart Cities has always been a dream for mankind. Since the past couple of years huge development has been made in making smart cities. The system that has been proposed provides real time information regarding availability of parking slots in a parking area. Users from distant locations could book a parking slot for them using our mobile application. It helps to resolve the growing problem of traffic congestion. The

efforts made in this paper are intended to improve the parking facilities of a city and thereby aiming to enhance the quality of life of people.

VII. ACKNOWLEDGMENT

This project report would not have been come into reality without the able guidance, support and wishes of all those who stood by us in the development. We wish to give our special thanks to our Project Guide, Prof. Nisy Mathew for her timely advice and guidance. We humbly thank our Project Coordinator, Prof. Nayana Mahajan, Prof. Akhil Masurkar and our Head of Department, Dr. Arun Chavan for their valuable guidance & unending support despite of a very busy work schedule.

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AET 020

COVID-19 Detection through Speech Analysis

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Abstract— Sound has always been a keen area of interest for medical researchers to gain insight from the body and detect and understand diseases, fractures, blood flow and such phenomena better. After the recent spiral of events caused by the pandemic after the widespread infection of COVID-19, otherwise known as coronavirus, it was in high interest of the welfare of humanity to find better and more efficient ways of screening methods to avoid more spread of the infection and contain it through isolation being exercised. The most accurate ways of testing required the patient to physically have a test under a professional or use complex medical kits at home which risk the idea of the infection spreading through contact and even inaccurate results when performed by themselves. A proposed system to check for COVID-19 positive or negative cases is discussed in the following paper using speech analysis, that takes in voice samples as it's input and by using feature extraction methods and classifiers, detects whether the patient is COVID-19 positive or not, with fair accuracy. The model was extensively tested with data provided from University of Cambridge that we requested and acquired formally for research purposes. The model performs well with over 80% Area under the Curve on all tests, And also discusses the importance of choosing the right samples for different investigations through research for audio samples in medical aspects. The proposed paper goes into depth about using such a method in future with fair advancements and discussed the possibility to use the following methods as screening methods for live scenarios.

Keywords—COVID 19, Speech Analysis, Machine Learning, Cough, Breath

I. INTRODUCTION

COVID-19, otherwise known as coronavirus, has spiraled the world into a pandemic, infecting millions of people and has brought down entire economies. Coronavirus symptoms very closely overlap symptoms of Flu and Cold, thus, screening processes without the use of a proper kit has been inaccurate and hard to differentiate from other pulmonary diseases. Due to the devastating impact of COVID-19, it's of the utmost emergency to develop strategies for early detection of the disease that will facilitate limit it's unfold also as aid with the development of targeted solutions by an accurate method that can be performed by the individual themselves without coming into external contact.

Sounds contain undermined data that can be extracted to gain insights and learn more about underlying conditions when applied in the field of healthcare. Heavy research has been underway for early detection of diseases such as Parkinson's disease, underlying conditions in Asthma, diseases related to Artery blockage, by acquiring sounds from the body. Studies have also shown change in certain features of speech can be studied to detect emotion and psychiatric conditions in advanced applications.

COVID-19 being a disease that heavily affects the pneumothorax and speech serves a great way to study forms of speech and derive results for screening processes.

II. LITERATURE REVIEW

Early detection of COVID-19 has been seen as a vital step to control the number of rising cases effectively, Thus, research related to screening processes has been pressed upon heavily for progress and meaningful results. Researchers have always used bodily sounds to understand and treat patients like heart diseases. In light of recent events, the coronavirus being a disease that heavily affects speech and glottal sounds, the application of screening through sound is a viable and much cheaper option than image screenings.

The research for such an expedition to detect a disease from sounds started with exploring potential diseases that could be found through machine learning methods from cough sounds for diseases like bronchitis, tuberculosis, etc [24]. Smartphones and such mobile devices have been used for ease of access and collection of data for further analysis [8]. Machine learning has been a constant for detection and diagnosing respiratory diseases [24]. As seen in [4] cough sounds were used for detection of diseases like bronchitis which inspired this research based on extraction of unique features from sounds. Other applications include diagnosing mental illnesses by analyzing speech and vocal muscle patterns [5,6,12]. Research has been launched consistently around the world asking questions about the viability of speech analysis for COVID-19 detection [10,14,16,17,26]. Our research differs from other works by using a varied dataset that lies across multiple demographics and ages as defined further in the paper, also the dataset chosen being very small shows their models overfitting the data and producing results that might not perform appreciably in real world live situations. Testing multiple scenarios and comparing them for best results across all tests with not just differing in classifiers but also in feature pairings.

III. DATA COLLECTION

Here, we explore our dataset to give an insight into it and understand the origins, limitations and factors considered for further processing, with resampling to fit the samples to our research needs.

A. Data Collection

The dataset used for this research was acquired from University of Cambridge with their data being approved by the Ethics Committee of the Department of Computer Science and Technology at the University of Cambridge.

B. Exploring the dataset

The entire data was crowdsourced with an android app, iOS app and a web-based app for recording samples and uploading them for contribution towards research. the user is asked to input their age and gender as well as a brief medical history and whether they are in hospital. Users then input their symptoms (if any) and record respiratory sounds: they are asked to cough three times, to breathe deeply through their mouth three to five times and to read a short sentence appearing on the screen three times. Finally, users are asked if they have been tested for COVID-19, and a location sample is gathered with permission. Below is the data distribution according to region and age that explains the data being from various demographics that eliminates the problem of a regional bias hindering live inputs on the model, visualised and represented in Fig. 1.

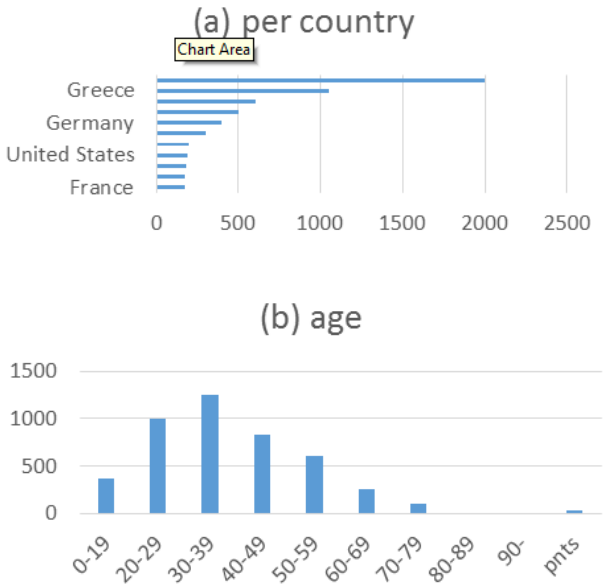

Fig. 1. Data Spread across (a) Per country and (b) Age

The exploratory data analysis gave us insights into the data for COVID-19 positive individuals and the factors that affect their medical conditions, the following can be seen visualised in Fig. 2.

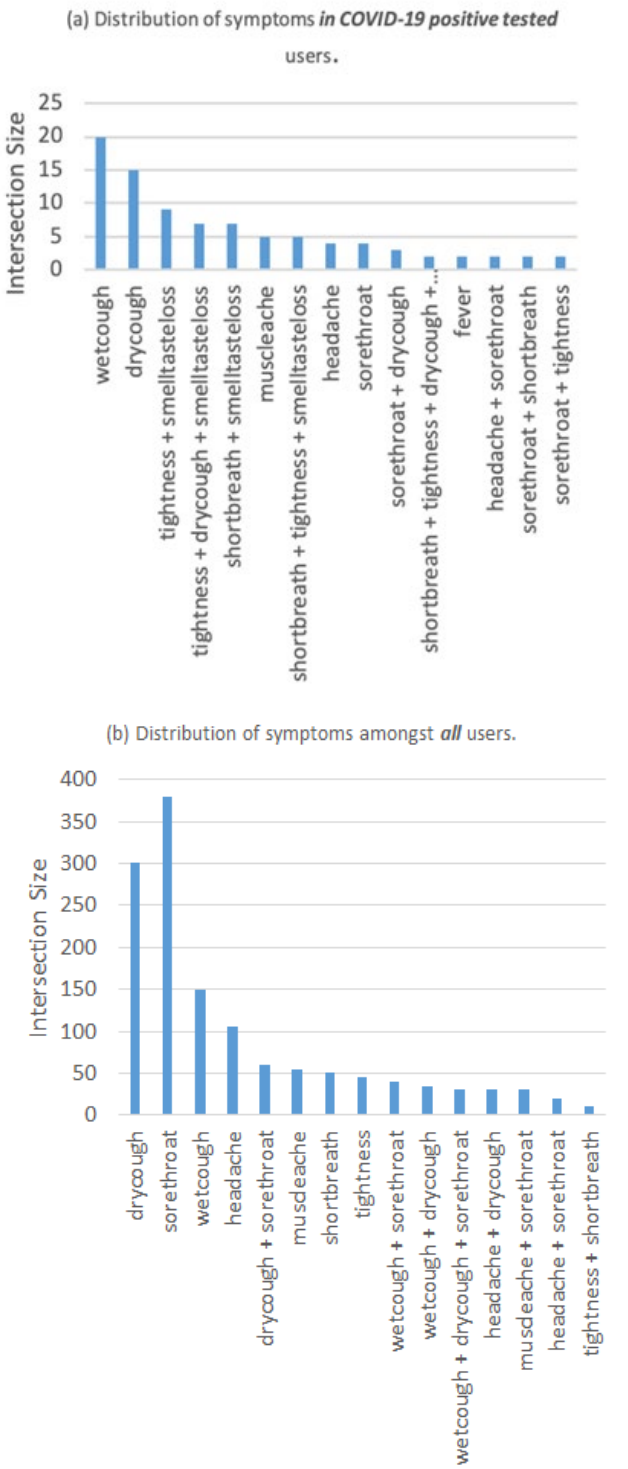

Fig. 2. Distribution of symptoms across (a)Distribution of symptoms amongst all users. And (b) Distribution of symptoms amongst all users.

IV. METHODS

We followed the process for general execution of processing data and analyzation for application of data for feature extraction and classification, the process was orthodox with steps in place following data preparation to execution of machine learning methods. We tested multiple methods to be sure of our execution being of the highest accuracy, different values for attributes were also placed and tested which can be found further ahead in this paper. Below in Fig. 3, A proposed visual representation for feature extraction, classification and testing methods is visualized.

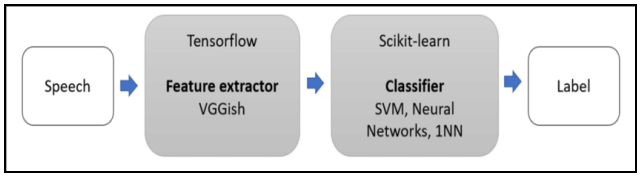

Fig. 3. Flowchart for testing proposal methods

A. Feature Extraction

All the raw data was reformed and processed to fit requirements, and features were extracted through attributes like structural, frequency, tempo, period, etc. The main attribute being MFCC; Mel Frequency Cepstral Coefficient, and its temporal differential delta. VGGish was employed to extract features automatically through its heavy audio trained model from YouTube data, the total number of features are further reduced by Principal Component Analysis.

We extracted numerous features including duration, tempo, onset, period, that were used for sampling and combining multiple features in subsets and comparing results.

B. Experimental Setup

We divide the entire testing setup into multiple feature sets with variable values to test different combinations and compare overall results, as discussed ahead in visually represented graphs.

a) Exploring the Dataset. While going through the data, we noticed that cough and breathing sounds had fewer exclusions and outlying points which made them an optimal choice for most use cases in the distribution of tasks.

b) Feature extirpation. After extracting features, we used PCA to reduce dimensionality and ranged the variance between 70-95%.

c) Test and Train Splits. The data was split 80%/20% and the evaluation was done with ROC-AUC, Precision and Recall.

V. RESULTS

Going by what the data suggests, the combination of coughing and breathing sounds seem to get the best results, with the highest Area Under the Curve of 82%, it was also observed that with slight augmentation and addition of white noise with fine tuning pitch, an average of 10% increase in accuracy values for all tests. The best result also infers that cough sounds are great at separating the COVID-19 positive and negative cases as compared to other attributes. We tested multiple classifiers such as Logistic Regression, Gradient Trees and Support Vector Machines, as more complex models would create an overfitting model that doesn't align with our goal of a practical use. The features were rooted out from scratch with variable differences tested for optimal and uniform outputs where the audio samples were also converted and resampled for the same. The prepared features were paired with features obtained from VGGish features as a part of transfer learning. For the tasks, feature type 1 has prepared features with PCA=0.8. Type 2 uses VGGish features with PCA=95% for task 1 and 90% for task 2. Type 3 combines the prepared features with the VGGish features with the PCA values kept the same as Type 2. We infer that the model performs well but lacks in areas of recall meaning it identifies COVID-19 Positive cases but not all of them, we also note that with some fine tuning as mentioned earlier the results boosted by as much as 10% but won't help a practical environment without proctors going over and optimizing the data which derails the purpose of the research, that is, to efficiently detect COVID-19 without external contact and Figure 2 below represents all the test data to compare between tasks deliver accurate results.

Task	Modality	Feature Type	Mean + std		
			ROC-AUC	Precision	Recall
1. COVID-positive/non-COVID	Cough + Breath	1	0.71 (0.08)	0.69 (0.09)	0.66 (0.14)
		2	0.78 (0.07)	0.72 (0.08)	0.67 (0.11)
		3	**0.80 (0.07)**	0.72 (0.06)	0.69 (0.11)
2. COVID-positive with cough / non-COVID with cough	Cough	1	0.65 (0.22)	0.62 (0.20)	0.69 (0.140
		2	0.82 (0.16)	0.79 (0.16)	0.71 (0.23)
		3	**0.82 (0.18)**	0.80 (0.16)	0.72 (0.23)

Fig. 4. Classification of tasks with results compared for alloted attributes.

VI. CONCLUSION

The use of various raw prepared features and combination of VGGish proved to be an efficient practice. The tests gave us insight into the kind of data and samples that would be the most effective against detection of diseases with sound analysis, it is also inferred the kind of features that are more insightful in certain aspects of understanding and implementing such models. We also noticed that most of the preliminary methods would be common with other throat and voice altering diseases, hence, the application does not end with just COVID-19. While the results look promising, the current model is not recommended to be used as a stand alone screening method. The method can be paired with certain screening tools to add a layer of assurity as COVID-19 heavily overlaps with other diseases like the common cold and flu. The use of this model could be very impactful and revolutionary when placed in the right situations with the data input points and additional classification features being added over time.

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AET 021

Printed Antenna for Cellular Applications

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Abstract— In this paper, a small-size low-cost printed antenna for all cellular frequency operation is presented. The antenna has a partial ground plane flushed with the feed line. To verify its frequency response, the antenna is also simulated using the IE3D Simulation software, and a prototype is fabricated and the return loss is measured. A credible analogy between computed and measured return loss data is witnessed. Furthermore, the antenna shows acceptable peak gain figures, good radiation efficiency values and omnidirectional radiation patterns over its band of operation. The proposed antenna will be focused on applications such as : GSM :- 900MHz, 1800MHz , 3G :- 900MHz , 2100MHz, 4G :- 850MHz ,1800MHz , 2300MHz and 2500MHz, UMTS :- 2.11-2.2 GHz etc.

Keywords - GSM, 3G, 4G, UMTS.

I. INTRODUCTION

There has been rapid growth of wireless communication technology leading to use of many operating frequency bands. It is preferable, for such system development as well as for applications, that one uses single antenna with very large bandwidth (BW) Single antenna should have a BW to include many bands for wireless communication systems. Planar monopole antennas meet these requirements, but because of their size and large ground plane, it is difficult to use them. Printed antennas are good candidates for use in wideband wireless technology because of their wide impedance BW and nearly omni-directional azimuthal radiation pattern. These antennas can be easily integrated with other components on the PCB . Printed monopole antennas are truly planar and have radiation patterns similar to that of a dipole antenna . A large impedance BW is realized using multi-resonant printed monopole antenna, which generally exhibits high pass impedance characteristics. The variation of input impedance between various higher order modes is reduced by increasing the width (lateral dimension) of the printed monopole antenna.

Although printed antenna have simple geometrical configuration, they are inherently narrow band because of the mismatch at the junction of feed 50 V line and the patch. This The UWB system has numerous benefits such as low power consumption, immunity to multi path propagation and high speed transmission. The wireless terminal equipments require being handy and small for short range communication applications. One of the most important requirements of portable devices to have small size antenna and at the same time provides better performance characteristics. Size of the antenna affects, at a great extent, the bandwidth and gain, hence the data rate. The printed antenna reduces the volume of UWB antenna by replacing three dimensional planar antennas, so it becomes easy to incorporate the printed antenna in RF circuits. Simulations have been carried out using IE3D software.

A. Problem Statement

Microstrip Antennas have several drawbacks like:

- The spurious radiation exists in various microstrip based antennas such as microstrip patch antenna, microstrip slot antenna and printed dipole antenna.
- It offers low efficiency due to dielectric losses and conductor losses.
- It offers lower gain.
- It has higher level of cross polarization radiation.
- It has lower power handling capability.
- It has inherently lower impedance bandwidth.
- The microstrip antenna structure radiates from feeds and other junction points.

  While, Compact size printed monopole antennas are important for the wireless applications due to its advantages of easy fabrication, omnidirectional radiation and wide operation bandwidth.

  So, Our main aim is to design a Printed Monopole antenna for Cellular applications which can receive all cellular frequencies.

B. Literature survey

1. Bandwidth Enhancement Techniques for Printed Rectangular Monopole Antenna
   K. P. Ray, Dr. S. S. Thakur and S.S. Kakatkar

Printed rectangular monopole antennas (PRMAs) have been investigated for increasing bandwidth. For antennas with very large BW, the lower band edge frequency (fL) is the main design parameter rather than the central resonance frequency.For monopole antenna, its height decides the frequency. The PRMAs with dual and triple microstrip line feed enhance the BW because of improved uniformity in surface current distribution. BW of a PRMA is also improved by optimizing the feed point and the width of the patch. The highest measured and simulated BW ratio of the antenna viz. 4.0:1 and 3.34:1, respectively, for VSWR 2:1 have been obtained for offset fed PRMA with increased width. This BW covers a large number of bands required to support several communication system bands such as DCS, PCS, UMTS, Bluetooth, and WLAN6 ISM, GSM to ISM, etc.

2. Compact Slotted Printed Monopole UWB Antenna
   K. P. Ray, Dr. S. S. Thakur and A. A. Deshmukh

In this paper, printed circular slot antenna is proposed for UWB applications. In this design, printed circular slot with microstrip line feed along with the circular base rectangular exciter has been provided for good matching between slot and the feed line and hence impedance bandwidth improves. This proposed antenna with substrate size of 36 mm x 36 mm, have achieved a bandwidth around 200% by optimizing slot, microstrip line and exciter. There is good agreement between simulated and measured results. This antenna exhibits stable omni-directional radiation pattern and gain over the entire band. The proposed designs are considered good candidates for UWB applications; slot antenna can be useful for wideband RADAR, satellite and many short range communication applications.

3. Design of Circular Monopole Antenna with enhance bandwidth for GPS, Bluetooth, LTE, WLAN, Radiolocation and X-band application
   Hiral P. Patel, Manjiri Gogate and Dr. Sanjay Thakur

The proposed antenna is designed for GPS, LTE, WLAN, RADIOLOCATION and X-Band application. It contains circular patch for WLAN, RADIOLOCATOIN AND X BAND application covering broad band from 5GHz to 12GHz. The first inverted Lstrip on the top of circular patch is resonate from 2.36GHz to 2.78GHz for LTE and BLUETOOTH application and second inverted L strip at left side of circular patch add one narrow band of GPS application which at 1.5GHz. Antenna shows Omnidirectional pattern and also achieve satisfied value of gain for desired band.

4. Design Aspects of Printed Monopole Antennas for Ultra - Wide Band Applications
   K.P. Ray

Multi-resonance printed monopole antennas are being used increasingly for applications of UWB technology because of their attractive features. Some of the design aspects of these antennas have been discussed in this paper. Some of the main features required for antennas for the application of UWB technology are as follows:

(i) It should have bandwidth ranging from 3.1 GHz to 10.6 GHz in which reasonable efficiency and satisfactory omnidirectional radiation patterns are necessary.
(ii) In this ultra-wide bandwidth, an extremely low-emission power level should be ensured. In 2002, the Federal Communication Commission (FCC) has specified the emission limits of -41.3 dBm/MHz.
(iii) The antenna propagates short-pulse signal with minimum distortion over the frequency range.

5. Dual Wideband Printed Monopole Antenna for WLAN / WiMAX Applications
   Chien-Yuan, Pan,Wen-Shan Chen and Chien-Hsiang Huang

The antenna structure consists of a rectangular monopole with a microstrip feedline for excitation and a trapezoid conductor-backed plane for band broadening. The measured 10 dB bandwidth for return loss is from 2.01 to 4.27 GHz and 5.06 to 6.79 GHz, covering all the 2.4/5.2/5.8 GHz WLAN bands and 2.5/3.5/5.5 GHz WiMAX bands. The key design configurations in order to meet this dual-band operation include a monopole antenna fed with a meandered coplanar waveguide.

C. Scope of Project

- The main scope of this project is that as it's a printed antenna this can be widely used in wireless domain and can also be used in cellular communication, aircraft aerodynamics.
- In future other different type of feed techniques can be used to calculate the overall performance of the antenna without missing the optimized parameters in the action.
- Same design method is used at different dielectric material of low loss tangent specially to enhance radiation efficiency.

II. METHODOLOGY

A. Zeland IE-3D (Design Steps):

1. Open Program Manger Application
2. Open IE-3D Simulator
3. M grid (Blue -Patch, Brown–Ground Plane, Green – Substrate)
4. Click on 'New File'
5. Then click on 'Basic Parameter'
6. Then select: Unit – mm (New Substrate Layer)
7. Then Click On Icon (Right Side Of Merge)
8. Substrate Design (Enter z top = 1.59)
   (Dielectric Constant = 4.3)
   (Loss Tangent = 0.01)
9. Double Click On 'Brown Layer'
10. Real Part Of Conductivity has to be reduced to 0
11. Then convert from infinite substrate (X => -35 to +35 and Y=> -35 to +35)
12. In MGrid, We May Not Able To See The Rectangle Substrate So For That Click "All".
13. Now, Click On Rectangle
14. Enter the Coordinate (X=0, Y= -30, Z=0, Length=70 and Width=10) for ground.

15. Click Ok
16. Click on Annular Sector
17. Enter the Coordinate (X=0, Y= -4, Start angle=180, End angle=360,Number of segments=51, Inner radius=13 and Outer radius=20)
18. Click Ok
19. Click On Rectangle
20. Enter The Coordinate (X=0, Y= -29, Z=1.59, Length=3 and Width=12) for feed
21. Click Ok
22. Then right click and Union Merge
23. Click on Rectangle
24. Enter the Coordinate (X= -16.5, Y=8.5, Length=7 and Width=25) for left rectangle
25. Click Ok
26. Again Click on Rectangle
27. Enter the Coordinate (X=16.5, Y=8.5, Length=7 and Width=25) for right rectangle
28. Click Ok
29. Click on Rectangle.
30. Enter the Coordinate (X=0, Y= -1, Length=7 and Width=32) for middle rectangle
31. Click Ok
32. Select Polygon group and select full design
33. Now right Click and Union Merge
34. Click on Probe to feed
35. Enter the Coordinate (X=0, Y= -35) and Click Enter
36. Number of Segments=2 and radius=0.6
37. Click Ok
38. Next Click on Simulate (Run symbol)
39. Enter The Values (Meshing Freq = 11Ghz) (Cell Per Wavelength = 10)
40. Automatic Edge Parameter (AEC Layer = 1, AEC Ratio = 0.01)
41. In Frequency Parameters, Click Enter and enter the values (Start=1, End=11, Number of Frequency=11 and Step=1)
42. Tick box Current Distribution File
43. Tick box Radiation Pattern
44. Click Ok
45. Now Simulation gets started
46. After Simulation is complete, Click On Window To See Every Graph
47. VSWR
48. Smith Chart
49. S Parameter
50. End.

B. Technology/Tools Used

HARDWARE REQUIREMENTS:

1. Printed Circuit Board (PCB): A printed circuit board (PCB) mechanically supports and electrically connects electrical or electronic components using conductive tracks, pads and other features etched from one or more sheet layers of copper laminated onto and/or between sheet layers of a non-conductive substrate. Components are generally soldered onto the PCB to both electrically connect and mechanically fasten them to it.

2. SMA Connector: SMA (Sub Miniature version A) connectors are semi-precision coaxial RF connectors developed in the 1960s as a minimal connector interface for coaxial cable with a screw-type coupling mechanism. The connector has a 50 Ω impedance. SMA is designed for use from DC (0 Hz) to 18 GHz, and is most commonly used in microwave systems, hand-held radio and mobile telephone antennas, and more recently with WiFi antenna systems and USB software-defined radio dongles. It is also commonly used in radio astronomy, particularly at higher frequencies (5 GHz+). SMA connectors must not be confused with the standard household 75-ohm type F coax connector (diameters: Male 7⁄16 inch (11 mm) circular or hex; female 3⁄8 in (9.5 mm) external threads), as there is only about a 2 mm difference overall in the specifications. Type F cannot be mated with SMA connectors without the use of an adapter. The SMA name is also used for a superficially similar optical fiber connector.

3. Spectrum Analyzer: A spectrum analyzer measures the magnitude of an input signal versus frequency within the full frequency range of the instrument. The primary use is to measure the power of the spectrum of known and unknown signals. The input signal that most common spectrum analyzers measure is electrical; however, spectral compositions of other signals, such as acoustic pressure waves and optical light waves, can be considered through the use of an appropriate transducer. Spectrum analyzers for other types of signals also exist, such as optical spectrum analyzers which use direct optical techniques such as a monochromator to make measurements.

4. RF Cable: A coaxial RF connector (radio frequency connector) is an electrical connector designed to work at radio frequencies in the multi-megahertz range. RF connectors are typically used with coaxial cables and are designed to maintain the shielding that the coaxial design offers. Better models also minimize the change in transmission line impedance at the connection in order to reduce signal reflection and power loss. As the frequency increases, transmission line effects become more important, with small impedance variations from connectors causing the signal to reflect rather than pass through. An RF connector must not allow external signals into the circuit through electromagnetic interference and capacitive pickup.

SOFTWARE REQUIREMENTS:

1. IE3D Simulator:
   IE3D is the first SCALABLE EM design and verification platform that delivers the modeling accuracy for the combined needs of high-frequency circuit design and signal integrity engineers across multiple design domains. For many companies, there is no longer just one EM problem at hand, but several different ones each presenting a unique bottleneck and delaying overall design closure. IE3D's multi-threaded and distributed simulation architecture and high-design capacity is the most cost-effective EM simulation and modeling solution for component-level and circuit-level applications. IE3D offers the highest simulation capacities and fastest turnaround times for the broadest number of applications making it the best choice for improving your design team productivity and meeting design schedules on time. Today's high performance antenna array design requires both, large capacity EM simulation and unit array cell EM design and optimization capabilities. Getting the array unit cell right from the start is essential before replicating into a larger antenna array structure. And if accuracy is sought, then the designer needs to be extremely careful with approaches that formulate estimated boundary conditions for unit cells used within larger arrays. These approaches typically suffer from poor capacity limits and do not accurately model the EM behavior between unit cells, especially for cells on the antenna array periphery. IE3D-SSD offers FASTEM to thoroughly explore the relevant design space and optimize the geometry for each unique unit cell. In addition, IE3D-SSD's superior capacity and run-time enable even the largest antenna arrays to be solved in least amount of time. IE3D-SSD is the best solution for your antenna design. Determining the primary and secondary characteristics of any RFID tag is always challenging. And ensuring the target layout will indeed meet the overall design objectives including a correct conjugate match is often a lengthy trial and error process. RFID design and EM modeling is a strength of IE3D-SSD where combining both disciplines of antenna and embedded passive design are best addressed. Critical geometries and dielectric impact on overall tag performance can be easily isolated and optimized accelerating design closure and improving the overall quality of the design. IE3D-SSD is the sure bet for RFID design.

III. ANTENNA DESIGN

Fig 1 shows the geometric structure of the printed monopole antenna fabricated on the FR4 substrate with the relative dielectric constant $\mathcal{E}$ r = 4.43, the thickness of the substrate is 1.59 mm, and the loss tangent is 0.01.
The proposed antenna covers one band from 1.5GHz to 5.9GHz, and then next band is from 7.2 GHz to 11 GHz. The dimensional area of an antenna is 70x70 mm2.

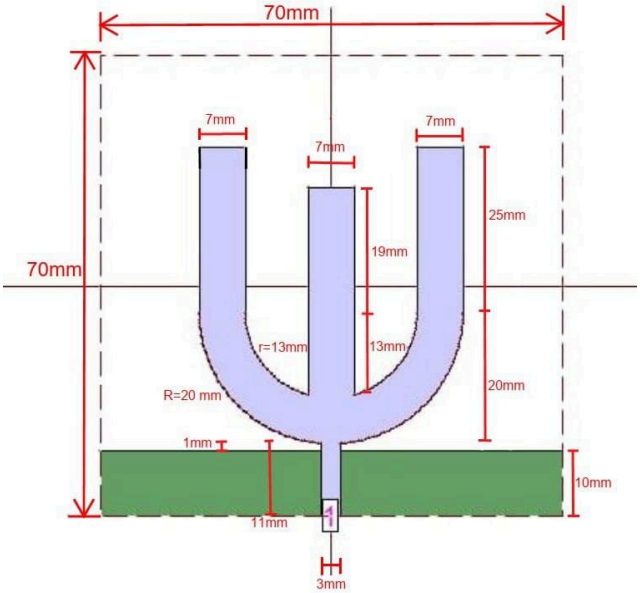

Fig. 1 Geometry of Antenna

Dimensions of Antenna : Side Rectangles = 7x25 mm
Middle Rectangle = 7x32 mm
Outer Circle Radius 'R' = 20 mm
Inner Circle Radius 'r' = 13 mm
p = 1

In order to keep the current distribution in side arms more as compared to the middle arm, so as to decrease the VSWR and enhance the impedance matching, Hence, we decreased the length of the middle arm.. As for the width of the side and middle arms, the width should be one fifth to one seventh of the height for optimum results. Hence, we selected '7 mm' after trying out various possibilities. After doing all this changes in shapes and dimensions, we got the desired VSWR.

IV. RESULT AND ANALYSIS

A. VSWR:
   In this graph analysis we can see that the analysis of VSWR is done from frequency 1Ghz to 11Ghz. As we know ideally VSWR should be low. We can clearly

see it in the below graph, that the VSWR is low for all the lower as well as higher frequencies.

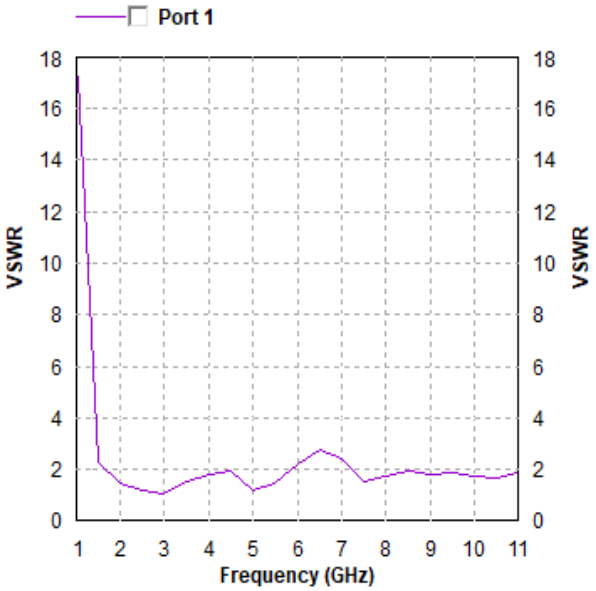

Fig 2. VSWR v/s Frequency [GHz]

B. Radiation Pattern:

Fig 3 shows the radiation pattern of the antenna at 2.5GHz. It is clearly shown from the patterns that antenna have the omnidirectional properties as it made figure of eight in its radiation pattern.

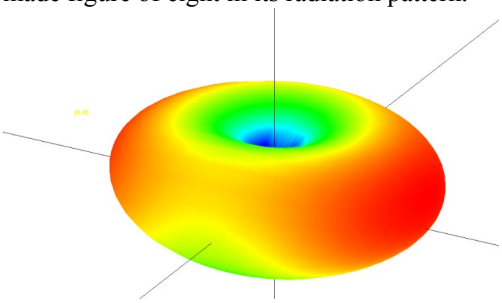

Fig 3. 3D Radiation pattern at 2.5GHz

C. Gain:

The simulated gain of the proposed antenna is shown by figure 4.

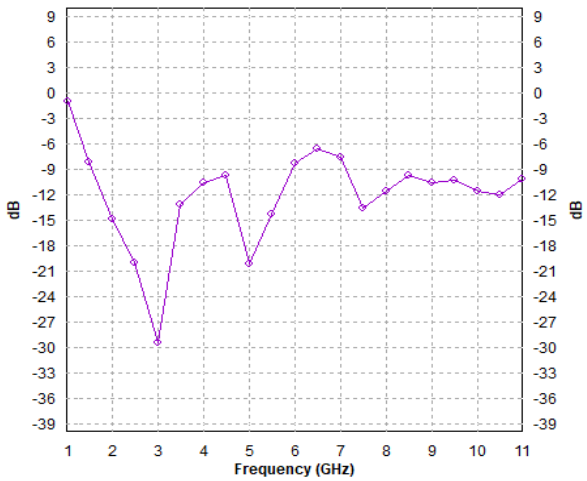

Fig 4. Simulated Gain

D. Impedance Loci:

For this proposed antenna, the simulated impedance loci is shown in the fig 5.

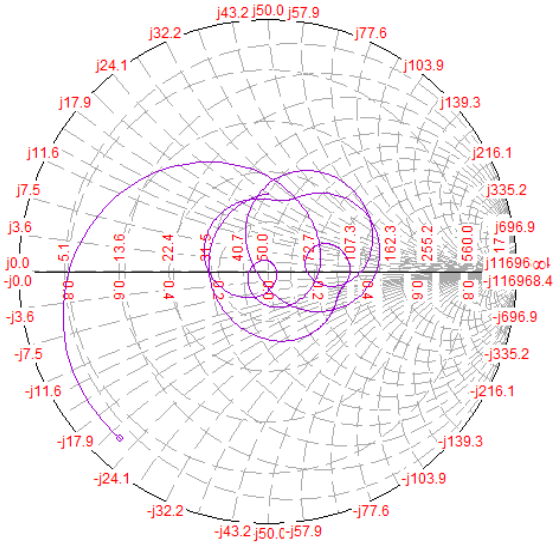

Fig 5. Impedance Loci

V. CONCLUSION

Upon the conclusion of our project we made the following assessment of our work: The overall working of antennas was understood. The major parameters (such as Return Loss curves, Radiation Patterns, Directivity and Beamwidth) that affect design and applications were studied and their implications understood. The constructed Printed monopole antenna operated at the desired frequency and power levels. Several shapes and designs were simulated (using IE3D) and the desired level of optimization was obtained. It was concluded that the hardware and software results we obtained matched the theoretically predicted results.

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AET 022

Automatic Medicine Vending Machine (AMVM)

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Abstract—In this current pandemic situation (COVID-19), it is very important to avoid any human intervention and the system being contact-less makes it possible to minimize exposure to any infections and germs. Also, the contact-less technologies meet the demand of modern consumers as they do not need to carry any cash for payment as the payment can be done through UPI IDs/Credit cards for the same. This automatic medicine vending machine with a self-contained on-site medicine strip dispensing mechanism and a storage facility for the plurality of pills that can be dispensed based on the user requirement. Major components of the machine is a system that includes stepper motors for dispensing the medication, storage space to store the pills, an inventory monitoring system to keep track of the storage, the inventory monitoring system also keeps track of the expiry date of each batch of medicine and sends an alert to refill the storage when the strips run out. It also holds a system to receive payment from the user via payment gateway. All these systems are monitored via the server, which is programmed to receive input from the user via the camera/gallery of user and read medicine names and dosages and then to actuate and control all the necessary components required to dispense the medication requested by the user via the controller without any human intervention thus making it completely contact-less and also solves the issue of space constraints.

Keywords - NodeMCU ESP8266, Motor Driver A4988, Stepper Motor

I. INTRODUCTION

The growing modern age has also brought with it the dawn of the age of numerous types of diseases. The use of medicine to maintain and regain physical and mental health has been growing at a rapid pace. The doctors prescribe different types of medicine for one particular type of illness. Every year an estimated 1.5[12] million injuries and deaths occur around the world due to misinterpretation of prescribed medicines. Thus, a medicine which can run without any human intervention which shall automate this process is proposed to reduce the risk of infection (due to the COVID-19 outbreak and also otherwise) and ease of operating for 24x7.

The present invention relates to automatic medicine vending machines, to a machine that has the capability to dynamically receive input for the user and then dispense the required type of medicine. The input, here means, the prescription by the physician to the user. The prescription shall be read by the device, using image processing tools the machine will distinguish the medicine and the dosage and accordingly dispense the required medicine.

A payment gateway will also be integrated along so that complete human intervention is ruled out. A packaging mechanism will also be included in which the medicines will be packaged and dispensed to the user.

Since the whole process is without any human intervention, one can expect quite a minimal exposure to any kind of infections and germs. An advantage of this system is that new functions can be added and existing ones removed or revised with little or no need to modify the dispenser control structure.

A. Problem Statement

Over the years, we have seen innovations of vending machines for various products like drinks and other food commodities especially biscuits and cakes. Medical inventors therefore can safely risk of developing a medical vending machine for drugs. Issues emerge when the need for some pharmaceuticals increases and medication stores are not open or medication is not accessible in stock, particularly amid evening time. Sometimes in most hospitals, especially public hospitals, it is very common to find that issuing drugs takes quite long and therefore this machine is one way to curb the problem of time wasting in such hospitals, also delay in medication may have adverse consequences for the patient. Customers can easily access the medicines whenever required in case of emergency. Medication noncompliance can lead to numerous problems hence need of maintaining the logs of all previous transactions systematically is needed. Since pharmacists are going to be visited by ailing people or their next of kins, they are at a high risk of getting infected with COVID-19 and other diseases and can spread it as well, to reduce this risk current pandemic

situation demands to make medicine dispensing system and payment of medicines to be completely contact-less.

B. Literature survey

AUTOMATIC MEDICINE VENDING SYSTEM-MEDICAL ATM[1] by M Sangeetha , T V Janardhana Rao , Ch S Rama Gowri suggests reducing the manpower time and energy. It is like an ATM through which we get the required money at any time & any place. Medicines for B.P, diabetics, cold, fever, headache, and first aid medicines like bandage, cotton, ointments, and other routinely used tablets can be obtained. In this paper the system goes like when an RFID card is inserted, the details of the particular user are read by the RFID reader and displayed. After the identification of the valid person, a list of medicines will be displayed on the TFT display, then the user selects the required medicines by entering the corresponding number of selected medicines by using the keypad. After entering the required list, the amount will be calculated according to the medicine and their quantity. The amount will be deducted from the RFID card and immediately the transaction details will be sent through GSM to the user. After payment deduction the selected medicines are delivered automatically from the system. For this delivery system the Arduino controller uses a slider arrangement with the help of servo motors which provide rotational mechanism.

Vishal Tank, Sushmita Warrier, Nishant Jakhiya in research paper MEDICINE DISPENSING MACHINE USING RASPBERRY Pi & ARDUINO CONTROLLER[2] presents a machine designed to provide basic healthcare at areas where having a medical store may not be feasible or possible. It allows the user to select a medicine, pay the required amount after which it verifies the amount received and dispenses the medicine. The amount is authenticated and identified using an image processing unit controlled by a Raspberry Pi, a credit card sized controller capable of processing still images. Due to the physical and infrastructural limitations in establishing a medical store in remote areas, this machine has been designed to be a standalone unit, requiring minimum supervision to operate for long periods of time. Medicine Dispensing part here in this paper is done using three motors; two of them connected to a slider to push the medicine out of the storage box. Another motor has been placed in the middle of the slider, to enable the pushing mechanism to move between the medicine storage boxes, as per the user selection. The Arduino board receives the commands from the user interface through the Raspberry Pi and controls the motors to receive the money, dispense the medicine and change as required. The price of each medicine can be fed into the machine, based on the medicine that is stored inside. Gearbox On pressing the switches, the LCD displays a message listing the medicine selected and the price, while the Pi also communicates the selected medicine to the unit for dispensing medicine if the amount paid by the user is equal or more than the price of the medicine selected.

SEGMENTATION OF HANDWRITTEN DOCUMENT TO IMAGES INTO TEXT LINES by Vassilis Katsouros and Vassilis Papavassiliou[3] a comprehensive survey wherein the first section is about the challenges that text-line segmentation must face, such as the touching or overlapping text lines and the variation of skew angles. text-line segmentation has to face many challenges, such as the touching or overlapping text lines and the variation of skew angles. Hence a method has been proposed to overcome these difficulties, mainly by considering the foreground pixel density and employing one of the following three broad classes of techniques. The first includes traditional methods that have been applied to printed documents and is based on the analysis of projection profiles. The second class incorporates grouping techniques, also known as bottom-up strategies that attempt to build text lines by considering the alignments of foreground pixels or connected components. The third category includes smearing approaches that aim to enhance the text lines structure by applying linear or morphological filters and exploiting well-known image segmentation methods, such as level sets, scale space analysis, etc. Moreover, there are some methods that exploit a combination of these techniques with the purpose to improve further the segmentation results.In the next section, the problem definition and the main challenges of the task are described. Several techniques and the contributions of the most effective algorithms within each class are presented. Then the available resources for validating relative methods and the comparative results of recent contests are reported. Finally, the paper is concluded with a discussion of the main outcomes.

AN ALGORITHMIC APPROACH FOR TEXT RECOGNITION FROM PRINTED/TYPED TEXT IMAGES by Agrawal, N., & Kaur[4] identifies methods to convert printed text images into editable documents. Extraction of texts from scanned copies of documents and text images is an important task in the recent scenario. Optical Character Recognition (OCR) is used to analyse text in images. The proposed algorithm deals with taking scanned copy of a document as an input and extract texts from the image into a text format using Otsu's algorithm for segmentation and Hough transform method for some modification to enhance images, perform skew detection, recognize characters. Despite using simplest techniques, the proposed algorithm showed good results against rotation and scaling after some modification. The system was confined to recognize English alphabets (A-Z, a-z) and numerals (0-9). OCR technique has been implemented to recognize characters. Validation tests were done on screenshots of typed texts and images of scanned document from Internet sources. The system is trained with templates of Verdana font type with size 14. Thus, the characters are recognized based on matching characters with the templates used for training. Experimental results indicate that the proposed algorithm is able to recognize alphabets written in Verdana font style with size 14 and also showed good

results with rotated images. Overall system accuracy was calculated to be 93%.

II. METHODOLOGY

After studies on suitable methodologies, prototype development methodology is chosen. The reason for choosing this methodology is because the advantages provided by this methodology will assist the development of the proposed system to the success path. The main reason to choose prototyping is because the proposed system will involve less human intervention in order to achieve contactless pharmacy. The various components in our project have the following functions-

A. NodeMCU(ESP8266)

It is an open-source firmware and development kit that is used for many general purpose IOT projects. We have used this component to extract an array from the server as well as to receive certain data from motors which we require for dispensing medicine strips. We have connected 4 I/O pins to the Stepper Motor Driver and 3 I/O pins to Stepper Motor to receive data of respective (x,y) locations.

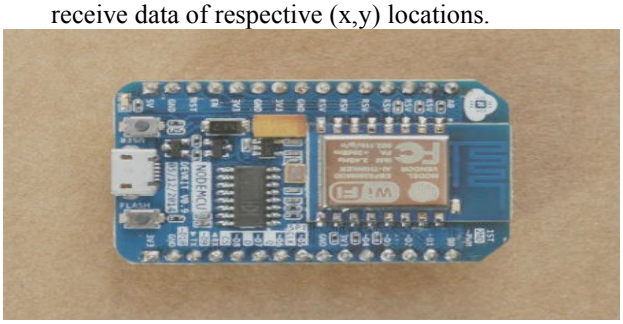

Fig.1. NodeMCU Microcontroller

B. Motor Driver(A4988)

It is designed to drive the motor like a stepper motor to rotate continuously by controlling the exact position without using a feedback system. The drivers of this motor mainly provide variable current control as well as several step resolutions. In our project we are providing the motor with 12V supply. The driver receives commands from the input pins and pushes the commands to the stepper motor through output pins.

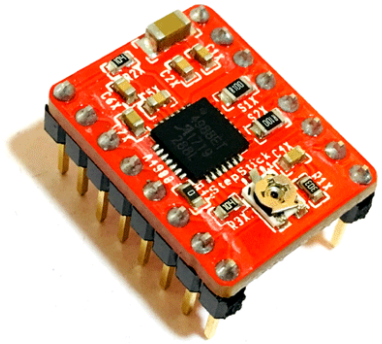

Fig.2.A4988 Motor Driver

C. Stepper Motor

It is a synchronous motor which divides a full rotation into a number of steps. We have used this motors to rotate according to our 2-axis dispensing mechanism. The motor receives commands from NodeMCU to rotate considering the extracted array from API and after rotating for certain values, the requested medicine is dispensed.

Fig.3. Stepper Motor

III. SYSTEM DESIGN

A. Block Diagram

Below is a basic overview of our system which will help in understanding the bifurcations in various parts which are explained in detail further in this report.

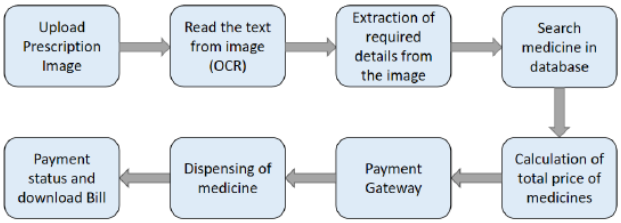

Fig.4. Block Diagram

Each block represented has its own set of software and hardware requirements as mentioned below :

a) Upload Prescription Image

The user interface is being created where the user can upload the image of prescription which are in ‘jpg’, ’jpeg’, ’png’ file formats. The uploaded image will be stored in the given directory. This image uploading step can be done using user’s mobile phone after scanning a given QR code the interface will open.

b) Read the text from image (OCR)

Using Image Processing techniques such as Thresholding, Dilation, Erosion we shall pre-process the image to make it suitable for segmentation. The processed image shall be detected for contours, the regions so detected will be extracted from the

thresholded image and each segment will be sent to the tesseract OCR engine. The output of pytesseract will be string form of image containing all the words of image which will be converted to lines as per the image and then it will be stored in 'sample.txt' file for further processing.

c) Extraction of required details from image
In this step main aim is to get the desired information from the prescription to perform further processing, information such as name of patient, name of doctor, medicine name and dosages will be extracted in this step. Regular expressions and python's list and string operations will be used in order to get these details. Medicine names and dosages will be stored in python dictionary for further processing.

d) Search medicine in database
Dictionary of Medicine name which is found in last step will be used here to check if that is present in our machine or not, this will search medicine in our prestored database which can be any Relational Database like MySQL, Postgres or even csv file depending upon volume of data. If medicine is present in database, its cost will be fetched. Also, The slots where respective medicine is kept will be searched and stored array, this array of slots will be requested by NODEMCU.

e) Calculation of total price of medicine
Main aim in this step to calculate total cost of the medicine. In the above-mentioned step if medicine is found its cost will be fetched, this will be repeated for all medicines present in medicine dictionary, and then total will be calculated for billing purpose.

f) Payment Gateway
On the user interface itself payment link will be given which will be unique for every user depending upon value of medicine purchased. This interface will be of Instamojo payment gateway, here all the security concerns are addressed. User can use Debit Card, Credit Card, Net banking for the payment.

g) Medicine Dispensing
In this step medicine dispensing will take place once the payment status is successful. In Dispensing unit stepper motor will work according to current and previous slot location which was requested by NODEMCU in above steps for dispensing the medicine.

h) Payment Status and Download Bill
This is the last step, here bill will be downloaded after the complete dispensing of the medicines. Bill will have details such Name of patient, Name of medicines, Cost of each medicine and total, also every bill will be having unique Id, which can be used for solving any future grievances.

System Workflow

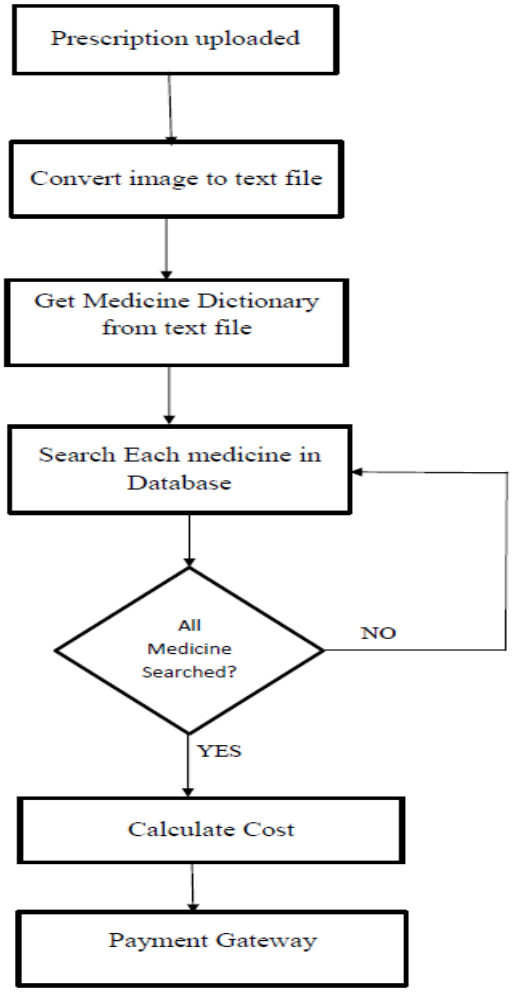

Fig.5. Flowchart

1) Prescription Uploading
For uploading captured image of prescription, we built a website for a user to upload a prescription. Here, we are using Flask API of Python which allows us to take image from user and store it for further processing.

2) Prescription Processing
Our aim is to extract words from prescription's image and convert them into text form and then use it extract information accordingly. Image processing is used to obtain the letters. Image processing is basically a set of functions that is used upon an image format to deduce some information from it. The input is an image while the output can be an image or set of parameters obtained from the image. Once the image is being loaded, we can convert it into gray scale image. The image which we get is now in the form of pixels within a specific range. This range is used to determine the letters. In gray scale, the image has either white or black content the white will mostly be the spacing between words or blank space. The black content will mostly be words. By using proper functions and techniques we can obtain the words. Once words are obtained from image, we stored it into a text file (sample.txt). Tools we used for performing

above mentioned task: - Python programming language gives us facility of many in built libraries, out of which for this purpose we are using OpenCV and pytesseract. OpenCV is used for reading uploaded image from the desired directory. Whereas Pytesseract is used to convert the given image into to string form. 'image_to_string()' function returns the result of a Tesseract OCR run on the provided image to a string. Optical Character Recognition (OCR) is a text recognition method that allows the printed copies of the text to be rendered into editable soft copies or text files. So here this is converting our printed prescription into string.

Fig.6.OCR Functioning

3) Extracting Features

In this case for us required features from the converted text are patient's name and age, Medicine Name and Dosage, Doctors Name. Since this model will be explicitly used for targeted hospitals, therefore we will be having their regular prescription formats. Applying regular expressions technique and python string and list operations on prescription format we are extracting desired information from the prescription and this information has been used in further process of generating bills and dispensing given medicine. Keeping in mind limitations of OCR engines, we have also given provision of checking spelling. In many cases it has been observed that OCR may give slight wrong spelling because of which that medicine may not be found in database, which is not the outcome we desire to get. So, to solve this problem spellchecker function has been used which can solve many common problems such as identification of 'o' as '0' or 'l' (lowercase alphabet L) as '1'(digit 1) etc.

4) Database

The name of medicine extracted in above steps are compared with pre stored database. If that medicine is present in database, cost of medicine will be calculated. This must repeat for every extracted medicine name. Subsequently left quantity must be reduced. Slots in which these medicines are kept is also stored in database which we are storing in array during this step and this array will be requested by NODEMCU by GET request for further working of dispensing unit. For implementing this currently for testing purpose we are using csv file which is accessible using pandas library of python, in future depending upon number of medicines we can even integrate ant relational database like MySQL, POSTGRES etc. which can also be accessed by python language itself using their respective connector libraries.

5) Payment

For payment of purchased medicine Instamojo payment gateway has been used. Which also handles all security concerns related to payments. User can make a payment using any of the following method: - Debit Card, Credit Card, Internet Banking. After the successful payment bill with unique bill id will be generated and downloaded. Also, we will receive confirmation mail regarding payment which can be used for resolving any future grievances.

Circuit Diagram

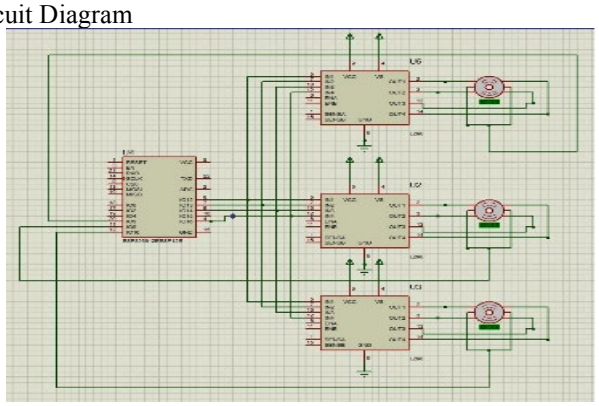

Fig.7. Circuit Diagram

Using a python library called FLASK , an API is made to request the GET method continuously over the time. As soon as there is an order of medicine strips , NODEMCU requests the array of slots by GET request and it accesses the data points of a location and subtracts previous location from the current one (for one axis each) and fetches the requested medicine. This process is done continuously until every medicine requested by user is dispensed.

IV. RESULT AND ANALYSIS

User Interface which has been created using HTML and CSS. It have buttons for seeing medicine names, Slots of medicines, Payment Link and also for checking payment status.

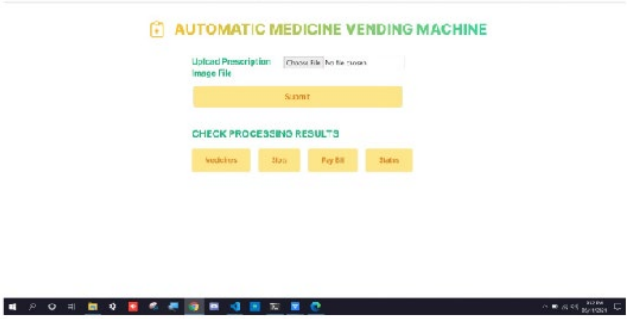

Fig.8. User Interface

After processing of uploaded image payment can be done through payment link given, below screenshot shows payment getting successful.

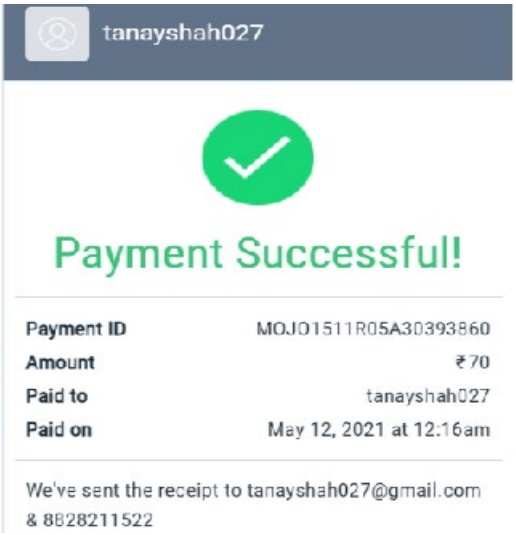

Fig.9. Payment Successful

While NODEMCU got the slot details, It is rotating motors required number of times by calculating x and y axis. Same Messages is being printed on console of Arduino IDE.

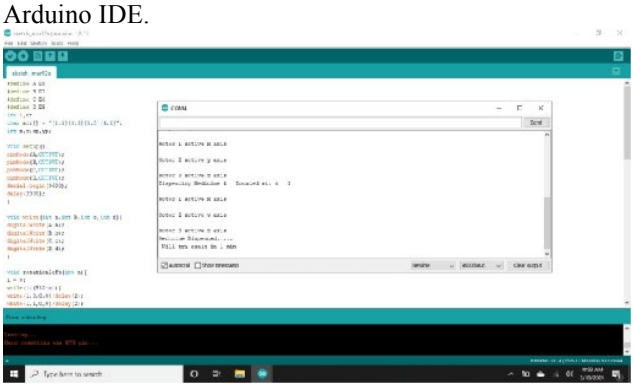

Fig.10. Messages while Dispensing

Dispensing units Structure will look like this. This is Isometric view of dispensing unit.

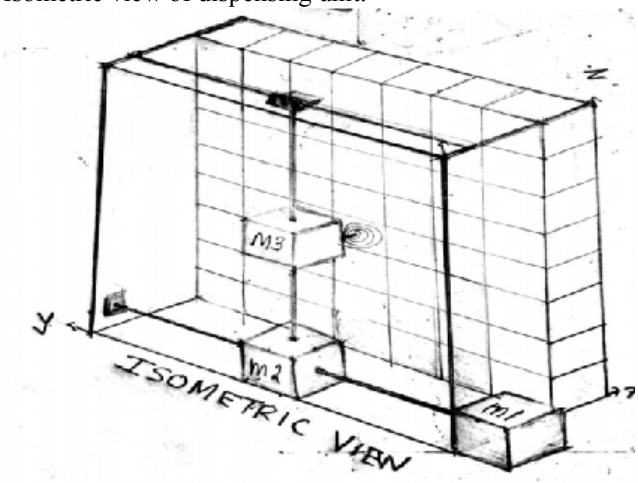

Fig.11.Isometric View of Dispensing Unit

V. CONCLUSION

A fully contactless medicine vending machine has been developed. It performs all the operations such as reading the prescription, converting the image to text form using python's pytesseract, managing stocks of medicine, and updating the stock by regularly reducing the dispensed medicine.

Calculation and collection of total payments which is inculcated by using Instamojo payment gateway has been performed successfully. All this operations can be performed by using the website which indeed results in paperless purchase. Then dispensing the correct amount of medicines completely by using NodeMCU and stepper motors by calculating positions of medicines using their slot values as x and y axis this whole dispensing of medicine is happening without any human intervention. The anytime medicine vending machine is techincally feasible for the people. This Automated medicine vending machine can be kept in hospitals in order to dispense medicines prescribed by doctors of the hospital. Implementation of this system reduces man power, 24 hours availability service and also reduces time consuption.A regular stock update will be done by inserting medicines in the vending machine and subsequently updating the same in database.

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AET 023

Solar Powered Portable Air Purifier

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Abstract- - This research paper is about designing an air purifier system which is powered by solar energy and testing the effectiveness of the system to curb the air pollution. The focus is on extracting the suspended particulate matter from the air which are the major contributors in the pollution of air in many urban cities. It works on a non-conventional method and intents to achieve best possible air purification results using eco-friendly and economical method. The principles of all four filters that we will be using are different. Principle of HEPA filter is it works by forcing air through a fine mesh that traps harmful particles such as pollen, pet dander, dust mites, and tobacco smoke, Principle of Carbon filter is that they remove pollutants from the air with a process known as adsorption, UV filter, principally work by reflecting and scattering the UV radiation, while the organic UV filters, or also called chemical UV filters, absorb the light and Cotton filter working is the cloth will swell in alkali solutions to create a better gasket effect during filtration. The fan, arduino, MQ135, LCD in system is operated with the help of solar energy, produced by solar panels, which converts the solar radiations into electricity.

Keywords—Pollutants, Filters, gasket effect

I. INTRODUCTION

As we know that air pollution level in cities is very high. Most of pollution comes as by-product from vehicle and construction of buildings, these are in form of particulate matter which are like methane, carbon dioxide, dust particulate etc. These create a lot of health problems like respiratory illness, decreased lung functions, development of diseases like asthma etc. Larger dust particles are major particulate among these and if its air quality value is down too minimum then air has very improved quality in which all type of living things can breathe easily.

Although there are many types of air purifier that are available in market but none of them are sufficient enough to deliver its working efficiency in public places like bus stand, near hospitals, traffic signals etc. Many institutes are also not able to afford these because of high cost and installation cost. Government organizations have very low budget for air purifier like extra expenditure. So, it is advisable to develop such air purifier which can cost less and are highly efficient. So, we are making solar powered air purifier, which runs on solar energy with use of filters and also works for longer duration than others. Our system has multiple stages which simultaneously throws clean air out after filtering polluted air. So basically, there are air purifier already installed in various places like railway stations, bus stations, etc but these systems consume large amount of electricity and cost around 79,000Rs. Whereas our system uses solar power to purify the air and hence there is no large consumption of electricity due to which the price of our system reduces as compared to the already installed systems. It uses component like solar panel, fan, HEPA filter, Carbon Filter, Uv filter, Cotton filter, Arduino, MQ135, DC charge controller, DC choke. The objective for this project is to develop and design concepts for the next generation Air Purifier.

II. PROBLEM STATEMENT

The World Health Organization measures indoor and outdoor air pollution. They report more than 4 million people die each year from indoor air pollution. This number is more than from outdoor pollution. An avalanche-like pollution of the natural environment, including air, has a negative effect on living organisms. This is especially true for residents of large urban agglomerations. The exposures are subjected to residents staying both in the open area and in enclosed spaces. Commonly used room ventilation systems in most cases do not have an appropriate mechanism for monitoring and cleaning the air entering the building. The idea motivating to engage in this problem is the contrivance of providing users, of said above building objects, the access to air devoid of mechanical and chemical pollution, negatively affecting human health.

Air purifier, why do we need it??

- Due to millions of microscopic particles around you, what actually happens is we are not aware to the diseases that may have inserted in your body without you being completely unknown about it which may lead to many affects.
- COPD (Chronic obstructive pulmonary disease), asthma and lung cancer.

- This will result to causing more spread in elder people who are above the age of 60.
- More diseases may spread in dependent demographic of the sub-continent.
- The effective use of the purifier will help to reduce the risk of one's safety in public place. Consequently, maintaining air quality below the satisfactory category (less than 100ppm).
- The use of air purifier will forward the goal of the improving public health and reducing risk towards one's life.
- The long-term use of air purifier along with improving science and technology in the medical field will decrease mortality rates and improve life expectancy.
- Making use of air purifiers will also help us to worry less about the industrial fumes.
- People with weak immune system will also have a very secure environment.
- Making use of air purifier will also help us stay aware about the particles and chemical mycotoxins into the air.

III. LITERATURE SURVEY

A. National Air Quality Index

Awareness of daily levels of air pollution is important to the citizens, especially for those who suffer from illnesses caused by exposure to air pollution. Further, success of a nation to improve air quality depends on the support of its citizens who are well-informed about local and national air pollution problems and about the progress of mitigation efforts. Thus, a simple yet effective communication of air quality is important. The concept of an ai quality index (AQI) that transforms weighted values of individual air pollution related parameters (e.g. SO2, CO, visibility, etc.) into a single number or set of numbers is widely used for air quality communication and decision making in many countries.

B. Identification and Characterization of Particulate Matter Concentrations at Construction Job-sites.

The identification and characterization of particulate matter (PM) concentrations from construction site activities pose major challenges due to the diverse characteristics related to different aspects, such as concentration, particle size and particle composition. Moreover, the characterization of particulate matter is influenced by meteorological conditions, including temperature, humidity, rainfall and wind speed. This paper is part of a broader investigation that aims to develop a methodology for assessing the environmental impacts caused by the PM emissions that arise from construction activities. The objective of this paper is to identify and characterize the PM emissions on a construction site with different aerodynamic diameters (PM2.5, PM10, total suspended particulates (TSP)), based on an exploratory study. Initially, a protocol was developed to standardize the construction site selection criteria, laboratory procedures, field sample collection and laboratory analysis.

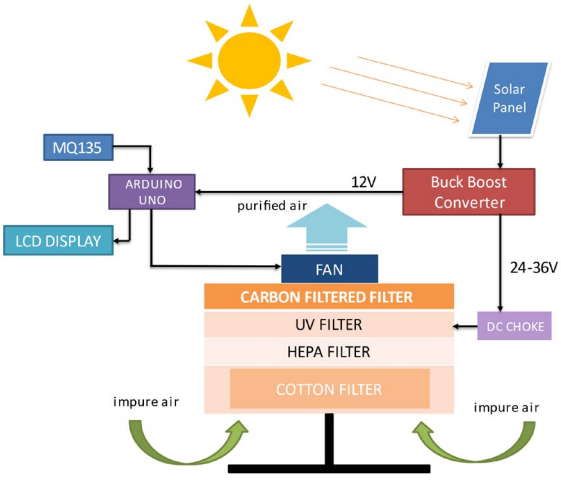
Carbon filtering is a method of filtering that uses a bed of activated carbon to remove contaminants and impurities, using chemical adsorption. Each particle/granule of carbon provides a large surface area/pore structure, allowing contaminants the maximum possible exposure to the active sites within the filter media. One pound (450 g) of activated carbon contains a surface area of approximately 100 acres (40 Hectares). Typical particle sizes that can be removed by carbon filters range from 0.5 to 50 micro-meters. The particle size will be used as part of the filter description. The efficacy of a carbon filter is also based upon the flow rate regulation.

UV air purifiers are designed to use short-wave ultraviolet light (UV-C light) to inactivate airborne pathogens and microorganisms like mild, bacteria and viruses. They have the same ultimate goal of all air purifiers: to reduce indoor air pollutants. The technology is also referred to as UV germicidal irradiation, or UVGI air purifiers. This is different from other air purifier technologies that contain UV light technology but do not use it directly against air pollutants.

On the market, UV-C air purifiers are currently sold as stand-alone, freestanding devices or as systems installed into pre-existing residential or commercial HVAC units. As air is forced through the device, it passes UV lamps, which directly attempt to disinfect the air by means of germicidal irradiation. Rarely a stand-alone product, UV-C light air purifiers often require additional systems for full effectiveness and are most often included in larger High-efficiency Particulate Arrestance (HEPA) air filtration systems. In fact, the EPA says that a UV-C air purifier does not seem effective as a stand-alone unit because it cannot trap or remove particles.

IV. METHODOLOGY

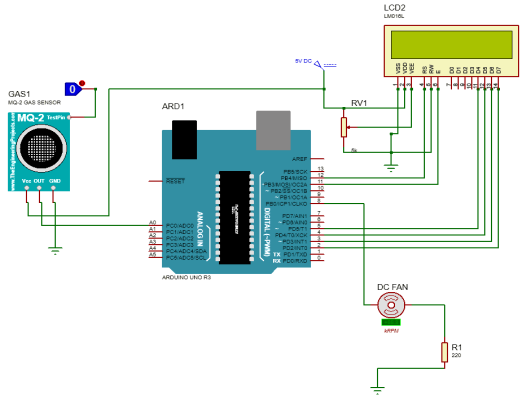
A. BLOCK DIAGRAM



Our Proposed system has blocks shown in above diagram, the solar panel converts the solar energy into electrical energy i.e. dc voltage. To provide a dc stable voltage to the output devices like Arduino and dc choke we have to first filter and regulate the voltage using a Buck Boost converter. This converter provides stable dc voltage at the output which is given to the Arduino which controls the Fan speed depending upon the result of our air quality sensor MQ135. This sensor detects the quality of the air depending upon the pollutants and bacteria present

in the air and gives an index number to the Arduino which then depending upon this index value controls the speed of the fan. A similar Arduino circuit is connected at the output of filters to determine by how much factor the quality of the air differs from the input of the filters. The circuit diagram for this Arduino circuit is given below.

B. CIRCUIT DIAGRAM



We are using Arduino uno for controlling input-Sensor MQ135 and output devices-LCD, fan at the input side and as well as at the output side of our system. Starting with the sensor MQ135, the pin VDS is connected to the 5V DC supply. OUT pin is connected to the A0 of arduino. Next the output device LCD, the VSS pin is connected to the gnd. VDD is connected to the 5V dc supply. VEE and RW are connected to potentiometer. The RS pin is connected to the pin no.12 of arduino. E pin of the LCD is connected to pin no. 11 of arduino. The data pins of LCD – D4, D5, D6, D7 are connected to the pins – 5,4,3,2 of the arduino respectively. And finally, the DC fan is connected to the pin no. 9 of the arduino uno. The index value obtained at A0 pin of arduino from the sensor is displayed on the LCD. If the air is highly polluted then the index value if high and is air is less polluted then the index value is low. The speed of the depends on this index value. Higher the value, higher the speed of rotation of the fan. Lower the value of index, lower the speed of the fan.

V. RESULT

After checking the connectivity of the circuit, we implemented the circuit on the PCB board. The required output was displayed on the LCD at the output side of the project. Further we attached the fan at the center and the arduino circuits at the input as well as at the output side, inside a cardboard box. Next, we inserted the HEPA filter and the Carbon activated filter inside the box and adjusted it according to our system design. The difference in the input air quality and the output air quality can be seen in the figure. Therefore, our system works properly and lets the purified air in the surrounding.

VI. CONCLUSION

For sustainable development, applying Solar Energy technology which is simple and renewable and that provides us constant supply of electricity; to our air purifier which is used to achieve a better air quality index. In this project, our Solar powered air purifier which can cost less and is highly efficient, which promotes the use of sustainable development and is economical. Also in future, modifications can be made to improve working efficiency without effecting setup.

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AET 024

Dynamic Smart Bus Monitoring and Management System

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Abstract—In the daily operation of a bus management system, the movement of vehicles is affected by uncertain conditions as the day progresses, such as traffic congestion, unexpected delays, and randomness in passenger demand, irregular vehicle dispatching times, and incidents. The Dynamic Smart Bus Monitoring and Management system is a system designed to display the approximate time between two bus stops. This project will enable the system to obtain location of the bus , which it will then transfer to the centralized control unit and will be shown on to the Thingsview application. The Dynamic Smart Bus Monitoring and Management system will effectively assist pedestrians in making the decision of whether to wait for the bus or walk.

Keywords - Raspberry Pi 3B, RC522 RFID Reader, VL53L0X LiDAR Time of Flight Sensor

I. INTRODUCTION

In today's tech era, IoT (Internet of things) has become much popular around the world. Almost all the devices, which are known as smart devices, can connect to the internet and access data from any corner of the world. One such application can be implemented for management and monitoring of bus travel. There are buses available for passengers travelling to different locations, but not many passengers have complete information about these buses. Complete information namely the number of buses that go to the required destination, bus numbers, bus timings, the routes through which the bus would pass, time taken for the vehicle to reach its destination location would assist the passengers with various routes, track the current location of the bus and give the correct time for the bus to reach its bus stop.

The proposed system will provide data and will display information like location of the bus, ETA (Estimated Time of Arrival), number of people travelling in the bus etc, which will tremendously help in the process of streamlining the transport and increase its popularity significantly. This model will be very efficient and reliable when the traffic pattern in the area of interest is relatively stable.

A. Problem Statement

To design a web based application for the users who want real time information about the estimated time of arrival (ETA) buses in the intra-colony/campus and avoid overcrowding. Use of a centralized server to share the calculated ETA, to bus passengers through application.

B. Literature survey

Vehicle Tracking Information System and its various applications have been extensively researched over the years. Different techniques have been implemented to achieve the 20 ultimate goal of travelling comfort.The main goal for the medium term is to improve the public transport system and phase in cleaner technologies. Improvements in public transport should aim at: Increasing capacity and coverage: Higher capacity and wider coverage make public transport more accessible to people. These can be achieved by deploying more vehicles and by adding more routes. In either case, it means additional investments, though not of a very high order.

These are some of the technical literature in engineering and technology where people have tried to implement similar kinds of Systems which are mentioned below with their shortcomings with respect to our Application. A proposed solution in " The Smart Bus for a Smart City - A real-time implementation", 2016 IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS) computes the shortest path to reach the destination in real time and gives that information to the bus driver. Artificial Neural Networks (ANN) is used to give an accurate estimate of the arrival time (ETA) to the commuter by means of an application. ETA to the next stop is communicated to the commuter using the MQTT (Message Queuing Telemetry Transport) protocol, by the hardware mounted on the bus. The proposed solution also adds a fleet management console to the administrators, making them manage and monitor the fleet of buses in real time. The prototype thus developed makes sure the commuting in cities is pleasant, and hassle free.Authors "Mr. Pradip Suresh

Mane & Prof. Vaishali Khairnar" have implemented the proposed system Analysis of Bus Tracking System Using GPS on Smartphone"s" which focuses more on just Tracking the vehicle module.[9] Authors H. M. Sherif, M. A. Shedid and S. A. Senbel, "Real time traffic accident detection system using wireless sensor network," used wireless sensor network to detect vehicle accidents on the road in real time, which used RFID to detect[10].The bus transportation and management system with the integrated system contains the cellular network and GPS which is used in public transportation. This system contains various modules. The bus stop module contains the RFID tag and also the bus module contains RFID reader. These modules have GPS and GSM. It is an integrated system which contains the elemental network and Global Positioning System. This is used in public transport.

II. METHODOLOGY

After studies on suitable methodologies, prototype development methodology is chosen. The reason for choosing this methodology is because the advantages provided by this methodology will assist the development of the proposed system to the success path. The main reason to choose prototyping is because the proposed system will involve more user interaction in order to acquire more user feedback. In the development processes of the Bus Monitoring System, there are many uncertainties. In Users perspective, the accuracy of estimated arrival time will determine the success of the system.

The various components in our project have the following functions-

A. Time of Flight sensor
TOF stands for Time of Flight, a mass spectrometry method that separates ions by their mass to charge ratio and determines that mass to charge ratio by the time it takes for the ions to reach a detector.

B. Lidar sensor
This sensor is used for determining ranges (variable distance) by targeting an object with a laser and measuring the time for the reflected light to return to the receiver. These Sensors in our project are used at entry and exit points to keep a count of people in the bus by shooting ions at a particular angled cone with designated height defined which will be used to check the entry and exit count of the people and for overcrowding also.

C. RFID reader
The RFID reader has a radio transmitter and receiver within. The reader transmits radio frequency signals incessantly upon powering. It is also called an interrogator. When an RFID tag is placed within the range area of a reader, it energizes the tag through electromagnetic induction and collects the data from it. Data is stored in the RFID tag electronically. Tags can store only a few kilobytes of data.This data is retrieved by the reader using electromagnetic waves.Each bus will be installed with a RFID reader which will read tags on the bus stop and figure out its location.[6]

D. RFID tag
RFID tags are available in different types of shapes and sizes. The Tag contains an IC for storing the information, an antenna for transmitting and receiving, and also a modulator. Tags are small in size and they can hold only a few bits of data. The operation of a reader is very much similar to the barcode scanning method which uses Universal Product Codes (UPC) codes. RFID tags will be used on every bus stop and have a unique ID.

III. SYSTEM DESIGN

A. Block Diagram

a) Bus with sensors
This consists of sensors installed on the bus which are RFID Reader and LiDAR sensor and Raspberry pi microcontroller. Here, all the raw data is collected, processed and sent on to the cloud.

b) Cloud
This consists of the Thingspeak cloud platform where all the data obtained by sensors is stored and displayed.

c) Client block
This consists of the user and the mobile device which he/she uses to access the data from the cloud.

d) Android Application
All the data processed on Thingspeak cloud platform will be available to the end user through this application.

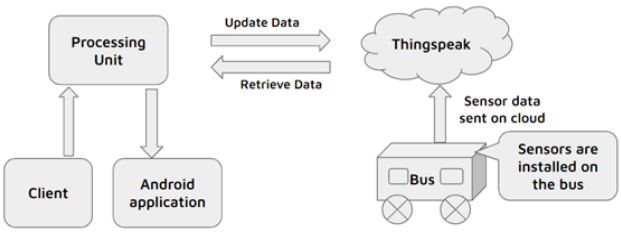

Fig.1. Block Diagram

1) Processing unit (Raspberry Pi 3B)
It is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.The Raspberry Pi operates in the open source ecosystem: it runs Linux (a variety of distributions), and its main supported operating system, Pi OS, is open source and runs a suite of open source software [7]. Raspberry Pi 3 Model B consists of 40 GPIO pins and works on 5V power supply. It runs on 1 GB LPDDR2-900 SDRAM and has 4 USB ports.

Networks supported by Raspberry Pi 3B are: 10/100 MBPS Ethernet, 802.11n WLAN, Bluetooth 4.0

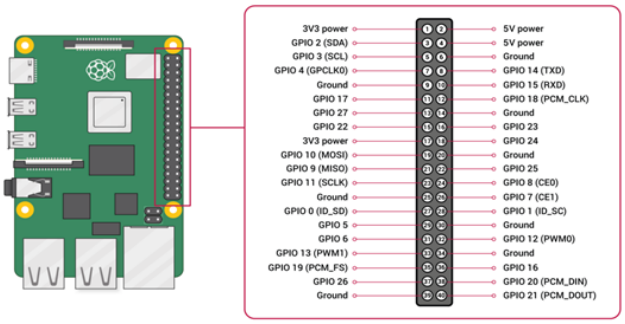

Fig.2. Pin out of the Raspberry Pi 3 Model B

2) User and Android Application (Thingsview)
ThingsView enables you to visualize your ThingSpeak channels in an easy way, just enter the channel ID and you are ready to go. For public channels the application will respect your windows settings: color, timescale, chart type and number of results. The current version supports line and column charts, the spline charts are displayed as line charts. For private channels, the data will be displayed using the default settings, as there is no way to read the private windows settings with the API key only.

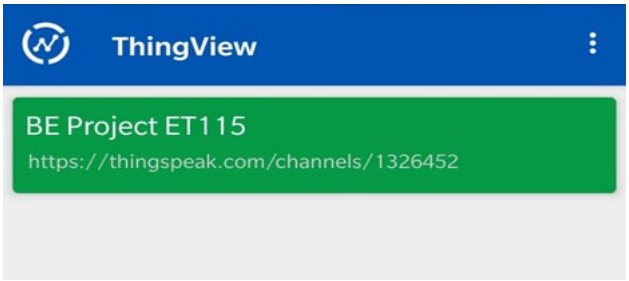

Fig.3. Thingsview android application

3) Cloud Platform (Thinkspeak cloud platform)
ThingSpeak is an IoT analytics platform service that allows you to aggregate, visualize and analyze live data streams in the cloud. ThingSpeak is often used for prototyping and proof of concept IoT systems that require analytics. Some of the key capabilities of ThingSpeak include the ability to: Easily configure devices to send data to ThingSpeak using popular IoT protocols.Visualize your sensor data in real-time.Aggregate data on-demand from third-party sources.Run your IoT analytics automatically based on schedules or events.Prototype and build IoT systems without setting up servers or developing web software.https://thingspeak.com/

Fig.4. Thingspeak cloud platform

4) Bus with installed sensors
In this project, we have used 2 sensors namely VL53L0X and RC522 RFID Module.

a) RC522 RFID sensor
The RC522 RFID Reader module is designed to create a 13.56MHz electromagnetic field that it uses to communicate with the RFID tags (ISO 14443A standard tags). The reader can communicate with a microcontroller over a 4-pin Serial Peripheral Interface (SPI) with a maximum data rate of 10Mbps.[2] It also supports communication over I2C and UART protocols. The RC522 RFID Module works on operating voltage of 2.5V to 3.3V. It supports communication like SPI, I2C protocol and UART. It can attain Maximum Data Rate of upto 10Mbps.It has Read Range of 2 m.[1]

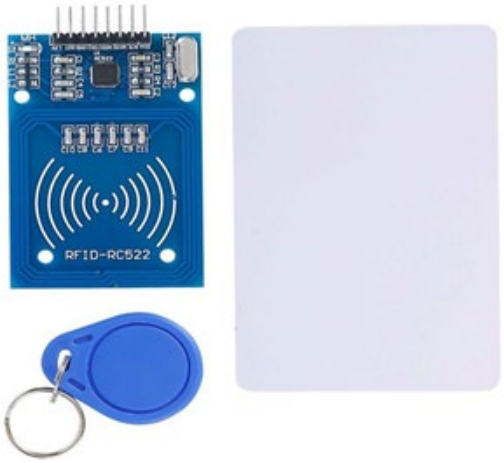

Fig.5.RC522 RFID reader and tag

b) VL53L0X LiDAR ToF sensor
The VL53L0X is a new generation Time-of-Flight (ToF) laser-ranging module housed in the smallest package on the market today, providing accurate distance measurement whatever the target reflectances unlike conventional technologies. VL53L0X Lidar distance sensor uses laser ranging techniques to measure the range of a target within 2 meters. It measures the distance by using the time of flight principle, thus, also called ToF (time of flight) laser-ranging module. It works in the voltage range of 2.6V to 5.5V. It works on I2C communication protocol. This sensor has an in-built voltage regulator.. VL53L0X has an integrated SPAD array. SPAD array accurately distinguishes between different photons within tens of picoseconds. The laser used here is a 940 nm VCSEL which has the feature of invisibility and it is very safe for the human eyes.[6]

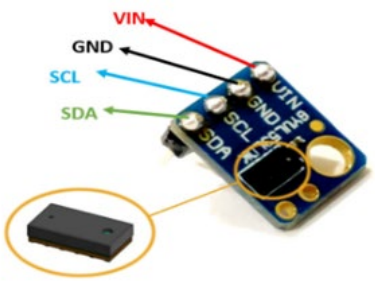

Fig.6.VL53L0X LiDAR ToF sensor

B. Circuit Diagram

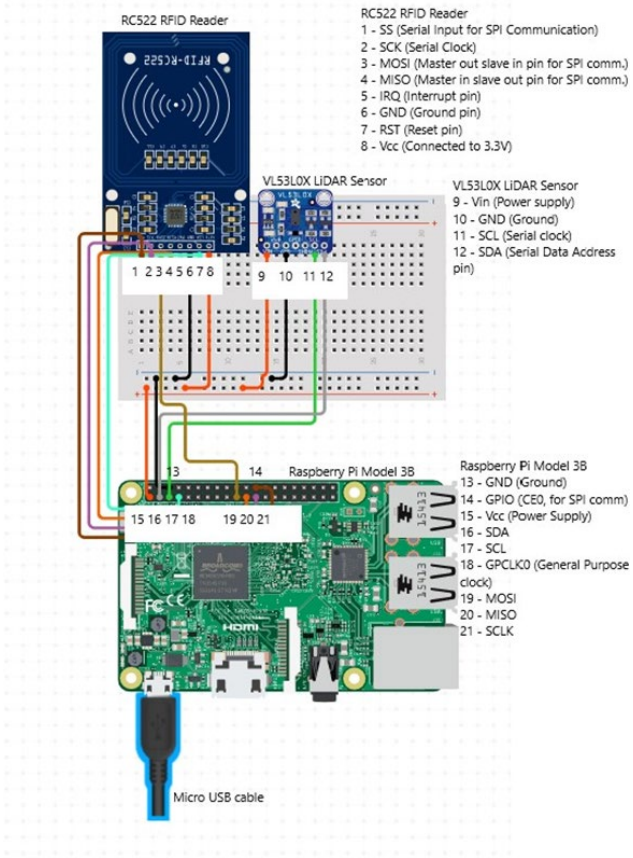

Fig.7. Circuit Diagram

Raspberry Pi is powered through micro USB cable which provides 5 V power supply.Vcc terminals of RFID reader and VL53L0X are connected to the 3.3V power supply pin of Raspberry Pi and GND pins are connected to GND of Raspberry Pi.SCL of VL53L0X and SCK of RFID reader are connected to the SCL and SCLK pin of Raspberry Pi respectively. SDA of VL53L0X is connected to SDA of Raspberry Pi.MOSI and MISO pins of RFID reader are connected to MOSI and MISO of Raspberry Pi respectively.

C. Project Model

Fig.8. Project Model Front & Back

D. System Workflow

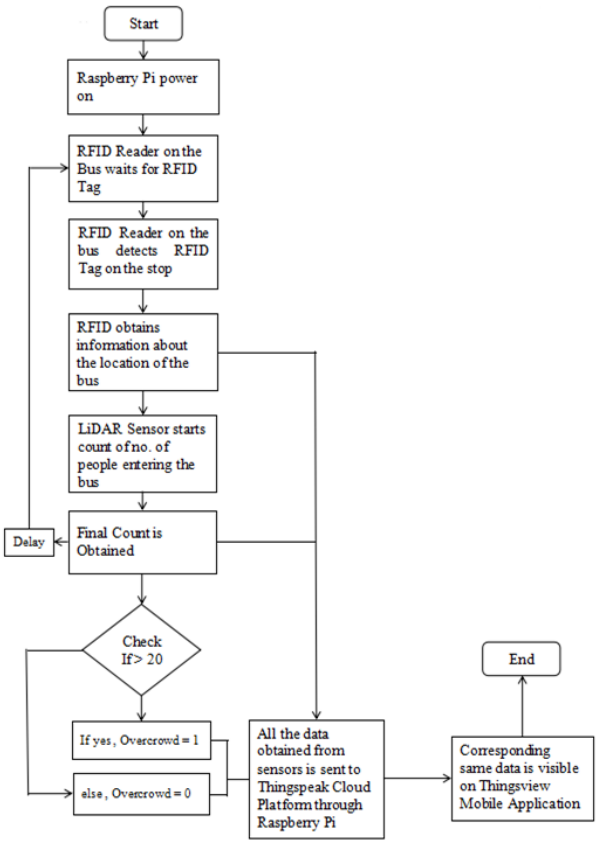

Fig.9. Flowchart

Bus will be installed with two sensors, namely, RFID sensor (RC522) and LiDAR ToF (Time-of-Flight) sensor (VL53L0X). LiDAR ToF Sensor (VL53L0X) will be installed on entry and exit points to keep a count of people entering and exiting the bus. This count will be used to keep a check on overcrowding. LiDAR sensors using ranging techniques will count how many people are entering and exiting the bus and determine the number of people currently in the bus. It uses the Time of flight principle for measuring the distance of the objects. Here a laser beam is released from the Vertical Cavity Surface Emitting Laser present in the device. This beam strikes the surface of the object and bounces back. The time taken by the laser beam to strike the surface of the object and reflect back to the sensor is known as the Time of flight. This time is measured to calculate the distance between the object and the sensor. To measure the photon timing and photon distance SPAD array is used in the device. This also increases the accuracy of the device.

RFID module (RC522) will be installed on the bus to obtain location of buses and will be helpful to calculate Estimated Time of Arrival (ETA) of the selected bus. Here in our project, we are using SPI protocol. The Serial Peripheral Interface (SPI) is a synchronous serial communication interface specification used for short-distance communication, primarily in embedded systems. SPI devices communicate in full duplex mode using a master-slave architecture with a single master. The master device originates the frame for reading and writing. Each bus will have a RFID reader and each bus stop will have a RFID tag. As soon as a bus reaches the bus stop, the reader will detect the tag and determine on which bus stop it is currently, and forward this data to the cloud.

Raspberry Pi (Version 3B) will be used to connect all sensors together and will be programmed to send the sensor values over to the cloud where further data processing will occur like calculation of ETA, to check if the selected bus is overcrowded or not, etc. Thingspeak cloud platform will be used to gather all the collected raw sensor data values and will be displayed on the dashboard. Thingspeak channel setting will be kept as Public so all the users can access the data. Thingspeak dashboard will have different fields showing all the data collected and processed. Thingsview Application is an Android App which uses an API key of public channels on Thingspeak to access data from the cloud and display all the data extracted like Estimated Time of Arrival, location of bus and number of people in the bus on the user's mobile phone.[5]

IV. RESULT AND ANALYSIS

A. Thingspeak dashboard

This is the Thingspeak Dashboard where the values are displayed which are obtained from the sensors.Thingspeak contains many visualization tools of which we are using a numerical display widget to display the information.

Field 1 displays the current location of the bus, which in this case is Bus Stop no. 1. Field 2 shows that 14 people have entered the bus. Field 3 specifies Estimated Time of Arrival of the bus. Field 4 indicates if the bus is overcrowded or not, by displaying 1(Yes) or 0(No). Here, the bus is not overcrowded.

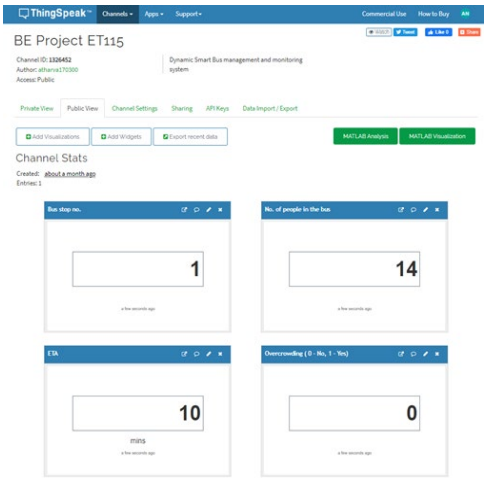

Fig.10. Thingspeak Dashboard (Case 1)

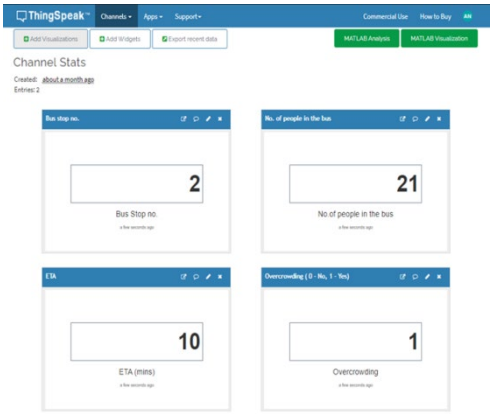

Fig.11. Thingspeak Dashboard (Case 2)

Field 1 displays the current location of the bus, which in this case is Bus Stop no. 2. Field 2 shows that 21 people have entered the bus. Field 3 specifies Estimated Time of Arrival of the bus. Field 4 indicates if the bus is overcrowded or not, by displaying 1(Yes) or 0(No). Here, the bus is overcrowded.

B. Thingsview Application

Thingsview Application is available on Google play store where by entering the channel ID we can get access to the values of fields shown below.

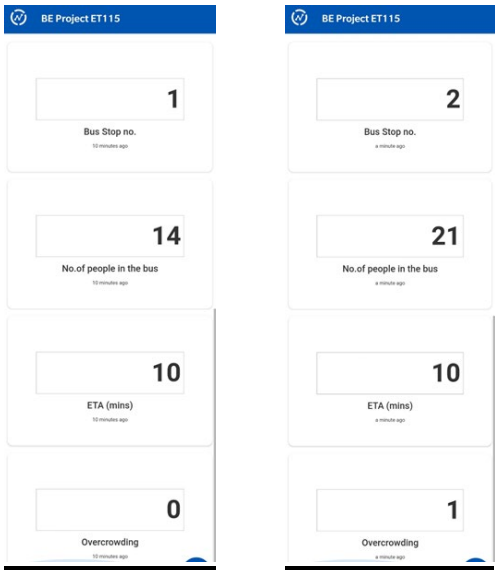

Fig.12. Thingsview Application (Case 1) & (Case 2)

Thingsview application uses the channel ID and displays the information present on Thingspeak dashboard.

V. CONCLUSION

The Dynamic Smart Bus Monitoring and Management System is developed to solve the problem of overcrowding, determine location of the bus and Estimated Time of Arrival (ETA). The Thingspeak cloud platform and Thingsview android application are used to process and display final values obtained by the sensors.By analyzing this data, people will be able to plan their journey accordingly. This project was correctly able to determine location of the bus, count of people in the bus and give ETA between two model bus stops. The intelligence implemented in the bus monitoring system can be achieved by compiling and feeding all the proposed theories and algorithms for RFID and other sensing technologies into the system. The ability of the system to act on its own can reduce the manpower required at the monitoring center.The system has high practical value and is cost efficient. This work is having a wide scope.Bus drivers will also be more punctual to the bus schedules that have been established, resulting in a more efficient bus circulation system. The results show that the system is intelligent enough and able to provide important basic information to the authorities for monitoring and management of the bus system.

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AET 025

Health Monitoring System For Comatose and Icu Patients

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Abstract— Nowadays, Health-care Environment has developed science and knowledge based on Wireless-Sensing node Technology oriented. Patients are facing a problematic situation of unforeseen demise due to the specific reason of heart problems and attack which is because of nonexistence of good medical maintenance to patients at the needed time.

System health monitoring is a set of activities undertaken to maintain a system in operable condition and may be limited to an observation of current system states, with maintenance and repair being prompted by these observations.

Many sensors are required to provide real-time, onboard structural integrity assessments for the integrated system health management system.

This project reviews system health monitoring sensor technologies, builds a sensor optimization selection model to select the minimal most informative, cost-effective sensor subset, and develops an energy-efficient decentralized detection scheme based on the sensor selective framework.

This can also be used for monitoring the old age patients and informing doctors and loved ones. So, we are proposing an innovative project to dodge such sudden death rates by using Patient Health Monitoring that uses sensor technology and uses internet to communicate to the loved ones in case of problems.

Thus, Patient health monitoring system based on IoT uses internet to effectively monitor patient health and helps saves lives. This project will negotiate as well as cooperate to its level best if we put in better action and give it a better way of exposure.

Keywords— Health Monitoring, IoT, Sensors.

INTRODUCTION

As we know coma is a state of unconsciousness in which patient cannot feel or respond to the pain, light or sound, it does not initiate volunteering any actions. In general, the comatose patients never respond for anything however they might abnormal movements are frequently encountered in patients with brain injury characterization of these movements and their underlying pathophysiology is difficult due to the comatose or uncooperative state of the patient. Patients in a coma state need to have a continuous update of Blood pressure, temperature, humidity, and urine level.

Doing this manually can become almost impossible to keep updates of multiple patients at the same time. In order to address this situation, our system comes to the rescue; this system will collect the information of patients with the help of sensors. These sensors use WIFI to communicate this information to the internet. This system is powered by the Arduino UNO it includes a blood pressure monitoring unit and an ultrasonic sensor to check urine, temperature sensor, motion sensor, and an LCD display.

When we turn the system on, it gets connected to the website using WIFI, System monitor shows four signs namely heart rate, temperature, humidity, and urine output. While testing heart rate function of the system, the heart rate and blood pressure value get updated over IOT and LCD display. As we know the patient who is in comatose cannot urinate on their own so a rubber tube is inserted into their bladder to remove urine. This system tests urine level and also updates the value over IOT and LCD, when the patient urinates.

In case if the patient regains consciousness and attempts to move, the sensor will detect the motion and update it over IOT and LCD. In this way, our system monitors the comatose patients.

LITERATURE SURVEY

A number of reviews on the subject of Wireless Sensors techniques were done in the past either as part of research papers/technical reports on IoT-based Health Monitoring System.

(a) First System Here, researcher designed health monitoring system using ATmega8 microcontroller with Wireless Body Area Sensor Network (WBASN). In this work, the sensors which are used here are Temperature sensor, Blood pressure sensor, Heart beat sensor. These sensors are placed on human body which are helps to monitor the health condition without disturbing the daily schedule of the patient and these health-related parameters are then forwarded to physician's server using long range wireless technology GSM. Health monitoring system

consists of sensors, microcontroller, LCD display and GSM modem to transmit or receive health related data to or from the doctor.

Similarly, at hospital same GSM modem is used. Hence, GSM modem helps in the establishment of network between patient's server and doctor's server. LCD (Liquid Crystal Display) display is providing to show the instant result to the patient. Here researcher used LM34 as temperature sensor, IR LED and red LED is used for heart rate monitoring and Pressure transducer or the sensor based on piezo-electrical material is used to measure the systolic BP and diastolic BP.

Microcontroller reads data as given by the temperature sensor, blood pressure sensor and heart rate sensor and processing it gives the output in the form of digital and it gets directly display on LCD or it gets transmitted to the doctor's server through GSM modem. This system gives exact and instant result with high accuracy which gets directly display on LCD.

It takes max 4-5 sec to monitor the doctor's server using GSM wireless technology. This system takes small amount of time to know the health condition of patient and then delivers the report to the doctor.

(b) Second System using same system, health parameters are sanded by using RFID reader, Bluetooth, GSM and UMTS. This system gives facility to monitor the blood pressure of patient. The health parameter directly sends to the doctor using GSM and UTMS. Here, video guide is used. This video guide feature serves the patients age and his blood pressure correctly. This system consists of three parts: Touchpad, remote server and reading of the Tag ID and BPM.

For reading the Tag ID and BPM, use a microcontroller unit (MCU) as a kernel. The client touchpad receives the blood pressure measurement (BPM) data a RFID through Bluetooth. Client touchpad send the data to the receives health parameter. Also, these health parameters are directly sent to remote data center and remote data center to the doctor using GSM and UMTS wireless technology. Data gets transmitted in the form of the packets. This system helps to store previous data. Similarly, it takes less time to monitor the blood pressure of the patient.

(c) Third System shows the blood pressure monitoring system using microcontroller. This system includes motor control unit, Microcontroller Atmega328, LCD display. The pressure sensor is directly connected to the cuff, which is inflated or deflated via a motor and valve. ON and OFF switches of motor are controlled by the microcontroller at correct time. Due to changes in the ON and OFF switches of the motor, the wrist cuff gets inflated and deflated, this pressure is measured by the pressure sensor. Pressure sensor generates the health parameter in the analog sensor. The processing of analog sensor is done with the help of the microcontroller and gives digital output which is displayed on the LCD or on the Personal computer using RS232. Magneto resistive RAM (MRAM) stores the value of systolic and diastolic blood pressure and is directly connected to the microcontroller. Similarly, here no need of pump the cuff by hand, all the system is controlled by the microcontroller. It is not required to calculate or observe blood pressure manually. Time consumption is very less compared to old system.

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PROPOSED SYSTEM

We have proposed a system which is powered by the Arduino, it includes a Pulse Rate Sensor to check the pulse rate of the patient, an Ultrasonic Sensor to check Urine level, Temperature Sensor to check the body temperature, and the Motion Sensor (PIR sensor) to detect the body movement of the patient in unconsciousness or in coma, and an LCD display to show the output.

This system will collect the information of patients with the help of these different sensors and then the ESP8266 Wi-Fi module connects to Wi-Fi and sends the data to IoT device server. The IoT platform used in this project is Thing Speak. Thing Speak is an open-source Internet of Things (IoT) application and API (Application Programming Interface) to store and retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network.

METHODOLOGY

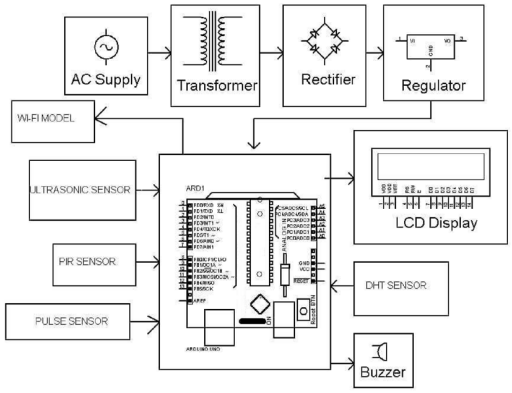
We have designed and implemented a healthcare monitoring system for comatose and ICU patients to monitor significant body parameters of patient inside hospital as well as in home.

Different sensors are attached or induced to the patient's body to collect vital body parameters like temperature, heart rate, pulse rate, urine level etc. to be monitored. Heart rate and PIR sensor probes are also attached to patient's body.

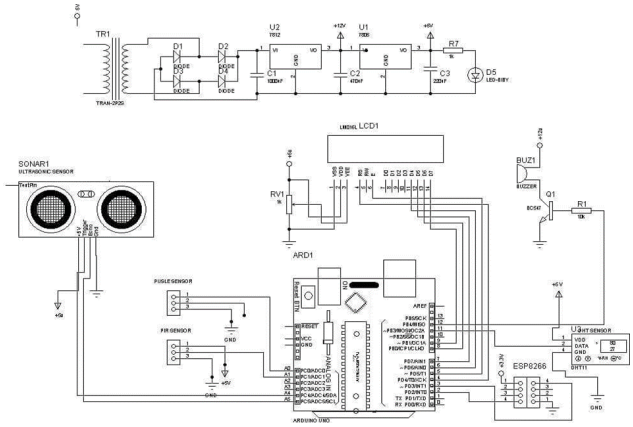
The sensor data is in the form of analogy signals and to be converted into digital form using inbuilt circuits of Arduino board which collects and processes sensor data for further communication. For further use and storage, it is then sent to server using suitable wireless communication. In our proposed system ESP 8266 is used to convey sensor data to server using wireless communication. Existing Wi-Fi from home or hospitals is used for this purpose. After comparing different candidate wireless technologies, we have chosen Wi-Fi for following main reasons: Latest modules such as ESP 8266 are easy to connect and have built-in controller and Wi-Fi communication module.

As the system is used in ICU room, the room size considered for maximum of 8 beds in any hospital is nearly 2000 sq. meters for which Wi-Fi is better than Bluetooth (Not enough range) or ZigBee (Low power hence cannot transmit for longer range). Wi-Fi provides very high-speed access to internet compared to any other technology already established in the market.

BLOCK DIAGRAM OF HEALTH MONITORING SYSTEM



CIRCUIT DESIGN

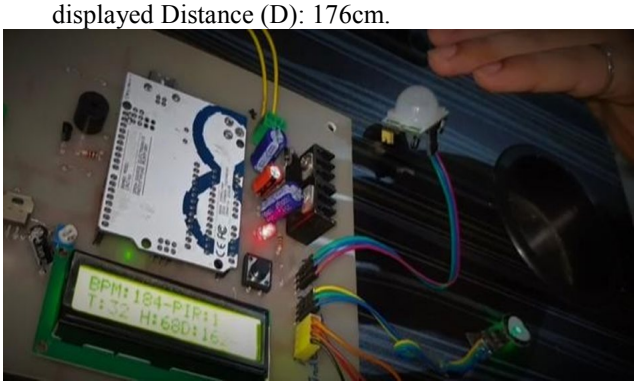


- In this Project, after every new sensor reading, data gets uploaded to the Thing Speak IoT channel
- The different sensors, Pulse rate, Ultrasonic, DHT, PIR record the various reading from the patient.
- The sensors send their readings in terms of voltage in the form of an analog or digital signal and that is received at the respective analog / digital input pin of the Arduino.
- The Arduino processes this data and displays it on the LCD Screen.
- Checking the first reading for the pulse sensor, if the pulse is below 10 or above 200, the buzzer will buzz to notify the medical staff about the changes in the pulse of the patient. The BPM value is then shown on the LCD screen.
- Next, whenever distance is below 5cm, the ultrasonic sensor will detect and the buzzer will buzz to signal that the level of urine in the urine bag has been increased and the urine bag needs to be changed.
- When the temperature is above 40deg(C), the buzzer will give the warning signal and the value of temperature is shown on the LCD screen. The humidity is also shown on LCD.
- PIR value initially shown on the LCD will be zero. As soon as motion is detected by PIR, value on LCD will change to one and the buzzer will buzz to give signal again.
- The Arduino also transmits the data with the help of a Wi-Fi module onto the Thing-Speak channel, which is an Open Source IOT Platform which helps process and interpret this data.
- The Thing-Speak channel shows the graph data for all the sensors along with the date and time of uploading every time it gets updated.

RESULTS

~ In the Output shown above, the top line of LCD displays the heart rate as 191 BPM, PIR sensor reading which is shown as 0 since there was no movement detected by the sensor.

~ In the second line of LCD, we can observe the Temperature and Humidity value shown as 0 and then next to it is the output of Ultrasonic sensor which is displayed Distance (D): 176cm.



~ Now in this Output we can see on top line of LCD the heart rate is displayed to be 184BPM and next to it is the PIR sensor value which is now displayed as 1 because it has detected some motion around it (as you can see, I waved my hand above it).

~ The line below it shows us the Temperature value T: 32°C and Humidity value H: 68 which is actually the sensors sensing the room temperature and humidity next to it is the value of Ultrasonic sensor D: 162cms

CONCLUSION

By using this system, the vitals of a patient can be monitored, at any time and from anywhere. This IOT based patient monitoring system could be installed in ICU rooms for constant measurement of the vitals of the patient.

We have achieved success in this project, the results have been tested and verified multiple times for various data sets. We have been successfully able to get data from all the sensors and pass it on to the Thing Speak channel via IoT.

By using this system, the workload in hospitals could be reduced and doctors/sisters do not have to conduct regular

check-ups of the patient. A number of patients can be monitored simultaneously. This project is specially designed for Coma patients but can be used to monitor other patients as well.

Therefore, our main goal of creating a portable, efficient, cost-effective, compact and precise product for "Health Monitoring System for Comatose and ICU Patients" has been achieved along with a wide range of applications.

ACKNOWLEDGMENT

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Smart Farming using Internet of Things and Cloud Computing

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Abstract— In order to better the safety, efficiency and management of today's agricultural scenario, problems such as its quality, safety of the products and the environmental impact from these activities requires significant research. Based on the current developments in the field of information technology, an integrated framework system that incorporated the Internet of Things (IoT), image processing, cloud computing, and other necessary technologies is implemented, and a proposal for its application in the next generation of agriculture has been presented in this project. The methodology offered includes inexpensive and low energy requirement equipment, along with modern information technology services being used to produce a system framework capable of meeting demands for current agricultural needs. In addition to this, the innovation which has been derived by combining different technologies plays an important role in reducing the overall cost of the system and ensuring its reliability as well as security.

Keywords— ESP8266; ESP32; agriculture; aeroponics; farming; IoT; DHT11;

I. INTRODUCTION

The current technological era of promoting and implementing information technology is the basis for the economic and industrial foundation in India. Agricultural information technology refers to the application of computer science and modern electronics technology in the process of agricultural production management. The implementation of information technology in the field of agriculture has a lot of benefits. It can effectively resolve problems such as low management efficiency and high product pollution. It can even improve the agricultural workers financial gain. Thus, improving the development of agricultural infrastructure helps to narrow the gap between the rural and urban regions. With the development of information technology and the continuous research in the field of sensor technology, Internet of Things technology is emerging fast. IoT as an extension of the Internet is able to connect things in the physical world to the Internet through information sensing devices. It can be expected that in the future, cross-industrial integration of IoT will increase and the applications of the IoT will become more prevalent in human lives. According to the forecasted figures, in 2050, the world population is expected to touch 9.8 billion, an increase of approximately 25% from the current figure [1]. Almost the entire mentioned rise of population is forecasted to occur among the developing countries [2]. On the other side, the trend of urbanization is forecasted to continue at an accelerated pace, with about 70% of the world's population predicted to be urban until 2050 (currently 49%) [3]. Furthermore, income levels will be multiples of what they are now, which will drive the food demand further, especially in developing countries. As a result, these nations will be more careful about their diet and food quality; hence, consumer preferences can move from wheat and grains to legumes and, later, to meat. In order to feed this larger, more urban, and richer population, food production should double by 2050 Agriculture which is considered as one of the prime occupations of human beings has 64% of the total available land occupied by agriculture out of which it consumes 85% of available fresh water [4]. The land requirement of traditional farming is also tremendous.

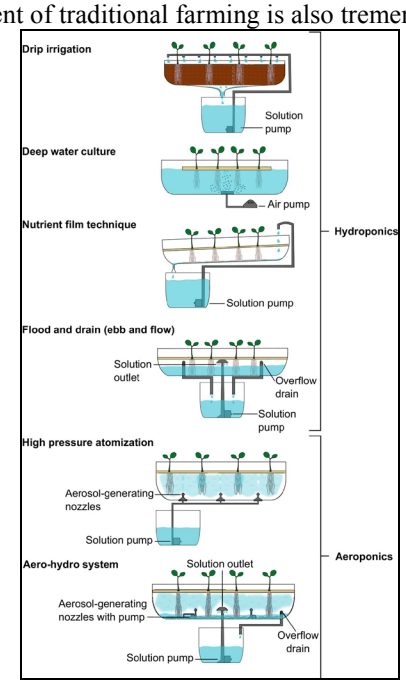

Fig. 1: Difference between hydroponics and aeroponics [5]

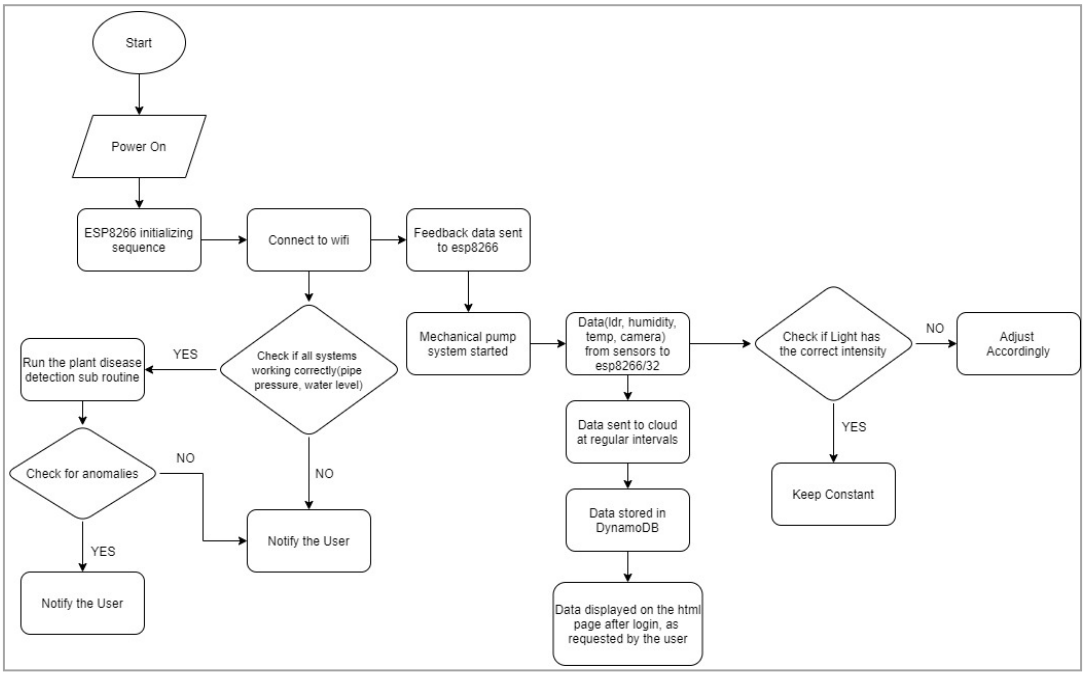

Fig. 2: Flowchart of the system

Traditional farming requires a large amount of direct human monitoring as well. For this project, an environmentally friendly production mode for agriculture is designed by integrating IoT and surrounding technologies, such as dig data and cloud computing. The project aims to solve problems relating to water and land requirements of agriculture, while making a system which can run with minimal human intervention.

The project is based on aeroponic systems. In aeroponics, there is no growing medium and hence, a container is not required for the crops. In this method, mist or nutrient solutions are used instead of water as compared to hydroponics, where plants are grown in water using nutrient solutions without soil. The aeroponic system is more efficient than hydroponics as it saves more water and helps the roots to grow further. Moreover, in aeroponic systems, there is more oxygen available for the roots to absorb. As there is not a requirement of soil, the plant roots and be sprayed with mineral solution, and hence, it requires very less space, very less water and no soil [6]. The smart farming system replaces use of water in traditional farming with mist in order to reduce the water requirement by about 90%. The framework system indicates implementation of basic functions for agricultural monitoring and control.

II. METHODOLOGY

When the system starts, initialization sequences of the ESP8266 and ESP32-CAM begins. Both the devices get connected to the Wi-Fi and the local variables for them get initialized. After the ESP8266 is ready for processing, it starts the watering operation. This consists of sending signals to the relays at regularly defined intervals. The relays control the pumps, i.e., each time the relay gets triggered, the pump gets activated and mist is sprayed out of the sprinklers. In case there is any fault in the starting sequence of the system, there is a system check which is placed after the Wi-Fi connection stage. If all components are working as expected, the system will move ahead with its regular process, if not, it is halted and the user is notified through the web app.

Fig. 3: System design

Once the initialization sequence is complete, the sensors start sending data to the ESP8266. The OV2640 starts capturing images at regular intervals. These images are stored locally in the ESP32-CAM modules internal memory. The data from the sensors is sent to a DynamoDB table for storage. Similarly, the images are sent to a S3 bucket. A static HTML page is hosted with the help of AWS Amplify. The web app is used to display relevant information to the user. The webpage through a combination of processes updates the displayed values on a timely basis. On the hardware level, parameters like the light intensity and spraying interval are controlled.

The requirements of various crops are stored in the form of datasets. These datasets hold information about the temperature, humidity, light intensity level and required spraying interval. The data values of the plant which is in the system are passed on to the ESP8266. The microcontroller keeps monitoring the values coming from the sensors. If there is a discrepancy between the sensor values and required values, the ESP8266 takes steps to shift the readings to match the ideal values.

III. HARDWARE REQUIREMENT

The hardware components used in this project are given below along with their descriptions:

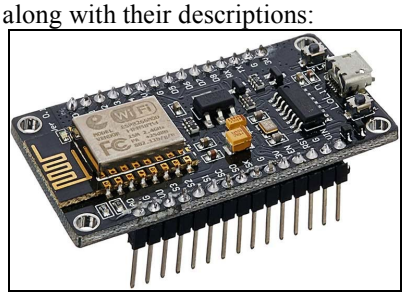

Fig. 4: NodeMCU devkit [7]

A. ESP8266

The ESP8266 is a low-priced Wi-Fi microcontroller, with a full TCP/IP stack and microcontroller capabilities. The ESP8266 has a System on a Chip (SoC). It consists of a Tensilica L106 32-bit small controller unit (MCU) and a Wi-Fi transceiver. It has eleven GPIO pins (General Purpose Input/Output pins), along with an analog input pin. For this project, we are using the NodeMCU dev kit which is built on the ESP8266 processor. The microcontroller can be powered by a regular USB port. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency and has an operating frequency of 3.3V. NodeMCU has 128 KB RAM and 4MB of Flash memory to store data and programs. [6]

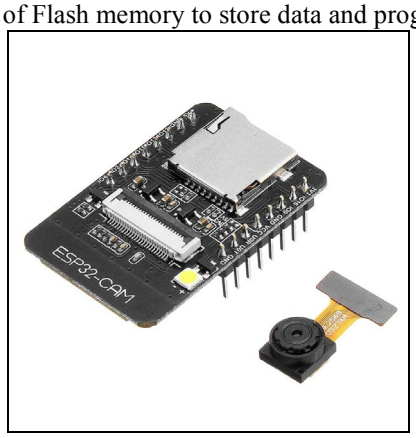

Fig. 5: ESP32- CAM module [8]

B. ESP32-CAM

The ESP32 - CAM module is a cheap and versatile microcontroller which is built upon the ESP32-S chip. It has an inbuilt port which is used to connect the OV2640 camera module. Besides this, it has 10 GPIO pins. This system can operate on 3.3V as well as 5V. It has a low power 32-bit CPU which can also serve the application processor. There is 520 KB RAM and 4MB of flash memory to store data and program. It has a SD memory card slot which can be used to store images. The architecture allows the images directly to be uploaded online through the use of the built Wi-Fi module.

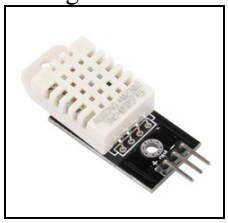

Fig. 6: DHT11 sensor [9]

C. DHT11

The DHT11 is an inexpensive digital humidity and temperature sensor. It is a capacitive humidity sensing digital temperature and humidity module that contains the compound that has been calibrated digitally to signal output of the temperature and humidity sensors. The sensor includes a capacitive sensor, wet components and high-precision temperature measurement devices, and connected with a high-performance 8-bit microcontroller. The product has excellent quality, fast response, strong anti-jamming capability, and high cost. It is definitely long-lasting and has great endurance. [10]

TABLE 1

Model	DHT11
Power Supply	3.3-5.5VDC
Output Signal	Digital signal via 1-wire bus
Humidity Operating range	Humidity 20-90% RH
Humidity accuracy	Humidity ± 1%
Temperature Operating range	0° to 50°C
Temperature Accuracy	±1°

DHT11 SENSOR SPECIFICATIONS [11]

D. DC PUMP

For this project, we are using a 60W 12V DC pump which operates at 3.5A. At max capacity, it can output 5L of fluid per minute. It builds a pressure of approximately 125 psi which is ideal for the formation of mist when the water passes through the sprinklers. The pump is highly energy efficient and has a long-lasting durability. The DC pump is connected to the relay system.

Fig. 7: DC water pump [12]

E. LED Strip

For this system, we are using a 5V 1A waterproof LED strip. The LED strip operates in the white spectrum light band which is helpful for plant growth and helps plant bloom and germinate. The light intensity of this strip can be varied in accordance to the surrounding light. The LEDs have a long operating life and are power efficient.

Fig. 8: White LED strip

F. Relay

A single channel relay module has been used in the system. The relay coil within the module can be activated at a voltage potential of 3.3V-6V. This module can switch a load of 10A at 250VAC as well as 10A at 30VDC. This relay is used for triggering the DC pump.

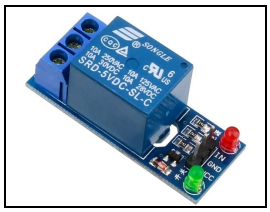

Fig. 9: Single channel relay module [13]

G. Fan

A fan working on 3.3V to 12V is placed in the system. The speed of the fan can be regulated according to the required conditions. It is connected to the pin of the Esp8266 and is mainly used to circulate the air flow inside the system.

Fig.10: DC axial fan

H. Sprinklers

The system uses 4mm sprinklers for spraying water in the form of mist. The sprinklers are connected in series below the plants and are connected to the DC pump through a pipe system. The amount of water coming out of the sprinklers is regulated according to the plant growing by changing the spraying time interval in the ESP8266.

Fig. 11: Mist sprinkler

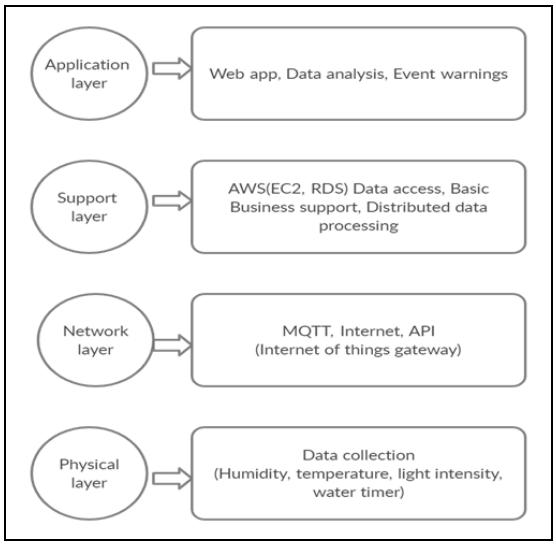

Fig. 12 System architecture design

IV. SOFTWARE DEVELOPMENT

A. STORAGE OF DATA

After the data values are perceived, the values are stored into a NoSQL database, i.e., DynamoDB in AWS. The DynamoDB table consists of columns of data points, i.e., Temperature, Humidity, Light Intensity along with the MAC id of the device it is being broadcasted from and a timestamp. An SQL command is written in IOT core to pick up the data from the MQTT channel and posting it in the DynamoDB table. This data helps us make decisions based on the various trigger conditions. Since we are using a cloud service, it provides a real time data query interface. Another storage component that is used along with DynamoDB is the AWS S3 bucket. The images from the ESP32-CAM module are stored in this S3 bucket. They are used for monitoring the health of the plants, as well as providing the user a real time view of them.

B. DATA ANALYSIS

To make the system more self-sufficient, we are using a data analysis tool. The system is trained on many datasets which contain data points on the various requirements of different crops. They contain information on the preferred temperature, humidity, lighting as well as spray time. The dataset even contains information on the growth stages of individual plants. This enables us to predict the harvest time of a plant. It is also helpful for recommending users the appropriate crops based on their surroundings. The data points are also used for the feedback system.

C. PLANT DISEASE DETECTION

For the detection of disease in the plant, we are using the Amazon Rekognition platform from AWS. This service provides an easy and powerful image recognition service. The system has been trained on datasets of both healthy and diseased plants. The Rekognition API gets called every time a new image enters the S3 bucket. The image is processed and checked for any disease. The results are passed onto the web app for displaying to the user.

D. FEEDBACK SYSTEM

In the IoT system, reverse control of equipment is a more complex process. To ensure the stability and security of control, while the equipment is in the LAN, the cloud cannot directly connect to the internal and external equipment through the Internet. The system uses MQTT (Message Queuing Telemetry Transport) protocol, sends control instructions to the equipment control gateway through encrypted data transmission mode, and varies the instructions after the equipment gateway receives them and controls terminal equipment. The performance of the system needs to be open, highly concurrent, and secure. Therefore, the supporting features of the system should include mass storage, scalability and high Timeliness. Currently, the feedback system controls the light intensity inside the system as well as the spraying interval timings. The amount of light that is required for optimum growth varies by the stage of growth that the plant is in along with the time of the day. The system smartly manages this and provides adequate lighting to the plant. This system can be

easily scaled up to control variables such as temperature and humidity which might prove useful to grow certain types of crops.

E. MAKING INTERACTIVE WEB PAGES AND CALLING THE API FOR IMAGES AND SENSOR DATA

The system consists of a front- end and back-end environment. For the front- end of the system, we have used HTML5 and CSS. Further, the user page has been made extremely user-friendly by adding various styles and designs using Bootstrap4. The script tag in html is used for writing JavaScript, through which we fetch the API of the lambda function. After fetching the API, we call the data values and format it according to our needs and display it on the web page. The deployment of this page is done on AWS Amplify.

F. ADDING USER AUTHENTICATION TO THE WEB PAGE

The delayed web page should not be publicly accessible; therefore, user authentication has been added to it from the access control panel on AWS Amplify.

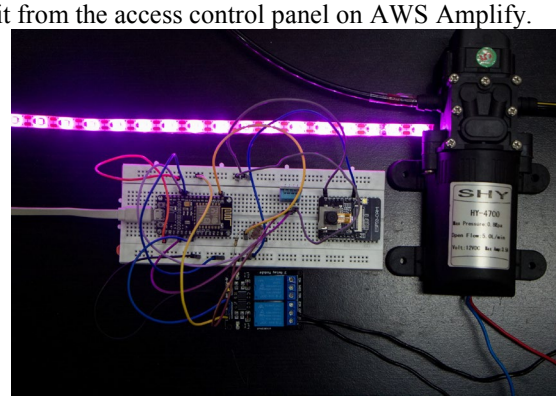

Fig. 13: Complete system circuit

V. IMPLEMENTATION

1) The ESP8266 takes the data from the DHT11 and LDR sensor. The data is temporarily stored on the ESP8266. A connection to the wireless internet is made to the microcontroller. After this the ESP8266 posts the data to the MQTT channel. Using the IOT Core platform of AWS, the data is picked up from the MQTT channel and stored in DynamoDB.

2) Using the ESP32 - CAM module a picture is taken from the top angle. This picture is temporarily stored in the internal memory of the microcontroller. A connection is made to the internet using Wi-Fi. The module invokes an API with the image coded in the URL. This code is passed to a lambda function which decodes the image and makes a jpg file post which it saves in an AWS S3 bucket.

3) The webpage which is hosted using the AWS Amplify service invokes an API which calls a lambda function. This lambda function is written in python. It is connected to the database. The function , where they are displayed. The webpage has a download button which can be used to download the latest picture from the ESP32retrieves the data values of the sensor from the DynamoDB table when called. The values are returned to the webpage by the lambda function-CAM. The button is linked to the path of the latest image in the S3 bucket.

4) A lambda function is invoked every 4 hours which sends the expected values of light intensity and spray time to the ESP8266. The ESP8266 uses these values to make changes, if required, in the timing intervals of the water spraying or the intensity of light with regards to the surrounding light.

5) The image from the ESP32-CAM module is passed through the Amazon Rekognition platform from AWS, which is a service which provides image processing capabilities. The image is compared with other images present in the dataset to check for any plant disease. If any disease is detected, the user is notified through the UI of the web app.

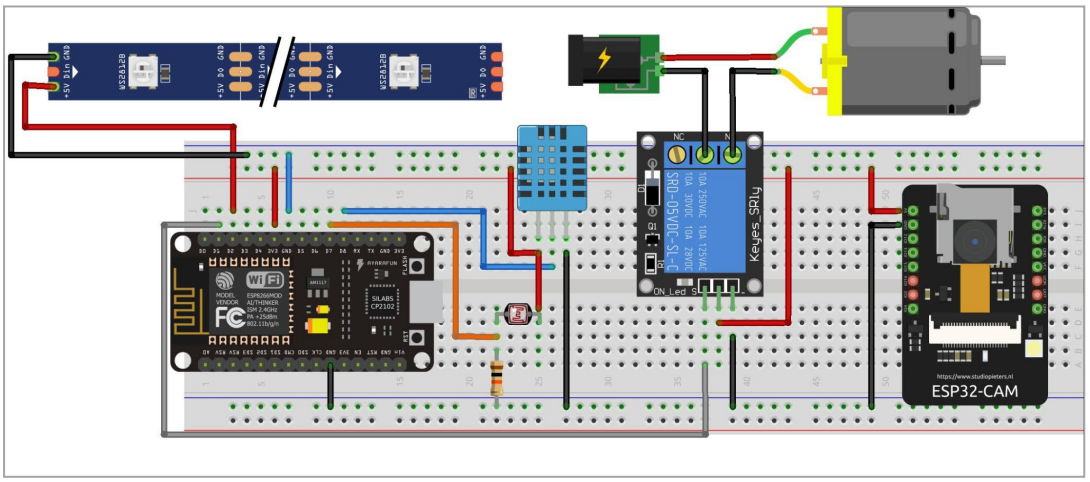

Fig. 14: Circuit diagram for system

VI. RESULTS

The system has been tested on fenugreek crops and is currently being tested on spinach crops. Both these crops have similar sets of requirements. They have a temperature requirement of 18-28℃ and a relative humidity of 60-90%. On comparing the growth time of the fenugreek plant to its regular farming methods, the system has shown to reduce the growth time by 10 days and produced a healthier yield. At the time of writing, the spinach crops are on track to be harvested in 15 days. The decrease in growth time has been similar for both the crops. From the data generated by the growth trial, the system promises a reduced growth time and lower likelihood of failure of crop. In comparison to traditional methods, the system has shown a 90% reduction in the amount of water required for the harvest.

VII. FUTURE SCOPE

1. The system can be built upon to control environmental variables like temperature, humidity as well as the CO2 levels in the system.
2. More compartments can be created, each growing a different plant with different growth conditions. This way, it will be possible to grow almost any plant with optimal growth conditions.
3. As the world is taking more and more decisions based on data, more sensors can be added to the system, which can in turn result in more data points. The sensors can be leaf sensors, fruit size sensors, stem sensors, etc. The data collected from various sensors can then be used to study the plant more, and can help to create a more efficient and precise environment.
4. This data can be put into a feedback system, where machine learning models can be made for specific plants and trained according to them.
5. The system can be also converted to a vertical farm by stacking more layers over it, and eventually needing less space.

VIII. CONCLUSION

With emerging IT technologies, the agriculture industry will have to incorporate technologies such as IoT, Machine learning, Big data, etc. The project tries to validate the effect of such technologies by combining technologies such as cloud computing, big data, a non-relational database system DynamoDB and AWS S3 to store objects. In the system, we have used an open source and a low-cost hardware ESP8266 to connect to the internet with the help of a highly scalable intelligent gateway. Functions such as remote controlling of equipment, data analysis, and image capturing is realised Amazon web services is used as a cloud platform as the basic software platform for the system, in order to connect to the ESP8266 and to process the various data points. We used AWS amplify to host the website, AWS IoT core to connect to the devices, AWS lambda to call the APIs, AWS DynamoDB and S3 to store the data and AWS Athena for data analysis. According to the research, it can be suggested that the results can be scaled and applied further. As the study is experimental in nature, more research can address the limitations that this study can have on its effectiveness of large-scale adoption of IoT into agricultural production like advanced vertical farms and greenhouse farming.

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AET 027

Design & Simulation of High Slew Rate Two Stage Operational Amplifier

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Abstract—In Electronics, Slew rate is defined as the change of voltage or current, or any other electrical quantity, per unit of time. Expressed in SI units, the unit of measurement is volts/second. It helps us to identify max input frequency and amplitude suitable for the op amp such that the output is not distorted. It decides the capability of the op-amp to change the output rapidly and decides the highest frequency of operation. Slew rate plays a major role in op amp. The idea of this project is to achieve a High slew rate of two stage CMOS Operational Amplifier and simulate it using LTspice.

Keywords—Slew Rate, Operational Amplifier, LTspice, DC Analysis, AC Analysis, Transient Analysis

INTRODUCTION

Modern Telecommunication systems can transmit digital data over longer distances without any damaging loss due to noise and interference. The basic component of any digital communication system involves transmission of voice, radio signal, television signals etc. Digital transmission is employed in order to achieve high reliability and because the cost of digital switching systems is much lower than the cost of analog systems. In order to use digital transmission, however, the analog signals that make up most voice, radio, and television communication must be subjected to a process of analog-to-digital conversion.

One of the major benefits of an ADC converter is high data acquisition rate even at multiplexed inputs. With the invention of a wide variety of ADC integrated circuits (IC's), data acquisition from various sensors becomes more accurate and faster. Dynamic characteristics of the high-performance ADCs are improved measurement repeatability, low power consumption, precise throughput, high linearity and excellent Signal-to-Noise Ratio (SNR). Traditionally, an operational amplifier is used in ADC to provide gain and also to level shift the Input signal to match the Input range of ADC. Higher the Speed of Operational Amplifier, Better performance is achieved in ADC.

II. OBJECTIVES

The Objective of this project was to achieve better results of Slew rate of two stage CMOS Operational Amplifiers for 180nm Technology which were available in Market and thereby also improving other parameters like Gain, Gain Bandwidth Product and Phase Margin.

III. LITERATURE SURVEY

Lower Slew rate will cause distortion at high output frequency and amplitude. If Operational Amplifiers have limited slew rate, for a periodic waveform as Input (sine, square, etc.), the output will generate a sawtooth wave. Therefore, there is a need for a high slew rate Amplifier. We have done a Market survey of available High Slew rate Op-Amps and below is a tabular comparison between a few parameters of the mentioned IC's.

Parameter	LM 741	NE 5532	CA 3130	OPA 2725	LT 1357
Power Supply	5 - 18	5 - 12	16	3.5 - 13.2	5 - 15
Voltage gain (dB)	100	40	110	120	30 - 40
Slew Rate (V/μS)	0.5	9	10	30	600
GBW (MHz)	1	10	4	20	25
CMRR (dB)	90	100	90	94	80

Market survey of available High Slew rate Op-Amps

The commonly used IC 741 has the lowest slew rate and LT 1357 has the highest slew rate but significant drop in voltage gain. We are going to design an Op-Amp with a High slew rate and comparatively High gain. We are using a two-stage Op-Amp because it requires less MOSFET and therefore Less chip area as compared to 3 stage Operational Amplifier. There are many Topologies like Differential Stage, Folded Cascode, and Telescopic Operational Amplifier etc. In the project design, we have used two stages, the Differential Stage. The following table shows comparison between them:

Parameter	Two-Stage	Telescopic	Folded Cascode
Power Supply	1.2V	1.2V	1.2V
Gain	85.93dB	29.67dB	49.3dB
Output Swing	1.1V	0.7V	0.7V
Power Consumption	109.07uW	16.25uW	212.57uW
Slew Rate	44.29V/us	35.30V/us	2.71V/us
CMRR	61dB	56.78dB	52.71dB
Unity Gain Bandwidth	55MHz	394.6KHz	58MHz
Area	10umx39um	8umx14.5um	13umx32.5um

Different Topologies of Operational Amplifier

From the above table, the Differential two-stage Op-Amp appears a good candidate for use in ADC as compared with the other topologies because it provides high gain, a high output swing, a high slew rate and a better CMRR. For the second stage, we are using CS Amplifier as it provides High gain and High Input impedance.

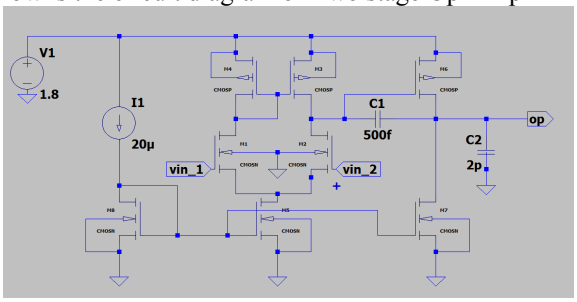
IV. METHODOLOGY

We have designed an Op-Amp considering the following Design Parameters.

Design Parameter	Value
Vdd	1.8V
ICMR	0.9 to 1.6V
Gain	60dB
Slew Rate	20V/us
Phase Margin	>45
Gain Bandwidth Product	30 MHz
Kn' and Kp'	250µA/V^2 & 60µA/V^2
Vtn and Vtp	0.5 V and -0.5V

Design Parameters

Below is the circuit diagram of Two stage Op-Amp



Circuit Diagram

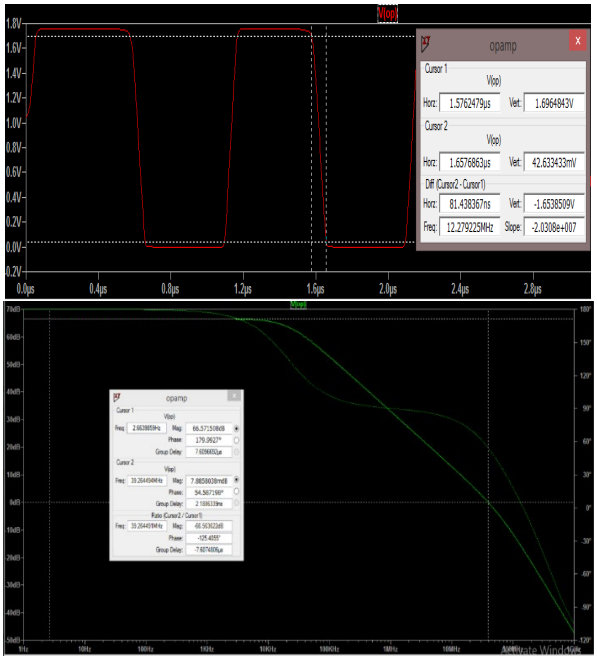
For the design of the above circuit, we find out the W/L ratio of each MOSFET using Design equations

MOSFET	Value of W/L
M1	6
M2	6
M3	8
M4	8
M5	10
M6	131
M7	82
M8	10

W/L values of MOSFET

After Substituting the value of W/L of each MOSFET in LTspice we performed DC Analysis to find out Dc operating point, AC Analysis to find out Gain, Gain Bandwidth Product and Phase Margin and Transient Analysis to find out Slew rate of Op-Amp.

V. Results



AC and Transient Analysis

VI. CONCLUSION

1. Increasing the Current driving capabilities at the output, slew rate of amplifier increases.
2. We have Successfully designed our circuit for the slew rate of 20.4V/µS
3. This design Successfully satisfies the following planned factor i.e., Phase Margin, Gain Bandwidth Product, Gain having values >45, 30 MHz, 60 dB respectively. And by Simulation we obtained value for Phase Margin, Gain Bandwidth Product and Gain as 54.59, 39.26 MHz, 66.571 dB respectively.

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AET 028

PLC Based Automatic Vehicle Washing System

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Abstract- In today's era of automation everyone seeks for instant and effective solutions. Automatic vehicle washing system is very common in developed countries. It consists of large machines with automated brushes controlled by program logical controllers. We all know that manual way of car washing requires a lot of water, time as well as manpower. It is necessary to have an effective system to sustain the vehicle cleanliness. Vehicle washing system has three main processes namely washing, cleansing and drying. Automatic vehicle washing system is fully automated with Different stages of foaming, washing and drying. Various industrial level sensors, relays and motors are used for efficient working of system. Sensors are placed at gate for vehicle detection and once sensor will detect the vehicle gate will open. In normal washing system which are being used today has same type of cleaning and procedure for each vehicle whether its dirty or clean. In our system according to size of car water is used for cleaning. Also in order to provide minimum water usage we are using water recycling mechanism. We are using PLC as a main controller as it is use to perform repeated processes with high reliability and it is suitable for various industrial hazardous conditions such as electromagnetic interference, high temperature, power fluctuation etc.
This paper presents PLC based automatic vehicle washing system. It uses Programmable logic controller, ED18-D80 photoelectric sensor, M-18 photoelectric sensor, 100 RPM motor, submersible motors, Relay, SMPS.

Keywords: PLC, Foaming, Cleaning, ED18-D80, Photoelectric sensor, washing, WPL soft.

I. INTRODUCTION

In an environment of rapidly expanding and changing control systems, a solution geared towards an automation of application is a necessity. It helps us work efficiently. Vehicle washing procedure is one of the mandatory procedure in maintenance of a vehicle. Under various circumstances car washing procedure is used in various businesses. At present two modes of car washings are available. One of them is manual washing by a person in which Various washing stations are available where that person will wash the vehicles manually with pipe, water, soap and foam cleaning vehicles with their hands. This process takes time as well as manpower. And second one is Automated washing. In India This type of system is currently only available in high-tech car body building industry and car service centres.

When vehicle has travelled a long distance the cleaning process is hectic and also on day to day basis we tend ignore the fact of cleaning because its time consuming. In developed countries automatic vehicle washing systems are being used broadly. But in India it is neither economical nor fully automated. As we are living in fast paced environment it is upmost necessity to use efficient and effective solutions.

A good car wash makes use of many different pieces of equipment and stages of chemical application to thoroughly clean the vehicle. In all automobile Industries manual car washing need more labor to carry out work which effects in time consumption and also the results may or may not be satisfactory to the customer that depends. There are different methods of cleaning vehicle. But in a lot of cases same steps and procedure is being followed for every vehicle resulting in wastage of water. To avoid this problem we are going detect the size and length of vehicle and according to that water usage can be controlled. Also we have made an attempt of water recycling by reusing the water in suitable conditions. So as to overcome these issues, car washing can be done automatically using Programmable Logic Controller (PLC). PLC is a specialized computer used for the control and operation of manufacturing process and machinery. It uses a programmable memory to store instructions and execute functions including on/off control, timing, counting, sequencing, arithmetic, and data handling.

II. LITERATURE SURVEY

The first automatic car washes appeared in the late 1930s. Automatic car washes consist of tunnel-like buildings into which customers (or attendants) drive. Some car washes have their customers pay through a computerized POS (point of sale unit), also known as an "automatic cashier". The mechanism inputs the wash PLU

(Price look-up codes) into a master computer or a tunnel controller automatically. The sale is automated, after paying the car is put into a line-up often called the stack or queue. The stack moves sequentially, so the wash knows what each car purchased. After pulling up to the tunnel entrance, an attendant usually guides the customer onto the track or conveyor. At some washes, both tires will pass over a tire sensor, and the system will send several rollers. The tire sensor lets the wash know where the wheels are and how far apart they are. On other systems the employee may guide the customer on and hit a 'Send Car' button on the tunnel controller, to manually send the rollers which push the car through.[1]

There are basically two styles of automated washes: roll-over and conveyor washes. With the roll-over style, you drive into a bay and remain stationary while the wash equipment moves past your vehicle. These washes are common at gas stations and are usually self-serve. The other style, the one most drivers are familiar with, is a long tunnel where your car is moved along on a conveyor past a series of synchronized machines.

There are also two different methods of cleaning a car in an automatic car wash. When you think of a car wash, you might envision spinning soapy hula skirts and dangling tentacles brushing past you. That method of cleaning relies on soft materials to gently wipe away dirt and grime from your car. This soft-cloth car wash is extremely popular and effective. Old-school “brushes” found in car washes of the past have been replaced by softer materials, making the process far less aggressive and abrasive than it once was. The other method employed in some car washes is the “touchless” wash that relies on high-pressure water jets and strong detergents to blast the dirt off of the car. This method avoids physical contact with the vehicle, but may leave some areas unclean because it does not wipe any surfaces. And the chemicals can be a bit harsh.[2]

The first step in the wash cycle is the pre-soak. You travel through a metal arch fitted with several small nozzles that spray a cleaning solution on your car to pre-wet the surface and begin loosening up the dirt.

Car then travels through a series of long strips of soft cloth hanging from a metal frame moving back and forth. This is the mitter curtain and it is designed to gently wipe away contaminants from the horizontal surfaces of your car: the hood, roof, and deck lid (trunk lid).

Next, vehicle pass through the foam applicator. This is where a chemical cleaner is sprayed on your car through a series of nozzles. Two to four scrubbers are used to clean the sides of your car once the pre-soak has loosened up the dirt. Once the mitter curtain and scrubbers have wiped away the loose dirt, high-pressure nozzles - rotating water jets - rinse your car off with as much as 1000 pounds per square inch of pressure. In order to accommodate the hundreds of gallons necessary for this process, a high-pressure tank stores water. The water is usually recaptured and recycled back to the tank after use.

Finally, once your car has been pre-soaked, scrubbed, washed and final rinsed - it travels through the dryer. The giant nozzles of the dryer force warm air across the surface of the vehicle to remove most of the water. [3]

III. BLOCK DIAGRAM

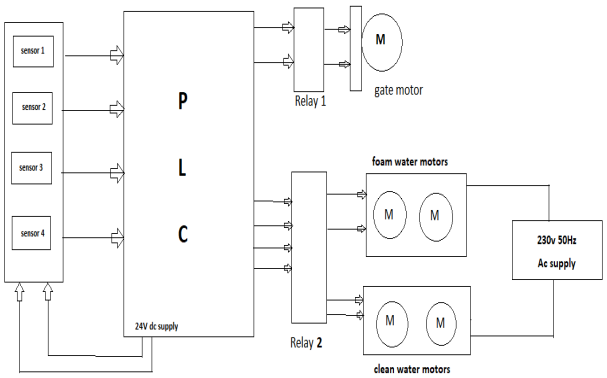


Fig 1. Proposed system

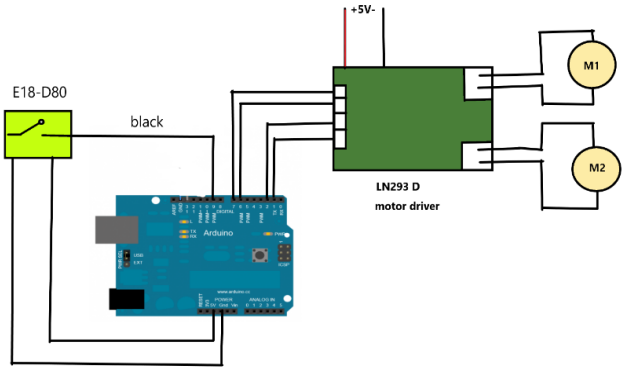


Fig 2. Final Soaking system

Working Principle:

Project working is divided in three sections

1. Vehicle detection at entrance gate:
   In this two photoelectric sensors are mounted on opposite ends of path. To avoid opening of gate in unnecessary conditions. Gate will be open only when two sensors output goes high. Output of sensors are given to AND gate logic.
   When both sensors are high then plc will turn on relay to open gate motor. After delay of 10 plc will turn on relay to close the gate motor
2. Vehicle washing chamber:
   In this chamber also two industry graded photoelectric M18 sensors are mounted to save water. We have total 6 sprinkler pipes. When front sensor detects car. Plc will turn on front motors of 40W which will drive 4 sprinkler pipes. First motor will sprinkle foam water onto car via 2 sprinklers for 10 seconds. After 10 seconds second motor will sprinkle clean water for 10 seconds.
   Similarly when back sensor detect the car
   Plc will turn on two motors of 18W each which will drive 2 sprinkler pipes. Third motor will sprinkle foam water for 10 seconds then fourth motor will sprinkle clean water for 10 seconds
3. Vehicle moisture soaking chamber:
   In this we have used Arduino uno. E18D80 sensor is used to detect car. When car is detected Arduino will drive two motors through driver LN 293D . Soaking brushes are connected to these motors which will rotate with motor to soak moisture on car surface.

IV. HARDWARE IMPLEMENTATION

Delta digital PLC

A Programmable Logic Controller, or PLC, is a ruggedized computer used for industrial automation. These controllers can automate a specific process, machine function, or even an entire production line.
The PLC receives information from connected sensors or input devices, processes the data, and triggers outputs based on pre-programmed parameters. Depending on the inputs and outputs, a PLC can monitor and record run-time data such as machine productivity or operating temperature, automatically start and stop processes, generate alarms if a machine malfunctions, and more. Programmable Logic Controllers are a flexible and robust control solution, adaptable to almost any application.

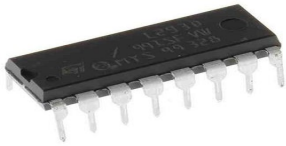
E18-D80NK Infrared Sensor

E18-D80NK is a IR proximity Sensor with an adjustable range of 3 cm to 80 cm. The E18-D80 IR Proximity sensor has very less interference by visible light and can even work quite well even in sunlight. E18-D80 consists of IR Transmitter and IR receiver in one module. The IR transmitter transmits modulated IR signal which is then reflected by the obstacle and then detected by the receiver. The sensor works on modulated IR so the sensor can also work in daylight. Detection range of E18 Proximity Sensor is approximately 3 cm to 80 cm. This detection range is adjustable using a multi-turn screw which is located at the back of the E18 sensor. You can increase the sensing range by rotating the screw clockwise and sensing range decreases by rotating the screw counter clockwise. Since the E18 sensor uses a multi-turn potentiometer you will have to rotate quite a few times to vary sensing distance. To cover the compete range from 3 cm to 80 cm you may have to rotate the screw atleast 10-12 complete turns.

100 RPM Motor

This 12 Volt DC Motor – 100 RPM can be used in all-terrain robots and a variety of robotic applications. These motors have a 3 mm threaded drill hole in the middle of the shaft thus making it simple to connect it to the wheels or any other mechanical assembly.Nut and threads on the shaft to easily connect and internally threaded shaft for easily connecting it to the wheel. DC Geared motors with robust metal gearbox for heavy-duty applications, available in the wide RPM range and ideally suited for robotics and industrial applications.

LN293D Motor Driver



The L293D is a 16-Pin Motor Driver IC. As the name suggests it is mainly used to drive motors. A single L293D IC is capable of running two DC motors at the same time; also the direction of these two motors can be controlled independently. The L293D is a 16 pin IC, with eight pins, on each side, dedicated to the controlling of a motor. There are 2 INPUT pins, 2 OUTPUT pins and 1 ENABLE pin for each motor. L293D consist of two H-bridge. H-bridge is the simplest circuit for controlling a low current rated motor.

Volt Relay Driver:

are components that permit a low-power circuit to control signals or to switch high current ON and OFF which should be electrically isolated from controlling circuit. A Relay driver IC is an electro-magnetic switch that will be used whenever we want to use a low voltage circuit to switch a light bulb ON and OFF which is connected to 220V mains supply.

SMPS

A switched-mode power supply (SMPS) is an electronic circuit that converts power using switching devices that are turned on and off at high frequencies, and storage components such as inductors or capacitors to supply power when the switching device is in its non-conduction state. Switching power supplies have high efficiency and are widely used in a variety of electronic equipment, including computers and other sensitive equipment requiring stable and efficient power supply.

5V DC Motor with Rack And Pinion

Racks and pinions are power-transmission components primarily used for converting rotary to linear motion and

vice versa. In gear parlance, a pinion is the smallest of two meshing gears and provides the input in a typical gear reduction. The larger one is simply the gear. A rack can be thought of as a segment of a gear with an infinite radius. Probably the most common application of a rack-and-pinion is in automotive steering where rotary input from the steering wheel is converted to linear motion to pivot the wheels. They are used elsewhere in industrial settings.

Arduino Uno

Arduino Uno is a microcontroller board based on 8-bit ATmega328P microcontroller. Along with Atmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller. Arduino Uno has 14 digital input/output pins (out of which 6 can be used as PWM outputs), 6 analog input pins, a USB connection, A Power barrel jack, an ICSP header and a reset button.

Water Lifting Submersible Pump(40 Watt and 18 Watt)

Submersible Pump is a highly efficient tool for various machines that require a pump to function. This pump has an 40W motor that can lift water up to 2.65m and it is made of rust proof durable quality material. The motor submerges completely into the water as it is water resistant. The product output of 3800 L per hour. The pump weighs 400 gms and is highly portable.

M18 Photoelectric Sensor

M18 proximity sensor style photoelectric sensors are a perfect choice for general purpose counting, sorting, and object detection. These are available in diffuse, retroreflective and thru-beam types. Available in NPN, PNP or AC type photoelectric models.

V. ACKNOWLEGEMENT

It is with a great deal of gusto an enchanting learning spirit that we present before you, this project report before we get into the thick of things on this joyful occasion, we present our whole hearted compliments with high regards and profound delight, we would like to thank all the people who have been like the bone beneath the sinews of this project. It gives us immense pleasure to express our heartiest gratitude and earnest thanks to Dr. SANJAY SINGH THAKUR, Head of Electronics & Telecommunication Dept., for having provided us with all the facilities required for the successful accomplishment of this project. We would like to thank our project guide Dr. Dhananjay Patel for giving us an opportunity to undertake this project, and for supervising of all the activities and lending his cooperation despite his busy schedule in the successful development of this project.

VI.CONCLUSION

Proposed system is designed with the help of PLC. A Programmable logic controller (PLC) is simply a special purpose computing device designed for use in industrial control systems and other systems where the reliability of the system is high. Automatic car washing system is fully automated with different stages of foaming, washing, drying. Soap water is collected and reused in suitable conditions to limit water usages. Water source will be controlled as per requirement of each vehicle.

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AET 029

Floor Sanitization Box Using Uv Rays

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Abstract— Since the last year the overall growth has been laborious after the virus hit the world. The pandemic has costed us almost everything which no one wanted. World Health Organization has been raising voices that there could be another pandemic in future. In a worldwhere the virus can kill anyone, disinfecting our belongings has been the most fundamental goal of everyone, after we enter our respective houses. The floor should be sanitized or disinfected thoroughly everyday to avoid the virus as the virus does not spare anyone. The UV rays are used to sanitize the floor and this is demonstrated further in the paper.

I. INTRODUCTION

Floor Sanitization is not only useful for the current situation but also in day to day life. For Sanitization of the floor UV LEDs are required.

Using the Sanitizer all over the floor to disinfect it is too expensive, requires physical and mental work, etc. The best substitute is a machine which just needs some amount of electricity to actually sanitize everything.

In this Project we have used 40 LEDs in the system. A SR - 04 Ultrasonic Sensor is used to detect if anyone is near the system as the UV LEDs can be harmful.

Also, an IR sensor is used to detect the floor and based on that,Switch On or Off the Relay Module which will switches On the whole system.

II. OBJECTIVE

In today's world, disinfecting and sanitizing has become the mandatory thing. The virus is contagious and deadly. Disinfecting the floor will make you mentally and physically safe and will make you not to worry about cleaning or being

Afraid of the virus. It always hints you mentally about cleaning everywhere there can be a possibility of the virus. The problem can be resolved by Floor Sanitization using Ultraviolet-C Radiation. This device will help you sanitize every surface possible by just placing the device on the surface. In this paper we propose Floor Sanitization using Ultraviolet-C Radiation using Arduino, Relay Module, PIR Senor for safety and Bluetooth Module to control from your Android device.

Objectives of the Proposed system are:

1) User can monitor and set the timer of the device, as when can it start and stop.

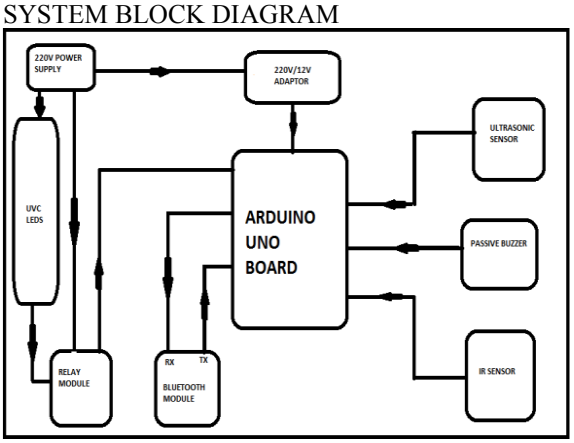
2) Surface disinfection by just placing the device on the surface.

3) The sensor to close the system if anybody is near as the rays can be harmful.

4) Coating to avoid risk of the rays.

III. PROPOSED WORK

1. SYSTEM BLOCK DIAGRAM



2 WORKING

I] Implementation of the Project

1. Firstly we setup the experimentalsetup of the system.
2. Connect the 12 V Adapter to thesystem.
3. The Bluetooth module gets switchedOn, hence pair you mobiles bluetooth and the systems bluetooth.
4. Start the Bluetooth Terminal HC -05 Application on your mobile phone.
5. Select HC - 05 and give the input 1to the Relay Module and then the Relay starts the UV LEDs.
6. If the IR Senor does not detect thefloor the system won't switch ON the UV LEDs.

7. If the IR Sensor detects the floor, itwill switch ON the UV LEDs.
8. If the SR - 04 Ultrasonic Sensor senses anyone or any surrounding around 20 centimetres of the system,it will terminate the system and you will again have to give 1 as the inputto start the system.
9. To terminate the system you need togive the input as 0.

II] Testing of Project

1. As our college labs were closed dueto Covid- 19 we didn't get a chance to check actual results and getimages of it in the college.
2. We went to the shop where we gotour components to check if it is actually sanitizing the floor.
3. After 2 Minutes 56 Seconds the floor was getting sanitized 99.99%.

3. EQUIPMENT AND MATERIAL

The equipment and material used to develop the prototype of this project consists of Arduino uno board, bluetooth model HC-05,relay module 5v, LEDs, passive buzzer, double side pcb, board, UV LEDs, 220v/12v adapter,L293D,IRsensor, ultrasonic sensor, resistor

IV. EXPERIMENTAL RESULTS

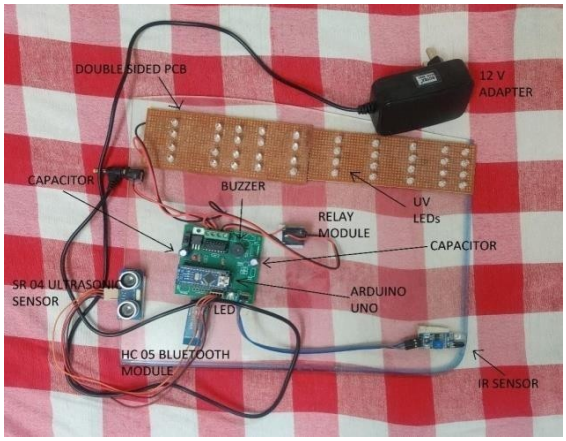


Fig 4.1 Actual Hardware implementation of device

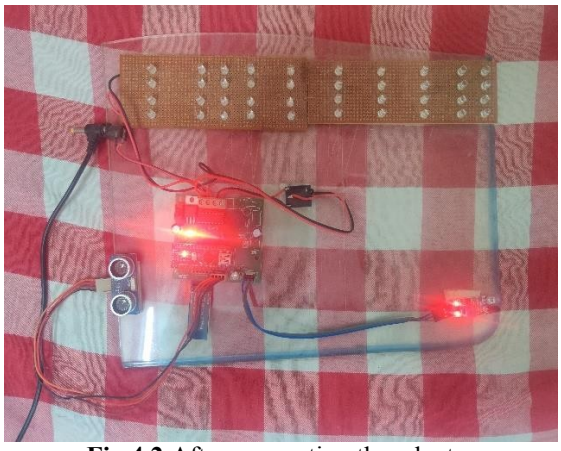


Fig 4.2 After connecting the adapter

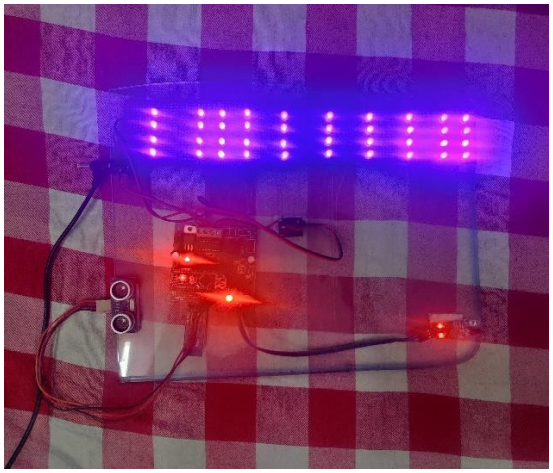


Fig 4.3 After sensing the floor, the UV LEDs switch ON

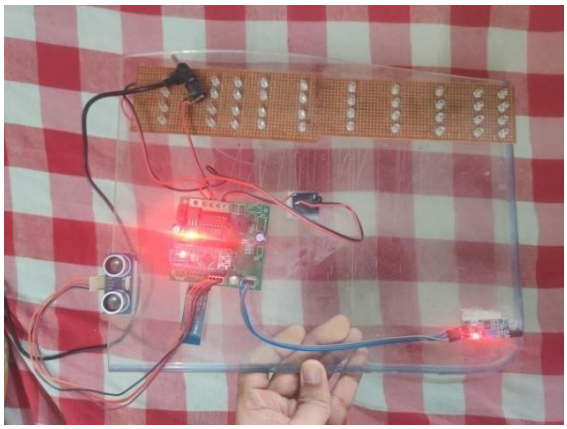


Fig 4.4 The circuit gets terminated when IR sensor doesn't sense the floor

V. FUTURE SCOPE

As we tried to make the system as cost efficient as we can but the system can be made more advanced and easy to use.

1) A robot can be placed above or below the machine to make it an automated process.
2) A remote controller can be made and the system could be placed on the wheels to control it.
3) Real Time Monitoring can be implemented using the camera and remote controlling device.
4) As we require a permission from the government to buy UV Lamps of high power as they are harmful. They can be used to make the process much faster.
5) Can be used on entrance and exit of Railway Stations, Parks, etc to sanitize everyone's belonging before they enter or leave.
6) Can be used in schools, colleges on the entrance so that it creates a sanitized bubble inside the school/college premises.
7) Also, it can be covered in a box to make it like a machine and function it faster.

VI. CONCLUSION

In this project, an advanced and cost effective approach for sanitizing the floor, surface or our belongings has been proposed. The project provides knowledge about the system for sanitizing the floor using UV LEDs.

Proposed System is more advanced, distinctive, cost efficient, accurate, etc from what we are currently doing to sanitize the floor. Also, it is reliable and is a one time investment which can save our time and physical efforts

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AET 030

PCB Printer

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Abstract—Electronics are an integral part of our daily lives. Everything from our smart phones to our cars includes electronic components. At the heart of these electronics is the printed circuit board, also known as a PCB. Most people recognize printed circuit boards when they see them. PCB Printer is a PCB making machine that fabricates a PCB automatically. A laser engraver is deployed to make tracks of the negative PCB layout on a copper clad board. Initially a layer of ink is deposited across the surface of the copper clad, the laser engraver engraves the negative PCB layout uploaded by students by evaporating the ink layer. The machine then drops the PCB in a ferric chloride solution which etches the evaporated/exposed part of the PCB. The advantage of this method is that very minute tracks can be precisely transferred onto the PCB in a short amount of time. The main focus of proposed system is to optimize management and a kind of higher autoimmunization, more credible and efficient control system. The sole purpose of this project is to educate students about the PCB fabrication process.

Keywords—PCB, Engraver, Laser and Arduino

INTRODUCTION

This PCB fabrication is the process or procedure that transforms a circuit board design into a physical structure based upon the specifications provided in the design package. PCB fabrication is not a design activity, it is an outsourced activity that is performed by a contract manufacturer (CM). Although, it is true that fabrication is not a design task, it is done in strict adherence to the specifications that you provide to your CM. In most cases, your CM is not privy to your design intent or performance objectives. Therefore, they would not be aware of whether you are making good choices for materials, layout, via locations and types, trace parameters or other board factors that set during fabrication and may impact your PCB's manufacturability, production yield rate or performance after deployment, as listed below: Manufacturability: The manufacturability of your boards depends on a number of design choices. These include ensuring that adequate clearances exist between surface elements and the board edge and the material selected has a sufficiently high coefficient of thermal expansion (CTE) to withstand PCBA, especially for no lead soldering. Either of these could result in the inability of your board being built without redesign. Furthermore, if you decide to panelize your designs then that too will require forethought. Yield rate: Your board can be successfully fabricated, while fabrication issues exist. Reliability: Depending upon your board's intended usage it is classified according to IPC-6011. For rigid PCBs, there are three classification levels that set specific parameters that your board's construction must meet to achieve a specified level of performance reliability. Having your board built to meet a lower classification than your application requires will likely result in inconsistent operation or premature board failure. [1] PCB printer is an idea that allows users to efficiently fabricate quality PCB. This idea is inspired from V-Print, V-print allows users to submit print jobs from anywhere. PCB printer uses similar concept, instead of printer paper this fabricates PCB. Imaging desired layout on copper clad laminates. Etching or removing excess copper from inner layers to reveal traces and pads. Creating the PCB layer stack up by laminating (heating and pressing) board materials at high temperatures. Drilling holes for mounting holes, through hole pins and vias. Etching or removing excess copper from the surface layer(s) to reveal traces and pads. This printing process can be done automatically by using PCB printer. It uses a 2 Arduino Mini Laser Engraver is deployed to make tracks of the negative PCB layout and motors. Also, Laser processing is a technology proved by many years of experience, which is used for many fields of industry.[5][3]

LITERATURE SURVEY

A few videos were referred to understand various PCB fabrication process the links to which are mentioned in references. To make PCB printing possible different techniques of PCB fabrication were also explored. Heat toner transfer, UV exposure method, PCB milling, CNC plotter, laser engraving to name a few explored methods. It was later discussed that laser engraving method would be most efficient, affordable and precise method of this project.

METHODOLOGY

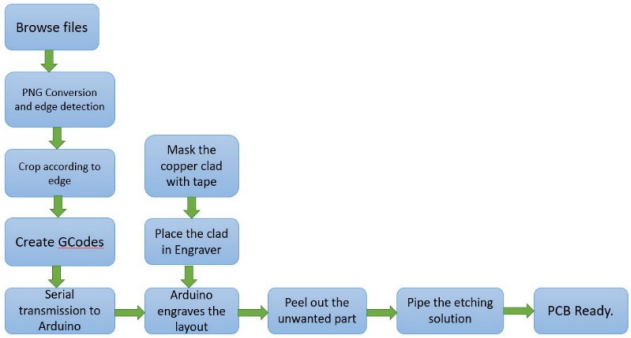
At the beginning, create the circuit design layout and then negative layout of PCB is to be uploaded in website and on the station then PCB will be placed in masking slot which covers the PCB with marker ink which will be done by the machine. Later, for the further process the PCB is placed in the laser engraving slot to burn the negative part of the layout on the PCB and once the process is completed then the PCB is taken out and placed in etching slot.

EXPERIMENTAL OUTCOME

There are two parts to the working of this project: GUI and Engraver. Black and white negative layout of their circuit in pdf format is first saved in a Flash drive.

A) GUI: a. At the printing station flash drive is to be inserted in the socket provided. A screen will display a logo of the project along with the browse button. b. Clicking on browse button will allow to browse through the computer and flash drive. c. Select the desired pdf and next button appears on the screen displaying "Generate G-code and Print". Clicking that button will convert the pdf into an image namely "output.png" using Fitz python module. Now that "output.png" will be cropped out at the edges of the layout using Open CV python module and a "newimage.png" will be created. Raster-carve converts that "newimage.png" into G-codes.

B)Engraver: a. Engraver uses an Arduino uno and a CNC shield. Arduino is loaded with a GRBL firmware, this enables Arduino to understand G-codes. b. The G-code created by the computer will be sent to the Arduino through the USB cable serially.



Work flow

A) DESIGN

The machine structure is the vital part of the machining tool. It merges all machine components into a single complete system. The machine structure is vital to the efficiency of the machine since it's directly affecting the total dynamic stiffness and also affecting the damping response. Perfectly designed structure can afford high stiffness, which leads to precise operation. Mini scaled machine tool required more precise stiffness than the regular large scale machine tool as shown in Fig. 1.

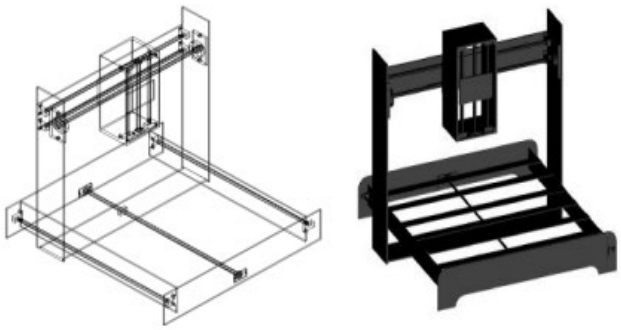


Fig. 1. Wireframe and solid model of the structure

B) COMPONENTS

1. ARDUINO UNO

Fig 2: Arduino Uno

It's a good micro-controller to start-up with something. This is the new Arduino Uno R3. In addition to all the features of the previous board, the Uno now uses an ATmega16U2 instead of the 8U2 found on the Uno (or the FTDI found on previous generations). This allows for faster transfer rates and more memory. No drivers needed for Linux or Mac (inf file for Windows is needed and included in the Arduino IDE), and the ability to have the Uno show up as a keyboard, mouse, joystick, etc.

2. A4988 stepper motor

A4988 is a complete micro stepping motor driver with built-in translator for easy operation. This product is available in full, half, 1/4, 1/8 and 1/16 step modes operate bipolar stepper motors, output drive capacity of up to 35 V and ± 2 A. A4988 includes a fixed off-time current regulator, the regulator in slow or mixed decay modes. A4988 converter is the key to the easy implementation. As long as the "step" input inputting one pulse drives the motor one micro step. A4988 interface is very suitable for complex microprocessor is unavailable or is overburdened. In the micro-step operation, A4988 chopping control inside automatically selects the current decay mode (Slow or Mixed). In mixed decay mode, the device is initially set to a fixed downtime in some fast decay, then the rest of the slow decay downtime. Mixed decay current control scheme results in reduced audible motor noise, increased step accuracy, and reduced power consumption. Internal synchronous rectification control circuitry is provided to improve the pulse-width modulation (PWM) operation power consumption. Internal circuit protection includes: thermal shutdown with hysteresis, undervoltage lockout (UVLO), and crossover-current protection. Special power sequencing. A4988 surface mount QFN package (ES), a size of 5 mm × 5 mm, nominal overall package height of 0.90 mm, with an exposed pad for enhanced thermal dissipation. This package is Pb (suffix-T), with 100% matte tin lead frame plating.

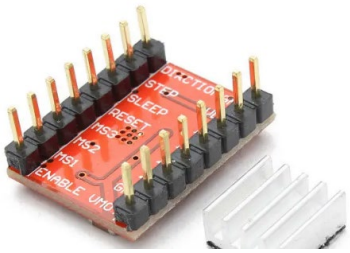


Fig 3: A4988

3. Laser 500mW

Enough power to facilitate precise focusing, high cost, DIY power engraving machine dedicated, built-efficient driving, low heat, eliminating external drive box, easier to install and use. works only with Ender and CR Series Product parameters: Wavelength: 405NM (Blue) Power: correspondence course 500mW Operating voltage: 12V (DC) Working current: 2100mA Idemitsu form: dot Lens Material: dedicated optical coated glass Cooling: Forced air Shell material: aluminum anodized black Input: 2.1 / 5.5 DC seat Package Included: Blue Violet Light Laser Engraving Laser. Operating voltage is 12V (DC), Output Power: 500MW, Current : 210 MA. It can focus, the Laser head of the laser component can be adjusted according to the distance of the working distance.

Fig 4 : 500mW Laser

Specifications for Laser
Brand Name -WOL 3D
Included Components - Laser Kit
Item Thickness - 1.75 millimeters
Item Weight - 380 grams
Outside Diameter-1.75 millimeters
Part Number - Laser Engraver Kit.

4. NEMA17 Stepper

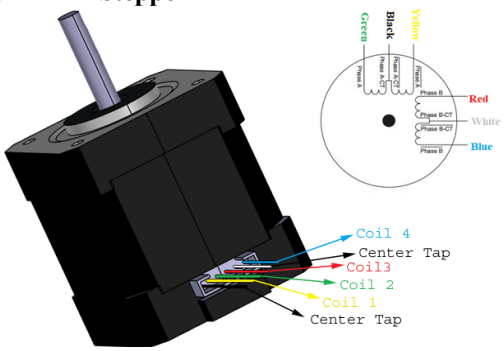


Fig 5: NEMA17

NEMA 17 is a hybrid stepping motor with a 1.8° step angle (200 steps/revolution). Each phase draws 1.2 A at 4 V, allowing for a holding torque of 3.2 kg-cm. NEMA 17 Stepper motor is generally used in Printers, CNC machines and Laser Cutters.

NEMA 17 Stepper Motor Technical Specifications

1. Rated Voltage: 12V DC
2. Current: 1.2A at 4V
3. Step Angle: 1.8 deg.
4. No. of Phases: 4
5. Motor Length: 1.54 inches
6. 4-wire, 8-inch lead
7. 200 steps per revolution, 1.8 degrees
8. Operating Temperature: -10 to 40 °C

C) CONNECTIVITY

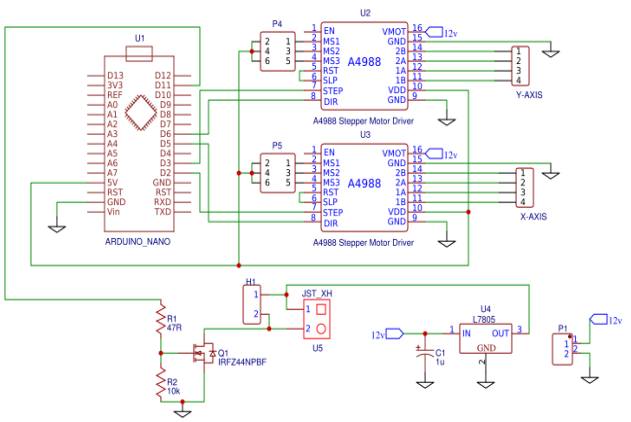


Fig 6: Circuit connection

The circuit diagram consists of components such as Arduino Nano, A4988 stepper motor drivers, L7805 IC, ports, various resisters and capacitors, laser port etc.

In Arduino Nano, out of all the digital ports D11 is connected to the pin no 2 of JST_XH IC through the resistors of 47R and 10K, IRFZ44NPBF and laser port (H1).pin no 1 of laser port is connected to the pin 1 of JST_XH IC and the output pin of L7805.input power of 12V is connected to the pin 1 of L7805 through the capacitor of 1u. 5V pin of Arduino Nano is given to the VDD of both the stepper motor drivers. STEP pin of both the stepper motor drivers are connected to the digital pins (D3 and D2) of Arduino Nano whereas direction pin is connected to the D6 AN D5. The two 2 pins, Step and Direction are the pins that we actually use for controlling the motor movements. The Direction pin controls the rotation direction of the motor .The Reset pin of A4988 is a floating pin so if we don't have intention of controlling it with in our program we need to connect it to the SLEEP pin in order to bring it high and enable the board. The next 3 pins (MS1, MS2 and MS3) have internal pull-down resistors so if we leave them disconnected, the board will operate in full step mode. The last one, the ENABLE pin is used for turning on or off the FET outputs. So a logic high will keep the outputs disabled. For powering the motor we have used the next two pins GND and VMOT and connected them to the power supply. The next four pins of both the stepper motors i.e, 2A, 2B, 1A and 1B are given to the X-AXIS and Y-AXIS of laser.

D) SOFTWARE

ARDUINO IDE: The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards.

To Program Arduino UNO we need IDE. Arduino IDE contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. For this

project we need two libraries: Software Serial and Liquid Crystal.

ARDUINO firmware code:

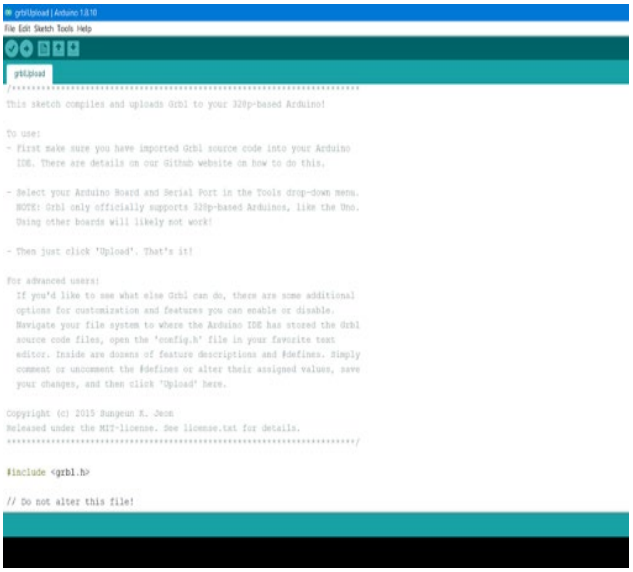


Fig 7: Arduino Code

Steps to install firmware:

1. Download grbl.zip firmware from github or follow this link: https://github.com/gnea/grbl.
2. Now go to Arduino IDE> Sketch> Include Library> Add .ZIP library.
3. Browse to the location where your grbl.zip was downloaded.
4. If it doesn't work try extracting the zip file and follow step 2 but add the extracted file instead of .zip file.
5. Go to file> examples> grbl . scroll to the bottom of the list. Upload the sketch in Arduino uno, your Arduino is now ready as a cnc controller.

E) STRUCTURE

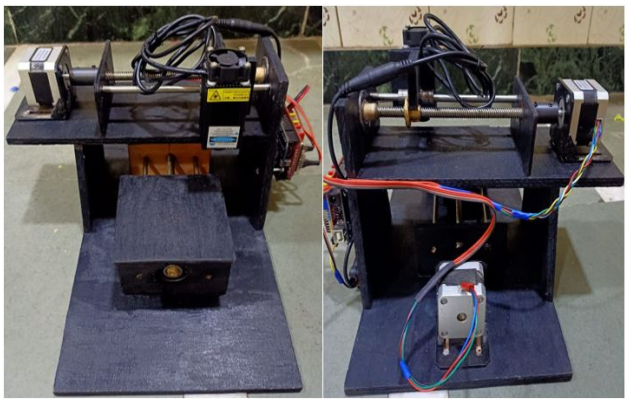


Fig 8: Final assembly of PCB Printer

The main objective of this project is to create PCB prototypes with minimum time and efforts in order to maximize and encourage production of electronic products, and for educational purposes in engineering institutes.

RESULTS AND ANALYSIS

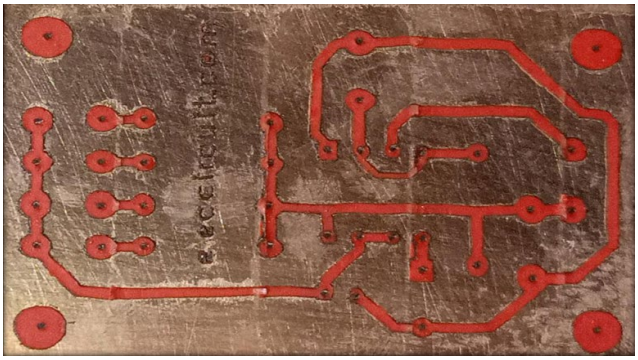


Fig 9: After engraving

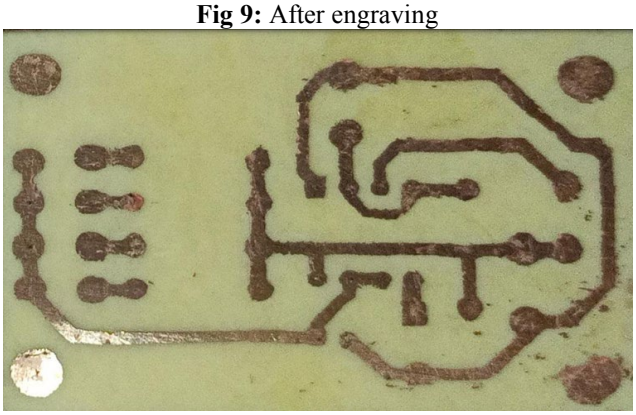


Fig 10: Finished Sample (Output PCB)

A typically printed circuit board offers a simple platform to arrange the electronic components in a compressed and efficient way. This compactness allows the creation of big and complicated electronic circuits in small form factors. This, in turn, takes less space in devices. PCB printer is a simple and unique concept which automatically fabricates the entire fabrication process. There is less interference of human in it which will allow accuracy of the fabrication. It is economical and suitable for mass production. It shortens the product development cycle and has consistent quality.
PCBs are used as connecting components in electronics, relaying messages between active components so the complete device can work. The application can be easily implemented under various situations. New features can be added as and when require. Simply by increasing the laser power this application can be used as laser cutter and be used as wide range of applications. The project can be a new tool that can determine how prototyping is done.[6]

FUTURE SCOPE

This project is helpful in prototyping and we can enhance its usage by introducing client- server model where user can upload their layout on a web server and print it wirelessly over WIFI. An etching station can also be added where etching solution is released when PCB is place in container.

CONCLUSION

It is observed that with different masking materials we can achieve different levels of precision. It is noted that with electrical tape it gives us proper outcome suitable for basic prototyping of PCBs.
As per the industrial feasibility optimized the cost of the laser-based PCB printer machine with the capacity of 500mW, 405nm wavelength .Based on Literature review and steps of working procedure simplified the PCB

printer machine. The key point was proficient that was to produce a laboratory modelled PCB printer machine. The result seems for the better-quality marking and engraving. This work has heavily increased a passion in future studies on the design of body structure that can hold an electrical and electronic platform.

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AET 031

Food waste management app: Implementation

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Abstract - Food waste is the most challenging issue humankind is facing in today's world. In the current era, the amount of food wasted is gradually increasing over the years. Approximately, 40% of the food produced in India is wasted and not consumed by anybody. Negligence towards the necessity of food has led to such an increase in the numbers. It is estimated that the value of food wastage in India is around Rs. 92,00 crores per annum [1].
Food waste is an ethical issue on a global scale. According to the Food and Agriculture Organization (FAO) of the UN has reported that about 190 million Indians remain undernourished. Here in India, the bigger the wedding, the bigger is the food wastage is expected to be. Reports state that 190.7 million Indians remain undernourished, it refers to 14.5% of the entire population. Food waste is an alarming issue in India. Major generators of food waste in India are Hotels, Restaurants, supermarkets, individual resident blocks, airline cafeterias and food processing industries. This scenario emphasizes the need to keep a check on these activities and proper management of the food supply chain so as to reduce the amount of wasted as much as possible. Reducing food wastage will be beneficial in alleviation of poverty and preserve environmental resources. [2]

Keywords: Food waste, Food quality, Social Impact, Indian poverty, Muskaan, Application for better India, Survey.

INTRODUCTION

Food waste is a major problem in India and a major part of the population is suffering its consequences. A lot of initiatives have been taken by various public sector organizations, government, NGOs and individuals. But these efforts are beneficial to a certain level and not scalable as they are unable to reach a huge number of needy people. Hence, many people are deprived of these initiatives. It is necessary that these initiatives and efforts are carried out with a systematic approach. This will help to reach people on a bigger scale and solve the problem more efficiently.

One of the approaches could be an android application designed for this purpose.

This android application would be accessible to most of the people and will be a centralized platform to carry out the food donation drive efficiently. Most of the food wastage is contributed by weddings, big parties and other events. NGOs could have this information and be a mediator to make this bulk amount of unconsumed food to a large number of people. Not only this application will focus on the wastage of bulk food, but also solve this problem at household level. Each registered user on the application will be able to donate a plate or more which is leftover and unconsumed. People could easily search for this information in the nearby localities and could consume this leftover food. Hence, this android application approach would successfully solve the problem of non-uniform distribution of food and food wastage. As well as fulfill its main aim to reach out to as many people as possible.

Although after a lot of social awareness, there are many people who do not consider the food wastage problem seriously and also neglect participation in food donation drives. Such types of people contribute to a large amount of the population. Hence, it is extremely important that we increase the participation of this group of people to solve the problem efficiently. The android application would also be fruitful to make people actively participate in this initiative by including many fun features. These would definitely gain people's attention and increase the contribution accordingly.

AIM AND OBJECTIVE

The growing numbers of population suffering from malnutrition which the country is facing today is the root cause of the declining economy. India is one of the most developed agricultural countries. The root cause of people suffering from malnutrition and not being able to receive one meal a day is the amount of food wasted every day. If this unconsumed food reaches the needy people, cases of malnutrition will definitely be reduced by a great number.

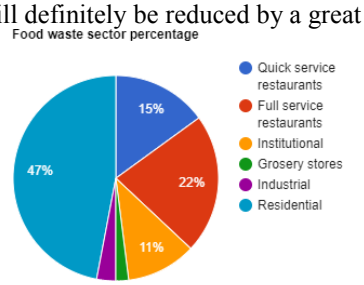

Fig 1. Food waste sector percentage [3]

People who tend to donate could reach out only to a few people who they know are in need or a certain organization. But there are a lot of individuals which require food and are not connected by any organization. An online platform is required to systematically handle the tasks of donating and receiving the food. Along with that, people taking active participation and donating the leftover food rather than throwing it is important.

LITERATURE SURVEY

A few existing systems are studied and analyzed as follows:

I. Aahar
Rating and reviews: 4.0
Size: 8.1 MB
Downloads: 10k+ [4]

Features:
- User registration/ Login
- Donate, receive and procure facilities
- Simple and easy to use UI design
- Regular updates available

Limitations:
- OTP verification takes a lot of time
- Constant internet connection required and app modules take more time than usual to load
- The application is limited to provide facilities in a particular city
- The application requires access to all permissions like calls, media, contacts before loading.
- Although being a great initiative, less downloads and usability.

II. Share the Meal
Rating and reviews: 4.8
Size: 14 MB
Downloads: 1M+ [4]

Features:
- Easy to use, simple interface
- Opportunity to donate and help simply and efficiently
- Worldwide scope
- No ads and runs smoothly
- Available options for making payment makes donation convenient

Limitations:
- Not everyone is able to help through money, excess food could also be means of helping
- Only money donations
- Few technical glitches occur while loading pages
- Achievement features doesn't recognize often
- No transparency to the users
- Most of the funds are being used for fundraising and marketing. Users should be aware and assured of the money reaching the needy.

III. Food Donation
Rating and reviews: No ratings
Size: 1.6 MB
Downloads: 100+ [4]

Features:
- Easy and simple design
- Easy to generate food donation request
- Food requests easily viewed on maps

Limitations:
- Very limited features
- Application takes very long to respond

IV. Daan India
Rating and reviews: 4.6
Size: 8.8 MB
Downloads: 1k+ [4]

Features:
- User registration/Login
- Allows to donate varied items including blood donation
- Provision to remain anonymous
- Hiding phone number and contacting through mail

Limitations:
- Technical glitches during signing up
- Although being a great initiative, less usability and downloads.

V. Hungry
Rating and reviews: 1.8
Size: 15 MB
Downloads: 1k+ [4]

Features:
- User registration/Login
- Simple design

Limitations:
- A lot of technical glitches faced during loading and user signup.
- Simple and great initiative, yet less downloads.

VI. Anna Daan

Rating and reviews: 4.0
Size: 4.7 MB
Downloads: 100+ [4]

Features:
- User friendly application structure
- Maintains donation records

Limitations:
- Email confirmation takes longer time than usual
- Less downloads and usability

LITERATURE SURVEY CONCLUSION

It has been analyzed that apart from a few technical glitches, the usability of these apps is much lower than usual. Being a noble work, the systems have been able to gather very less attention among people which makes it less popular.

It is required that many people come together to bring this change and take active participation, so that the systems are able to fulfill their aim and reach out to as many needy people as it can. But, research on human psychology says that unless and until a majority of people see some outcome or benefits, they don't tend to take active participation. Hence, the best possible strategy to gather public attention and increase usability of these applications would be giving some incentives or benefits after making donations.

The second point of focus on the system's less usability is limitations of area. Well-developed applications have limited their usability to certain areas. A

centralized system and proper management are required to solve the problem of food wastage in India and efficiently handle the food distribution system. The existing systems are designed with a noble cause but for people to take active participation, a system has to be designed considering the above two points and accordingly features to be added. The features to be added in such a way that the system itself generates revenue to help the needy people.

PROPOSED SOLUTION

Muskaan, a food donation service system is an online platform which aims to feed the needy out of the unconsumed food which is wasted.

The application is aimed to help the society and create a sense of solidarity through modern techniques. The social implications it will have after being launched will certainly aim at closing the gap in terms of quality of life for the less fortunate citizens. It not only works as a medium for transporting the unconsumed food to the needy, but also aims to make more and more people engage in the food donation service and actively participate.

The application will not only focus on some basic activities like food donation and receive, but will also include a lot of activities for the food donors so that they could be benefited with something out of the good karma done by donating food. Muskaan will be a centralized platform with no area limitations and will be accessible to all individuals in India. Overcoming the technical glitches faced by the existing systems, it will also include features which will make more and more people engage to donate food. The donor will be rewarded with bonus points and vouchers on the basis of good karma points earned in the application.

On the other hand, to assure people that the food donated is of good quality, a specialized feature to check the quality of food and on that basis give ratings to the food donated. Users before receiving food can be completely assured of the quality of food provided to him. The application itself will be able to generate revenue itself as an extra means of contributing to the welfare of less fortunate people. Muskaan, a non-profitable android application, is a means of effective food donation drives, which will also assist NGOs in their work and reach out to a large number of people.

OBJECTIVE OF PROPOSED SYSTEM

Objective of the system is to overcome below problems

1. OTP verification takes too long.
   Solution: This problem will be solved by using firebase mobile authentication service as it takes only 15 seconds to send OTP and validate it. Moreover, Firebase provides the first 10K verifications for free each month.

2. Constant internet connection required and app module take more time than usual to load.
   Solution: poor network connection gives a poor user experience. Muskaan application will be used on the internet only when and where needed. Internet use and requirement can be minimized using one time rendering.
   Loading time can be reduced by [5],
   a. Preventing costly re-renders
   b. Using <FlatList>, <SectionList>, <VirtualizedList>instead of <ListView>, <ScrollView>
   c. Using upgraded React Native newest version and pure components.
   d. Reducing Application Size
   e. Optimizing assets.

3. The application is limited to provide facilities in a particular city.
   Solution: Muskaan application will be available for every user in India without location restrictions for that strong configuration of the server is needed. [6]
   - Average Monthly Visitors: 300,000
   - Average Number of Page Views Per Visitor: 30 / visitor
   - Average Monthly Page Views: 9,000,000 Pageviews / Month
   - Average Page Size: 1 MB

   Data transfer per month: 9,000 GB /Month Internet Speed Requirement: 27.38 Mbps

4. Some applications require access to all permissions like media, contacts, etc. or does not load.
   Solution: Firebase provides a separate module for react - native application development which allows us to get required data in a millisecond. Built-in security, static file hosting, quick response, data scalability and efficient storage management are other advantages of using a firebase database.

5. Other technical glitches.
   Solution: React native is a cross platform application development framework which provides advantages like reusability, Live and hot reloading, simplified UI and Plugin support. Using such a framework avoids low level technical glitches and increases the performance of the application.

6. Less downloads and usability.
   Solution: The solution consists of two features to increase usability-
   1. Rating Food quality
   2. KARMA points

FEATURES OF PROPOSED SYSTEM

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.

Profile Management:

The user profile will contain the following data:

- First Name, Last Name, Email Address, Gender
- Contact details, Address
- Identity Proof

User profile modification:
Users shall be able to edit/delete data on their profiles.

Profile Upgradation:

The user will be able to register himself as an NGO/ restaurant person which will have their own specialties. Required, a user has to present the documents stating the organization he/she is a part of.

- NGO person: The user will have the ability to receive a bulk amount of donated food so as to distribute among the needy, whereas a normal user will be able to only receive a few plates of food.
- Restaurant person: The user will be able to post leftover food items available on the restaurant's menu at lower rates for other users to book/ order.
  Donor will add the following details:
  - Food item, shelf life, number of plates
  - Address and pickup timings
  - Good quality picture of food

  Donor will wait for the receiver's request and accordingly approve the requests.

Food receive process:

- Notifications will be sent to users for nearby locations.
- Search results shall enable filters and reviews/comments/ratings filters.
- Apply for receiving and wait for donor's approval.

Dine (Hoteliers, restaurants):

- Only the users who have upgraded and verified their account as a restaurant person will be allowed to mention food available for dining/order.
- Users can search for nearby restaurants and dine at low rates during closing hours.

Image Quality:

The application doesn't guarantee the quality of food that will be delivered but still receivers and NGOs can be assured of the quality by checking the ratings of food donated at the time of applying.
The rating of food quality will be determined at the time the user captures an image of the food.

KARMA points:

An interactive beneficial feature for the user to be rewarded when donating food. On each donation KARMA points will be generated which could be later used while dining at restaurants or playing fun games and winning exciting coupons and prizes.

Muskaan Mingle:

A social media module specially based on food donation services can aid user's engagement and encouragement on the application. It will also act as a connecting link between the ones who need help and the ones willing to help.
Features:

- A leaderboard representing the top 10 KARMA points holder is released daily, weekly as required.
- A story upload feature:
  Case: A person XYZ uploading a picture of donating food to some renowned NGO
- A post upload feature:
  Case: A post mentioning certain people in need at a given location
- Verified account (tick mark icon):
  An account with KARMA points above threshold, constant activity on the application and huge number of likes will be considered as a verified account. ('You can become a celebrity on this platform by doing good KARMA')
- Privacy:
  An AI system which will detect that nowhere a user's identity as a 'Receiver' is revealed in any post or story by analyzing the content. Privacy of the user will be maintained.
- Fetching related content for surfing:
  User's data will be fetched as location, number of likes on an account's post, searched account's data and more viewed stories. Based on this data, more relatable posts will be fetched for surfing. Location based posts will maintain priority as to connect with other users.

RESULTS

STEP-1: Users will log into the system using email and password or register if they do not have an account. There are alternate methods to login which are google, facebook and OTP.

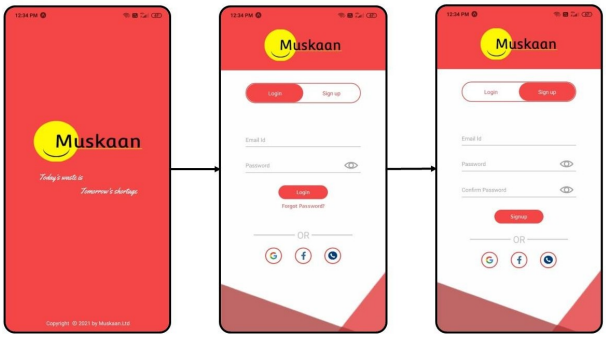

Fig 2. Authentication Process

STEP-2: Once a user login to the application, he needs to update profile by providing additional details and identity proof documents. He can then upgrade profile from normal user to NGO or Restaurant to avail additional benefits as below:
NGO: Can receive food in bulk. Restaurants: Can sell food at a low price.
Upgradation request will be approved by admin after validation

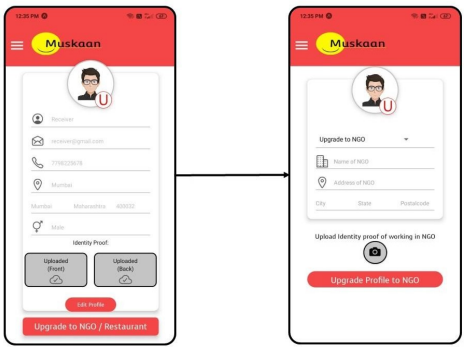

Fig. 3: Profile Update and Upgradation Process.

STEP-3: Users can navigate to different parts (Home, Notification, History, FAQ, Feedback, Logout) using the left navigation drawer and Can switch to frequent or core parts (Donate, receive, Dine, Kamra Zone) using bottom navigation and dashboard.

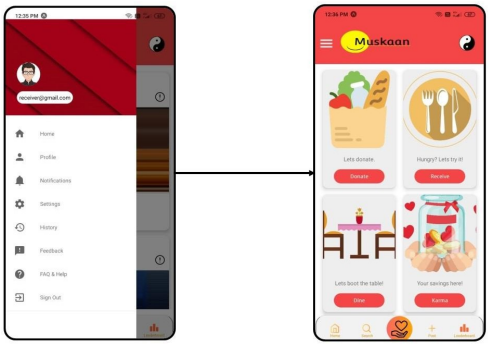

Fig 4. Application Navigation Process

STEP-4: Users (Donor) having good quality leftover food can donate it by providing details like Food name, Shelf life, Pickup start time, Pickup end time, plates, address and image of food. After donations he can monitor requests using the history page of the application and take actions.

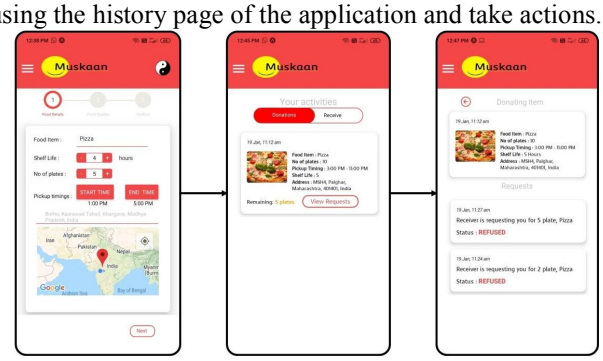

Fig 5. Donation process.

STEP-5: Users (Receiver) can view nearby donations using a map provided in application. He can send requests to donors by providing a number of plates. He can monitor requests in the history page.

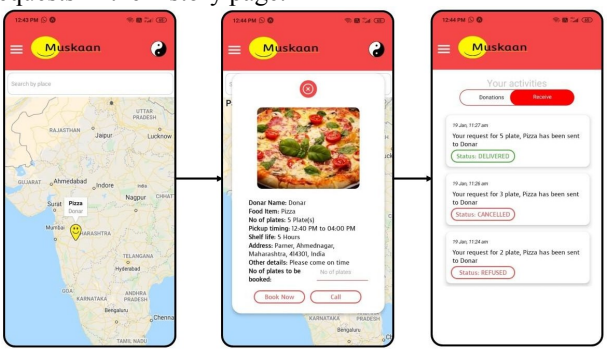

Fig 6. Receive process.

STEP-6: Donor will get karma points on the basis of ratings provided by the receiver and number of plates donated.he can invest points in the karma zone and earn vouchers and deals. On the basis of karma points of users, a weekly leaderboard of top karma points holder will be displayed.

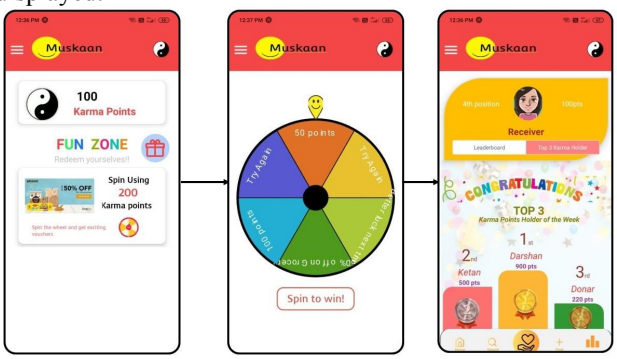

Fig 7. Karma Zone and Leaderbord.

STEP-7: Users can view, search or create new posts shared by other users in Muskaan mingle section, they can like the post or report it if the identity of the receiver is revealed in the post. Reported posts will be monitored by the admin.

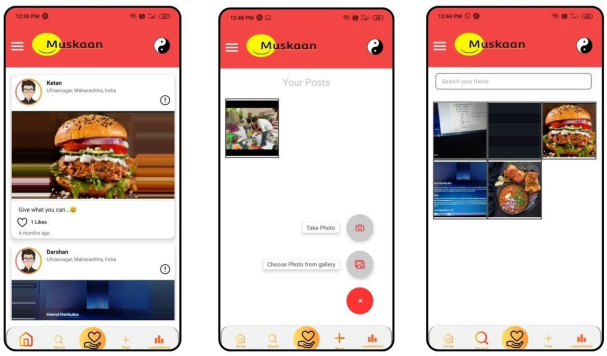

Fig 8. Muskaan Mingle

STEP-8: Users (Donor and Receivers) can chat on the application using the feedback section. If any user is having issues about a specific part of the application he can resolve it using the FAQ section of the application.

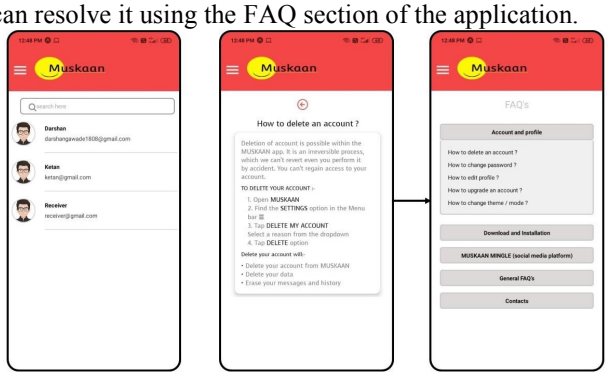

Fig 9. Feedback and FAQ

METHODOLOGY

Agile methodology is used in this project development with 8 sprints, Prototyping, Authentication, Donation, Receive, Karma Zone, Muskaan Mingle, Admin dashboard and Testing-deployment. Agile Software Development Methodology is widely used in many projects as it has many advantages. After gathering the project requirements, it is reviewed frequently in the form

of small iterations and made into action by executing it. After completing tasks each iteration, it could be reviewed properly and moved to the next iteration. The main advantage of this methodology is that we can change the requirements or design even in the middle of the project when the situation arises. Also, code maintenance is easier in contrast to the Waterfall Approach.

TECHNOLOGY USED

1. **React Native:**
   React Native is a JavaScript framework for writing real, natively rendering mobile applications for iOS and Android. It's based on React, Facebook's JavaScript library for building user interfaces, but instead of targeting the browser, it targets mobile platforms. In other words: web developers can now write mobile applications that look and feel truly "native," all from the comfort of a JavaScript library that we already know and love. Plus, because most of the code you write can be shared between platforms, React Native makes it easy to simultaneously develop for both Android and iOS.[7]

2. **Expo:**
   Expo is a framework and platform for universal React application. It is a set of tools and services built around React Native and native platforms that help you develop, build, deploy, and quickly iterate on iOS, Android, and web apps from the same JavaScript/TypeScript codebase. In order to build a react native app , you need to have expo SDK version 41 and also APK is generated using the same.

3. **Firebase**
   Firebase database service is provided by google hence it is more secure. We have used Firebase realtime to store the user data, authentication module for authenticating users and storage to store documents.
   The Firebase Realtime Database builds rich, collaborative applications by allowing secure access to the database directly from client-side code. Data is persisted locally, and even while offline, realtime events continue to fire, giving the end user a responsive experience.

Firebase Authentication provides backend services, easy-to-use SDKs, and ready-made UI libraries to authenticate users to your app. It supports authentication using passwords, phone numbers, popular federated identity providers like Google, Facebook and Twitter.
The Firebase SDKs for Cloud Storage add Google security to file uploads and downloads for your Firebase apps, regardless of network quality.

SOCIAL IMPACT

Considering this platform with social impact perspective, we have identified three types of users:

i) Middle class and rich people (10-20%):
   In the upcoming years, it would be very difficult for the people to take out time for carrying out such social activities and reaching out to people. Such people would definitely feel very awkward to receive food from unknown people and save food according to social norms. But, these people can definitely serve as an agent and receive food from someone else. In this way, people need not take out time specially to do social work. They can just spare 10-15 minutes every day, surf the application, and receive food for such people who cannot access the application.

ii) Poor (20-30%):
   This group of people will be largely benefitted by the application. They can avail the food from the donor's place directly through the app.

iii) Poorest (40-50%):
   There is a huge number of people living below the poverty line in India. These people do not have access to smartphones and hence, they cannot become direct users of the Muskaan application. But certainly, such people should not be deprived of this good cause and availing food. Through a non-android device people can register themselves with a contact number through NGOs in the application. After that, they will start receiving SMS services about availing food at the location.

CONCLUSION

Reports suggest that household food wastage itself in India is 50 lakhs per annum. Our application not only justifies but acts as a solution to the problem with uncountable benefits for the users.
Muskaan coming with a feature of high scalability all over India aims to reach out to a huge population of 138 crores. Along with an android application MUSKAAN also includes a population of more than 60% living below the poverty line through SMS services.
In India, each year approximately accounts for 10 million weddings and 40% food prepared is wasted. MUSKAAN through the NGO upgradation resolves this by reaching out this unconsumed food to a large number of people in need. And last but not the least, approximately 4 to 10 percent of food purchased by restaurants is wasted before reaching the customers. The restaurant upgradation feature resolves this by notifying the users about partly prepared food at restaurants at closing hours.[8][9]
Population census convey that 22 percent of population in India is youth out of which 90 percent are engaged in social media. The MUSKAAN Mingle is a social platform which will encourage the youth to do good KARMA and become an influencer. [10]
Henceforth, MUSKAAN model aims to solve the problem of food donation in India by its various user engaging features.

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AET 032

Data Structure Visualization

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Abstract—Data structures prove to be an effective way of performing various operations related to data management including storing and arranging data along with its retrieval so that the data can be easily used and manipulated in the future as the need arises. There are various algorithms for various operations of data management. Often it becomes confusing to differentiate and remember algorithms performing similar tasks. Understanding the concepts and the flow of the algorithm, why iterations are necessary at certain times can be really demanding and stressful especially for a beginner who is not familiar with its terminologies. Here comes the need for visualization. Algorithm Visualization can aid better to learn data structures. These tools for visualizing algorithms demonstrate how the algorithm works in a visually appealing manner so that the data structure's implementation can be understood easily. When we learn a concept after visualizing it, we form its conceptual model in our mind which stays permanently thus making learning effective and fun. This forms a clear understanding of the underlying mechanics behind some confusing data structures thus building the foundation for the concepts of advanced methodologies and implementations. To make the process more interactive, we are presenting animated algorithm visualizations.

I. INTRODUCTION

The rapidly developing technologies have influenced education greatly. Especially the pandemic has locked us inside our homes, everything starting from education to employment has gone digital. From traditional classrooms to digital classrooms, everything has evolved. Nowadays, various instructional websites offering online courses have grown dramatically. Web-based courses have become the new trend. Instructional websites dedicated to Algorithms on Data Structures can be easily found by using Search Engines. Data Structures and algorithms are basic concepts. But many students complain it being difficult to remember the various algorithms in data structures since abstract thinking is required in order to comprehend it and grasp the concept. One way for improving instruction in this area is to include algorithm and data structure visualizations in the form of animations. A visualization tool of data structures like arrays, stacks, queues, linked lists, trees and graphs is necessary for students to experiment with thus, allowing students to see the actual process of an element being inserted into or deleted from different data structures, how a tree is traversed in different orders (pre-order, in-order, post-order, level-order) etc. Good Algorithmic Visualizers have the capability to bring algorithms to life by illustrating data structures in natural, abstract ways and animating their various states. We are presenting a data structure visualization tool designed to animate standard manipulations of several common data structures. The platform is intended for use by students to thorough themselves with the subject as well as instructors who wish to enhance their lectures with an animated interface.

II. LITERATURE SURVEY

We surveyed papers aimed to examine the effect of instruction using this method in which students constructed visualizations on their programming achievement and their attitudes toward computer programming, exploring how such tools support their learning enquiring their self- reported experiences in the course where visualizations related to sorting were constructed. The resulting serial of key frames featuring major data structure transformation are available for review and analysis. All these combines to fill the gap between the abstract data representation and a dynamic learning-by coding process. It has been observed that Algorithm Visualisation (AV) tools help learners to learn the actual working of algorithms and data structures. Most of them cover basic data structure algorithms like sequential data structures such as arrays, stacks, queues, linked lists, sorting and searching algorithms. Some of the algorithm visualizers are in the format of packages that allow students or instructors to implement independently in any scripting language. Visualizations that can be directly accessed from web pages will naturally get more attention from potential users, since they do not have to go through the additional step of downloading and unpacking a visualization system. Most of the visualization platforms that we have encountered either does not have a user-friendly interface, or are a bit complicated to understand. Mostly these platforms lack interactive multimedia. The user does not actively play any role in the majority of existing platforms, being mere observers with no control over input values or the pace of observing the animations.

III. PROBLEM DEFINITION

The most proven method to learn any algorithm is visualizing them. Especially for subjects like Data Structures, where algorithms form its basis, it is not practical to memorize them theoretically without comprehending them practically. It becomes quite confusing and tedious to visualize them on our own since

abstract thinking plays an important role in forming its conceptual model in our mind. Thus, a need for a tool for visualizing the data structure algorithms interactively so that the student can experiment and learn as need arises.

IV. PROPOSED SOLUTION

Seeing them in action would be an effective way to understand the complex data structures. The proposed system has various interactive animations for a variety of algorithms. Our visualization tool is written in JavaScript using the HTML5 canvas element, and it can be accessed via any modern browser. The visualizations are meant to be fairly self- explanatory. Our proposed system can be used to enhance the traditional classroom education and textbook for Data Structures and Basic Geometric Algorithms courses.

V. AIM & OBJECTIVES

When we learn various algorithms whether it be from data structures or any basic geometry, most of the tools explain them without providing any details about how they are actually represented and their behaviour in a real program. This results in the students knowing only how the data structures work theoretically and may not be able to use them practically for solving a programming or any other task which in turn further enlarges the gap between students' theoretical and practical ability, adversely affecting the students' problem-solving skill. The main objective of this visualization platform is to provide a means for learning the conceps requiring abstract thinking in a more effective as well as enjoyable way which will engage the learners and drive away any boredom. The purpose is to build a user friendly interface where the students can experiment and learn data structtures. A system providing visualizations for some basic geometric algorithms and widely used data structures such as array, stack, queue, tree, heap, graph, etc. along with the animation of common operations associated with the data structures, such as inserting an element into and deleting an element from array, stack, and queue. The main aim is to mitigate the gap between students' theoretical and practical ability related to data structures via this platform to provide a systematic approach for learning and conceptualizing implementation of data structures. JavaScript will be used for creating animated implementations of algorithms which will be given a database connectivity. Thus, our main objective is to help the analysis of concepts of basic algorithms to those eager to learn.

VI. PROPOSED SYSTEM

Here in the proposed system, the user can select whichever model or algorithm he/she wants to study. On its selection according to the algorithm, a graph or its visual representation will be generated. On starting the animation, a systematic and detailed animation will be shown so as to how the algorithm works for a better understanding. The playing speed can be controlled according to the user's pace. After learning, the user can also test their knowledge by trying to predict the working before playing the animation.

VII. ALGORITHM

1. Graph Generation Algorithm: In order for the system to provide a better educational experience and to give users the ability to test themselves on the same algorithm multiple times, it is necessary to use randomly generated graphs. This means that every time the user reloads the application, they will see a different graph.
2. Basic Data Structure Algorithms like arrays, linked lists, stacks, queues, sorting algorithms, searching algorithms, graph algorithms, geometric algorithms.

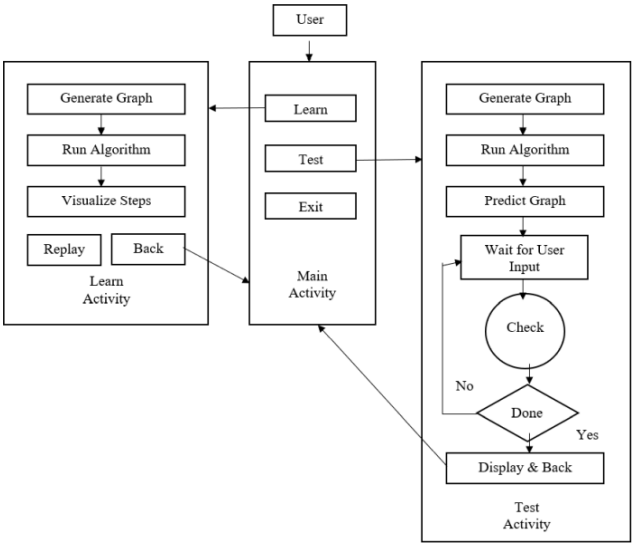

Fig-1: Flowchart

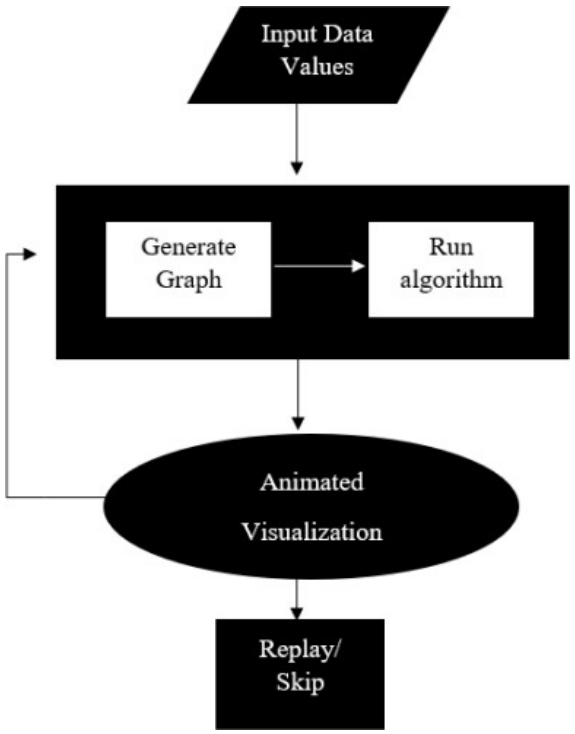

Fig-2: Algorithm

VIII. METHODOLOGY

The implementation of algorithms in a visually appealing animated format is developed using the various available animation libraries in JavaScript. A user friendly and interactive website is created to which all the

algorithm visualization models are exported. A backend database connectivity is also given to the system to keep a record of the existing users and new ones along with providing them the feature of tracking their progress in their respective accounts. Some of the general animation controls implemented in the system are – Skip back/forward, Step back/forward, Play/Pause, Move Controls to a different position etc.

IX. RESULTS

The user can sign up themselves to access the algorithms and can also give feedbacks or suggestions to make any amendments if necessary using the contact information provided.

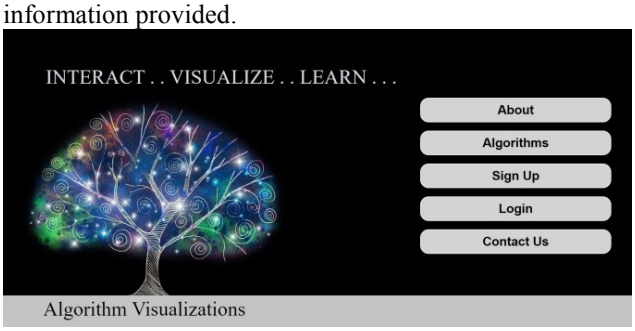

Fig-3: Home Page

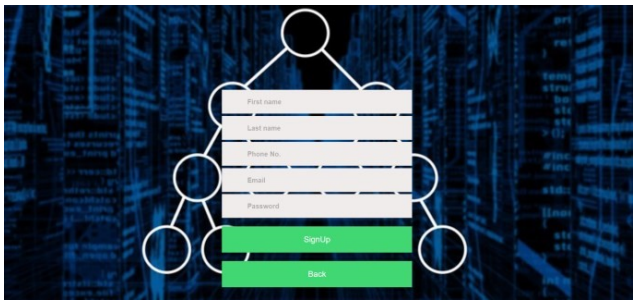

Fig-4: Sign Up Page

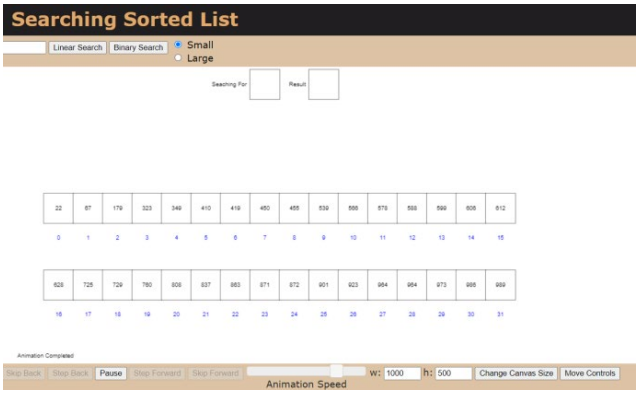

Fig-5: Algorithm Visualization

X. CONCLUSION

Some features implemented include a feedback system enabling the user to contact us if there exist any queries or even suggestions. While learning from the visualizations the learner can input their own data and see the outcome animated. So, they can experiment with various self-generated examples. They can also control the animation speed along with the options of rewinding, fast forwarding or skipping a particular iteration. Some of the general animation controls implemented in the system are - Skip Back/Forward, Step back/forward, Play/Pause Toggle, Animation Speed (in the form of slider) & Move Controls (Place control buttons above or below).

XI. FUTURE SCOPE

A visualization tool for visualizing some basic geometric algorithms along with data structure algorithms and operations associated with them has been presented. This tool provides an easy way to play and learn data structure concepts with its user-friendly and self-explanatory interface. In this system, only some commonly used and basic algorithms are implemented like arrays, queues, stacks, linked lists, linear and binary search tree, various sorting methods etc. Its scope can be extended by implementing more complex algorithms in the software. It can also be categorized for a more systematic interface. Developing and implementing a mechanism for the software package to recognize the user-defined observable data structures, and leave the implementation to the user is yet another way to extend its current scope, allowing users to use their own observable data structures, thus adding more flexibility to the software.

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AET 033

Student Guide: Implementation

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Abstract—In the current system students get confused about their syllabus, reference materials and previous papers as there are many options available online. Also, there is a possibility that books which are used by students become outdated. Thus we are providing them a guide which will make their learning easy and effective. In the proposed system, to overcome the issues faced by students we are designing an application where students can find syllabus for their course easily. Also we provide recommendation of the best book for particular subject based on student's feedback. For the recommended book, the portal will also show if that book is available in our bookstore and if that book is not available in the bookstore students can checkout links given by us where they can buy that book.

We are also providing them a platform where they can buy or sell their books. Those who want to sell their books can upload details of those books and interested students can send them request for buying. Both buyer and seller will get email notification about each other's contact details so that they can communicate for further details. The main objective of the application is all students can buy the second hand books at low rates and students will get proper guidance in their learning process .

INTRODUCTION

Online recommendation systems are the main in thing to do for many of the e-commerce websites. A recommendation system broadly recommends products to the customers that best suited to their tastes and traits. This project is like a guide for all students where they can view syllabus, also buy and sell the books. The students can go through the syllabus, view its reference books, buy the second hand books of interest or can sell a book they don't use and also be able to see papers.

Generally after exams student most of the student don't use their previous year's books which remains at home as it is, through this portal the students can sell their books. Other students can buy these second hand books at a price lower than the new book. Also the hassle of going to several bookshops to find any particular book can be avoided. Instead of throwing old books away or giving them to scrap paper dealers, this website provides a platform to sell these books to someone who actually needs it. Also buying second hand books instead of new ones can save paper cost and reduce cutting of trees. Reference books can be costly for many of the students to afford. This portal can help them to buy those books at low prices as there will be second hand books.

If a student is interested in a particular book he/she can request it to the seller. On sending a request, automatically a mail is sent to the seller quoting. He/She is interested in your book. . Further the buyer and seller can connect through email.

Also the hassle of going to several bookstores to find a particular book can be avoided. Instead of throwing old books away or giving them to scrap paper dealers, this website provides a platform to sell these books to someone who actually needs it. By doing these students can get books at lower price. Also buying used books instead of new ones can save paper cost which will save many students money and reduce cutting of trees which is helpful for the environment.

LITERATURE SURVEY

Below is the literature survey done about the online modes that are available for student to refer :-
Paper [1]

Application Name: Syllabus App
Rating and reviews: 3.5
Size: 4.8 MB Downloads : 50k+
Features :

- No ads and runs smoothly.
- Easy and simple design.

Limitations:

- Technical glitch while opening Settings.
- Static application.
- Content glitch.

Paper [2]

Application Name: BE Syllabus (RGPV)

Rating and reviews: 4.0
Size: 4.1 MB Downloads: 1k+
Features:

- Syllabus is provided in a pdf file which can be downloaded.
- It covers about 15 different branches.

Limitation:

- Syllabus is restricted only for B.E.
- Lack of user-friendly UI.
- Although being a great initiative, less downloads and usability.

Paper [3]

Application Name: B.Tech Syllabus
Rating and reviews: 3.5
Size : 4.8 MB Downloads: 10k+
Features:

- Easy and simple design
- No ads and runs smoothly

Limitations:

- Syllabus is restricted only for B.Tech
- Static Application.
- Although being a great initiative, less downloads and usability.

Paper [4]

Application Name: old.mu.ac.in
Application Type : Web Application
Features:

- Official website of Mumbai university
- Regular updating of content.

Limitations:

- Static Application.
- Does not provide book recommendation
- Created for Mumbai university syllabus only.

Paper [5]

Application Name www.unipune.ac.in
Application Type : Web Application
Features:

- Official website of Pune university
- Regular updating of content

Limitations:

- Static Application.
- Does not provide book recommendation
- Created for Pune university syllabus only.

Below is the literature survey done about the traditional system for buying and selling of books :-

- The major problem faced by the traditional system is that the student has to go physically for buying or selling book, here there are chances that at times the shop is close, or the book is not available. This lead to waste of efforts and time of a student.
- In traditional system if a student is asking his/her senior for notes/books and if the senior is asked by 3-4 students for books/notes, then this leads to conflicts and also only 1 student will receive books/notes others will have to find it from somewhere else.

LITERATURE SURVEY CONCLUSION

It has been analyzed that apart from the few technical glitches, static applications, the usability of these apps is very low than usual. Being a noble work, the systems have been able to gather very less attention among people which makes it less popular.

It is required that many people come together to bring this changes and take active participation, so that the systems are able to fulfil their aim and reach out to as many needy people as it can. But, research on human psychology says that unless and until a majority of people see some outcome or benefits, don't tend to take active participation. Hence, the best possible strategy to gather public attention and increase usability of these applications would improve students learning process.

PROBLEM STATEMENT

Today the amount of information in the internet growth is very rapid and people need some instruments to find and access appropriate information. As education is the most important and necessary thing in todays world, its very important to make the students learning process easy and simple to understand. In the current system students get confused about their syllabus, reference materials and previous papers as there are many options available online. Also, there is a possibility that books which are used by students becomes outdated. This leads to improper guidance to students in their learning process and students keep following the wrong data.

PROPOSED SOLUTION

In the proposed system, to overcome the issues faced by students we are designing an application where students can find syllabus for their course easily. Also we provide recommendation of the best book for particular subject based on students feedback. For the recommended book, the portal will also show if that book is available in our bookstore and if that book is not available in the bookstore students can checkout links given by us where they can buy that book. We are also providing them a platform where they can buy or sell their books. Those who want to sell their books can upload details of those books and interested students can send them request for buying. Both buyer and seller will get email notification about each other's contact details so that they can communicate for further details.

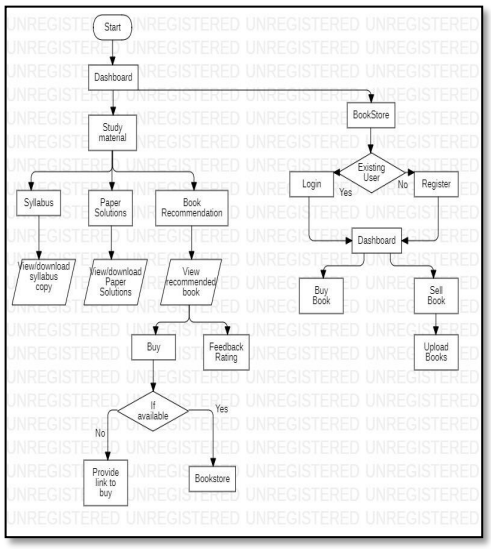
OBJECTIVES OF PROPOSED SYSTEM

- The main aim of proposed system is to improve efficiency of existing system for student guidance, the proposed system will overcome the issues faced by students, Thus we are designing an application where students can find syllabus for their course easily.
- Also we provide recommendation of the best book for particular subject based on students feedback. For the recommended book, the portal will also show if that book is available in our bookstore and if that book is not available in the bookstore students can checkout links given by us where they can buy that book.

FEATURES OF PROPOSED SYSTEM

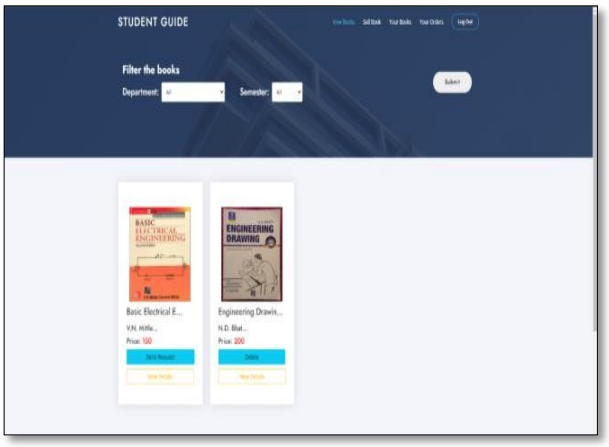
We are also providing them a platform where they can buy or sell their books. Those who want to sell their books can upload details of those books and interested students can send them request for buying. Both buyer and seller will get email notification about each other's contact details so that they can communicate for further details. The main objective of the application is the needy students can buy the second hand books at low rates and students will get proper guidance in their learning process.

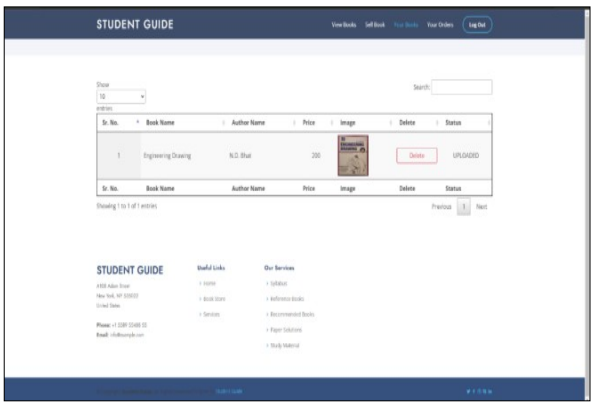
BLOCK DIAGRAM

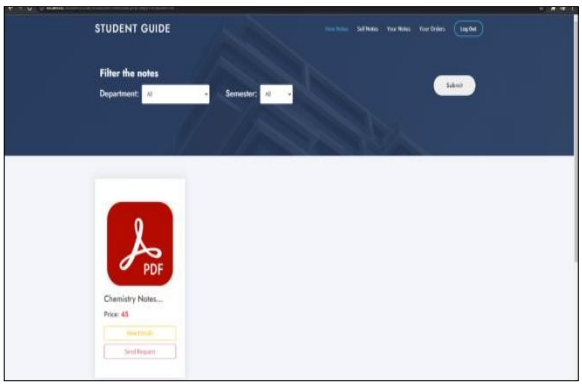


RESULTS

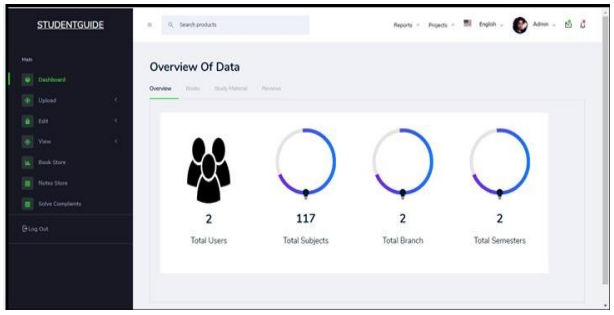
Website :

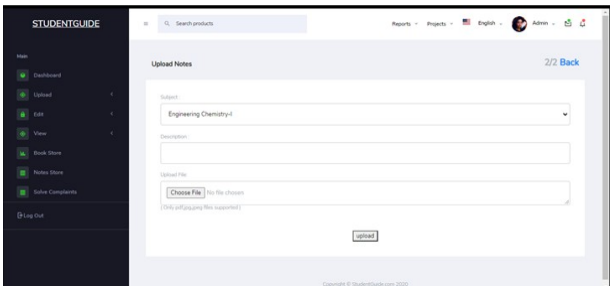


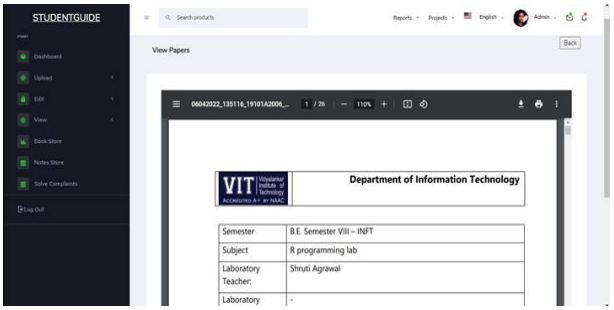


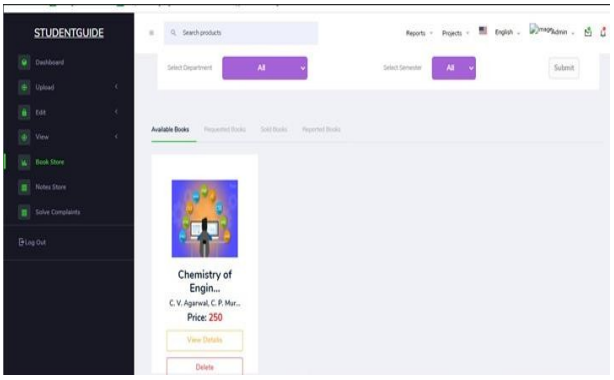


Admin Portal :









FUTURE SCOPE

In our system we are currently providing guidance for only students who are pursuing engineering, in future we will expand the system to cover all the possible career streams. Approaching expert people in particular career areas can increase the preciseness of the system. Expanding the marketing of the portal will engage more users. So that they can suggest appropriate, new editions of books for reference. This will help the portal from being outdated and inaccurate for student's use. Also we will continuously keep updating the provided material to avoid student's loss.

METHODOLOGY

The WATERFALL methodology is being used for our software development. Project development including documentation and release is divided into 7 sprints. According to sprints, the estimated time required to develop the project is 365 Days.

CONCLUSION

Student guide improves the learning process, by help ing students in providing all study material at one place. It will suggest them appropriate book from no. of reference books available for that subjects which will save their time in searching resources for studying.
Online bookstore is also available in this application so that students can by second-hand books at low price.
We will try to analyse and implement all the aspects regarding to this topic to provide students with hassle free learning.

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AET 034

Career Portal : Harnessing Power of Artificial Intelligence

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Abstract—Recruitment process is time consuming process and many resources are used to get the best candidate for a job. Job opening details are usually posted on various job portal and then the applicants starts applying. Many job portals has their own way of testing the candidate for job. If filtering of candidates are not done properly then task increases for the recruiter. The proposed system is designed in such a way that applicants and recruiters can meet at a single portal. The recruiters from various companies can post the job details of the vacancies available in their respective companies. Applicants can apply for a job by uploading resume after this their resumes are ranked based on matching with the job description for shortlisting. Today many companies are interested in the personality traits of a candidate. Therefore, in our system we have added the personality test, through which applicant's personality get predicted from traits like the Big Five personality factors. As student gone through various fields, gaining various skills and learning new technology, they often get confused in which domain they should pursue career. Our system has the career prediction test which will help students to get their career interest. Career domain are mainly focused on the CS/IT sector. Applicants can also go through the aptitude test which will help them to increase their logical thinking for placements. There is also a separate profile section for both recruiters and applicants.

Keywords – Artificial Intelligence (AI) , Machine Learning, Career portal, Natural Language processing (NLP), Spacy, Career prediction , Personality prediction , Job portal.

I. INTRODUCTION

Resume screening is the process of determining whether a candidate is qualified for a role based his or her education, experience, and other information captured on their resume. In a nutshell, it's a form of pattern matching between a job's requirements and the qualifications of a candidate based on their resume. The goal of screening resumes is to decide whether to move a candidate forward usually onto an interview or to reject them. The biggest challenge of screening resumes by far is volume. The number of resumes received is one of the biggest factors that increases time to fill. An average job opening receives 250 resumes and up to 88% of them are considered unqualified. This means a recruiter can spend up to 23 hours screening resumes for a single hire[13].

Our proposed system will automate the process of resume screening by saving time and resources. System harness the power of Artificial intelligence like using machine learning algorithms and natural language processing model. Applicant when upload their resume it matches them with job description and rank their resumes from best match of the job description to worst. While recruitment of fresher applicants , some companies tries to find some qualities in a candidate like easily adjusted to new changed, open minded, design thinker etc. These qualities are basically coming from personality traits of any individual. Our system used machine learning algorithm like XGBoost[14] to predict the personality of an applicant based on some questionnaire. Personalities are composed of traits like Openness, Conscientiousness, Extroversion, Agreeableness, and Neuroticism. Many students during their placement year struggle to find in which domain their interest lies. Our system has the ability of predicting the carrier interest of the student using pre trained machine learning based on logistic regression[15] algorithm. Here students also need to go through some questions get the predicted career choice. Our system also has aptitude test which helps both applicants and recruiter.

II. PROBLEM STATEMENT

There is a very huge workload on the human resource department to select the best and right personality candidate for a particular job vacancy from a pool of candidates, which will help them to grow their organization. Many departments wastes their time and resources on screening the resumes of the many candidates for even one job vacancy. Also, they concerned regarding the personality and aptitude skills of the candidate as this indirectly affect their company reputation. Also, many student worries about in which domain they should pursue their career. So, our proposed web portal will reduce this workload by automating the recruitment process also help applicants by conducting test like career test, personality test and aptitude test.

III. LITERATURE SURVEY

Authors proposed a web application[1] for screening and raking the resumes according to the job description posted by a recruiter. Various modules are mentioned as follows:-

A. Job Applicant Side,
B. Server Side
C. Recruiter Side

In this input resume accepted in the format of a .pdf file will then be stored in the database. Data is unstructured so scanning, parsing and then tokenization is done. Now resumes are converted in json format and passes through nlp pipeline. SpaCy framework is used for training model. SpaCy is a framework which is trained for general data by doing changes to NER. So that relevant entities are extracted. Same is done for job description. Now from these entities score is calculated and resumes ranked. For Career Prediction[2], Authors used advance machine learning techniques like SVM, Random Forest decision tree, OneHot encoding, XG boost for predicting the student career based on certain attributes. They discussed steps like data collection, data preprocessing, OneHot encoding, after these steps they train and test the data against models like SVM, Random Forest decision tree, XG boost. As a result, they concluded that the SVM has better accuracy then Random Forest decision tree, XG boost. Another Web Application[3] we have found during survey consist of two modules of Admin and Candidate. Admin can create and aptitude tests , he can also create and update personality questions used to predict the personality like Openness, Conscientiousness, Extroversion, Agreeableness, and Neuroticism. Admin can also view the candidates and short-listed candidates. Candidate can also fill up the CV form and apply for job, also candidate can also give the test and view results. In paper [4] ,Authors have discussed about first and second generation hiring system. They pinout some drawbacks like screening through bulk of resumes, Expensive hiring process, Resumes in specific format, Loss of potential candidate. They proposed their nlp model which will extract the required entities from any format of resumes. Nlp model will help them to avoid the unnecessary data. After this comparison of entities are take place between resumes and job description, resumes then screen to the recruiter showing relevant skills of the applicant. The questionnaire we have used for personality prediction is taken from paper [5] in which, authors have discussed in brief about selecting the questionaries for big five personality prediction and shortening the questionaries. They have mentioned two measure “The IPIP-BFM-50” and “The IPIP-BFM-20” for judging the personality of participants. These measures are analysis thoroughly with the result. “The IPIP-BFM-20” found to be good measure for judging the big five personality traits. Another study on Career Prediction[6] is surveyed by us in which they have discussed various researches and model regarding the prediction of career of the students. The result of various machine learning algorithms like Bayes, Regression, Classification, K -means were discussed and their accuracy. They have also mentioned how an Artificial Neural Network can be used for better results.

Authors have developed a job portal [6] for job seekers. The sole purpose of the system is to reduce the communication gap between job seekers and recruiters. Job seekers can also search their desired job on the portal. Unique functionality was that the job seekers can ask the job related questions to the recruiters through the portal. Another web portal [7] was also been developed for HR operations. In which there are three types of users who can access the portal are Job seekers, Employer and guest user. Job seekers can build their profile, apply for job, search for a particular job through filters and download placement papers, resume samples, cover letter etc. Employers can post the jobs and view the profile of job seekers. Guest user can also use the portal but with minimal functionalities. In paper [9] Authors have tried to find out the important factors that job seekers prefer while using the job portal sites. They have used KMO and Bartlett's Test for factor analysis of data consisting 250 responses on a 23 statement’s questionnaire. They have found out the six factors that job seekers looks in job portal sites. The factors Efficiency, Productivity, User friendliness, Extended services, Convenience and Information provision. Classification and Ranking of Resumes is done by the Authors[10] based on matching with the job description. They have used NLTK to tokenized the resume data. The tokenized data is further process to lemmatization and vectorization. KNN is used to classify the resumes into category such as Data science, Web Designing, Testing etc. Cosine similarity algorithm is used to match the job description with resumes data and the best matched resumes are suggested to the recruiter.

IV. PROPOSED SYSTEM

We have proposed a career portal web application named “CareerSaga” for recruiters and the applicants/students. They can build their profile in the portal. Applicant dashboard is made up of various tests available and also has a place to apply for a job. They can go through the questionnaire to get their predicted career interest. They can go through aptitude to get their aptitude score. They can go through the questionnaire to get their predicted personality. Recruiter can create a job profile description as well as his/her profile. Applicants can starts applying for a job by uploading resume and also go through the recruiter’s profile for getting the more information of the company. Extraction of text from resumes takes place at the backend and after that the relevant entities are extracted from each resume. Each resume then compared with extracted entities of job description and the scores are calculated. The most suited resume will get ranked firsts and so on. Recruiter can also go through the profile of the applicant for choosing the better candidate.

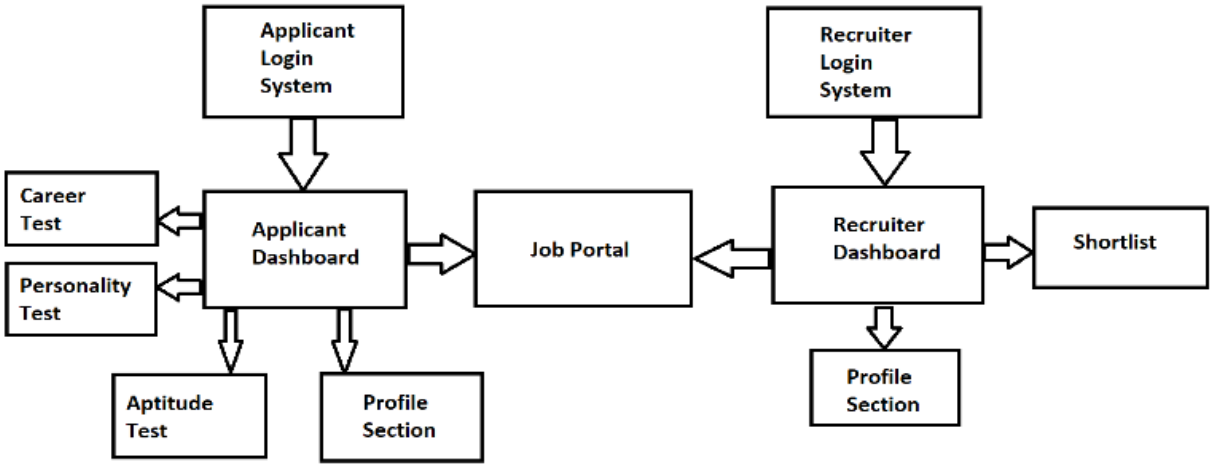

Fig 4.1 System architecture

The career portal is divided into two parts:

A) Applicant Dashboard

Applicant needed to be login first.

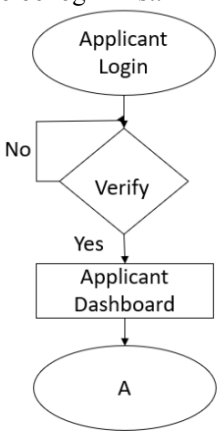

Fig 4.2 Applicant Login activity

This Dashboard has five sections in it.

i) Profile

The applicants can build their profile by filling fields such as position, name, email, skills, experience etc. They can also upload resume and profile picture of their choice. Aptitude score and predicted personality automatically updated on the profile if the applicants has taken tests. This profile is visible to the recruiters when applicants applied for a job.

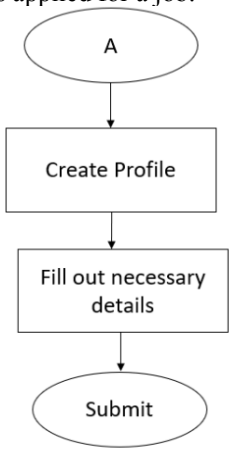

Fig 4.3 Applicant profile activity

ii) Aptitude test

There are two types of aptitude tests available on the portal, Complete aptitude test whose score are stored in the database and shown on the profile. Other is mock tests of type Quantitative, Logical and English. Each test has certain number of questions which are always be different and random, because we are fetching it from large question set. There is also a negative marking of 0.4 marks.

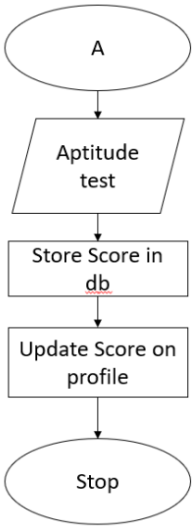

Fig 4.4 Aptitude test activity

iii) Career Test

This test is consisting of 25 academic questions related to the applicant. Almost every answer to the question, ranges in the value of 1 to 5. All the answers given by the applicant is passed to the career predicting model to get the necessary output and display to the user. This test is helpful to the students deciding their career interest. Career predicted by our model are Technical support, Software developer, UI/UX Designer, Data Analyst, Technical Writer, Web Developer, Software Tester, Business Analyst.

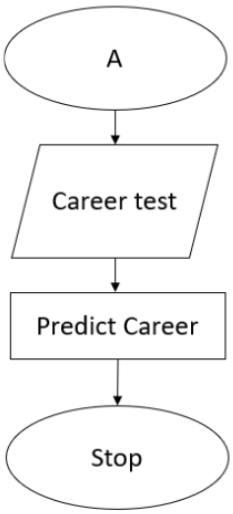

Fig 4.5 Career test activity

iv) Personality test

This test is consisting of 27 personal questions related to the applicant. Almost every answer to the question, ranges in Disagree, Slightly Disagree, Neutral, Slightly Agree and Agree. All the answers given by the applicant is passed to the personality predicting model to get the necessary output and display to the user. The personality predicted is stored in to the database and display on the profile. This will be helpful to the recruiters will selecting the candidate having best personality. Personality predicted by our model are Dependable, Extraverted, Lively, Responsible, Serious which are made of big five personality traits. Questions are designed in such a way such that every five questions belongs to the specific Big Five personality traits. We have referred the questionnaire mentioned in the paper[5] .

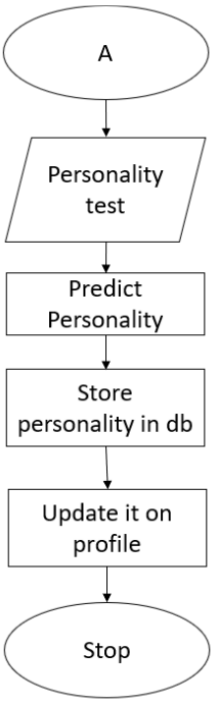

Fig 4.6 Personality test activity

```
Q1) What is your Gender?
Q2) What is your Age?
Q3) I Have a rich vocabulary.
Q4) I Have a vivid imagination.
Q5) I Have excellent ideas.
Q6) I Am quick to understand things.
Q7) I Spend time reflecting on things.
Q8) I Am relaxed most of the time.
Q9) I Seldom feel blue.
Q10) I Change my mood a lot.
Q11) I Get upset easily.
Q12) I Am easily disturbed.
Q13) I Am always prepared.
Q14) I Pay attention to details.
Q15) I Get chores done right away.
Q16) I Like order.
Q17) I Follow a schedule.
Q18) I Am interested in people.
Q19) I Sympathize with others' feelings.
Q20) I Have a soft heart.
Q21) I Take time out for others.
Q22) I Make people feel at ease.
Q23) I Am the life of the party.
Q24) I Feel comfortable around people.
Q25) I Start conversations.
Q26) I Talk to a lot of different people at parties.
Q27) I Don't mind being the center of attention.
```

Fig4.7 Personality test questionnaire

```
Q1) What is your SSC percentage?
Q2) What is your HSC percentage?
Q3) What is your Engineering CGPA?
Q4) What is your college type?
Q5) No of Academics projects done?
Q6) No of self projects done?
Q7) How good are you in core technical subjects?
Q8) How good are you in aptitude solving?
Q9) How good are you in problem solving?
Q10) How good are you in programming language?
Q11) How good are you in abstract thinking?
Q12) How good are you in design thinking?
Q13) When you used the computer first time?
    1)I haven't used computer till now.
    2)During Engineering college.
    3)During Junior college.
    4)During High school.
    5)During Primary school.
Q14) How well do you understand the problem statement?
Q15) How well do you perform in lab?
Q16) How good are you in DSA?
Q17) In how many domain have you done project?
Q18) How many competition you have attended?
Q19) How many competition you have won?
Q20) How many extracurricular activities you have attended?
Q21) How good was your learning capabilities?
Q22) How good was your college teaching?
Q23) How many college teachers know you?
Q24) How well do you perform in college exam?
Q25) How good are you in communication?
```

Fig 4.8 Career test questionnaire

v) Job Portal

This is the place where applicants and recruiters meet. Available job profiles with job title and job description are shown to the applicant with the link redirecting to the profile of the recruiter who has post that job notice. Applicants can apply to the job posted by the recruiters by simply uploading their resume. The resume contents of each applicant is passed to the nlp model, which extract the relevant entities and stored into the database in the form of key value pairs. Once the applicants applied for a job they cannot reapply.

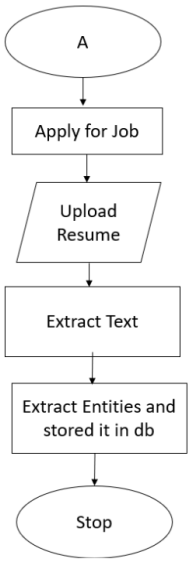

Fig 4.9 Job portal activity

B) Recruiter Dashboard

Recruiter needed to be login first.

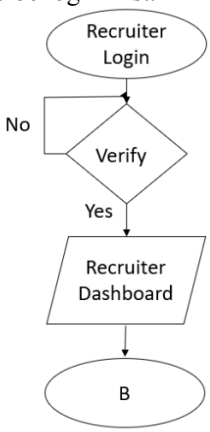

Fig 4.10 Recruiter Login activity

This Dashboard has three sections in it.

i) Profile
The recruiters can build their profile by filling fields such as position, name, email, skills, experience, company details etc. They can also upload profile picture of their choice.

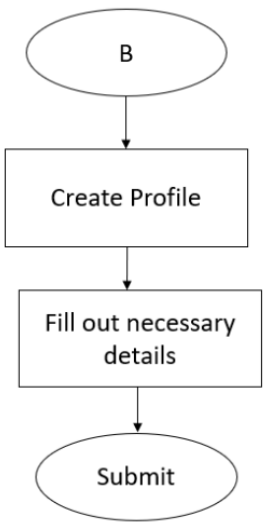

Fig 4.11 Recruiter Profile activity

ii) Job portal

The job portal of recruiter side is used for creating the job notices. They can create job notices by giving the job title and job description. Job description is then passed through the nlp model to extract the relevant entities and stored it into the database in the form of key value pairs. Once the notice created, recruiter can see the applicant count for that job and perform tasks such as shortlisting or delete the post.

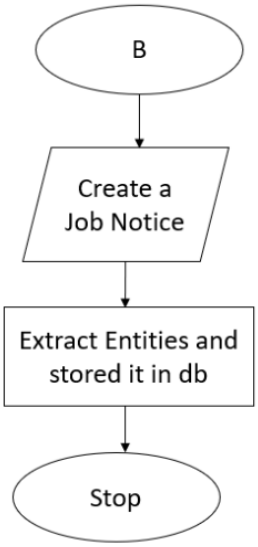

Fig 4.12 Job Notice activity

iii) Shortlist

Automated shortlisting of the applicants is available for the job on the recruiter side. The process goes such that the matching of the entities of every resume with the entities of the job description takes placed. The score is generated for every applicant based on matching and stored in the database. Further the applicants with their profile link and resume link is shown to the recruiter in the descending order of the score calculated.

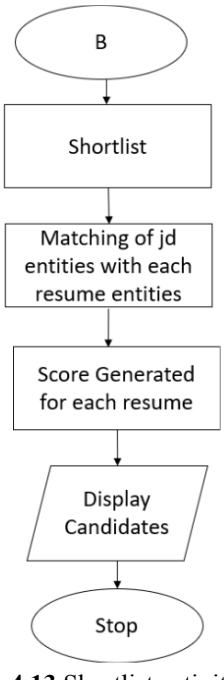

Fig 4.13 Shortlist activity

V. IMPLEMENTATION AND RESULTS

The complete project is implemented with HTML5, CSS3, Bootstrap, JavaScript, Flask and python. All the machine learning models and nlp model is deployed at the backend of the web portal. Some machine learning models has taken in consideration for predictions. We have tested and compared the models based on their accuracy. We have implemented the best accuracy models in our project.

Below is the accuracy analysis of career prediction models

Sr No	Career Prediction Models	Accuracy
1	Decision Tree without feature selection.	20%
2	Decision Tree with feature selection.	50%
3	Xgboost (Boosting the decision tree)	93%

Fig 5.1 Accuracy table for career prediction models

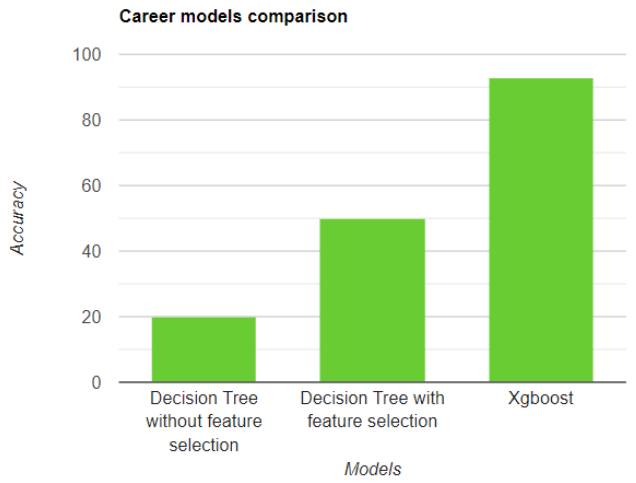

Fig 5.2 Bar Graph Comparison

```
Decision Tree accuracy without feature selection: 20%
Decision Tree accuracy with feature selection: 50%
XGboost accuracy: 93%
```

Fig 5.3 Snapshot of Google Collab

Working of XGboost Model

As shown above based on the accuracy we get on testing the models. We have chosen xgboost model for implementation of career prediction. The dataset has too many columns so we decided to use the chi-square test to get the important columns(features) from dataset. Decision tree algorithm goes as follows that it we first create the root node with complete dataset then we starting dividing the node based on the condition and creates the decision node. We recursively goes on dividing this node until we reach the leaf node which cannot be divide further. We have trained one decision tree on all features and a different decision tree on selective features for better accuracy. Xgboost is boosting algorithm which build the multiple decision tree one by one such that the new tree tries to overcome the errors of the previous tree. Thus, this helps in increasing the predictive power of the model.

We have made the python pickle file of trained xgboost model and imported it on our project backend for prediction based on form choices given by the applicant through career test available on applicant dashboard. Career prediction test is helpful to the students who need to decide their career but getting confused in lots of options available. As results of prediction is not needful in recruitment process, we are not going to store the results in database.

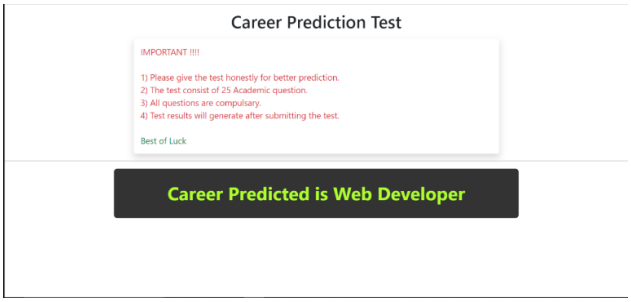

Fig 5.4 Snapshot of career predicted on portal

Below is the accuracy analysis of personality prediction models,

Sr No	Personality Prediction Models	Accuracy
1	Logistic Regression	42%
2	Logistic Regression by changing parameters value.	79%

Fig 5.5 Accuracy table of personality prediction models

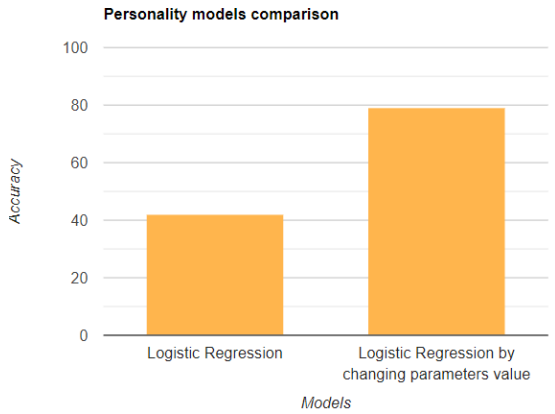

Fig 5.6 Bar Graph Comparison

```
accuracy = accuracy_score(y_test,y_pred)
accuracy*100

42.857142857142854

accuracy = accuracy_score(y_test,y_pred)
accuracy*100

79.54545454545455
```

Fig 5.7 Snapshot of Google Collab

Working of Logistic Regression Model

For personality prediction we have choose the logistic regression model as it was good fit for both regression and classification. After testing the model on dataset

and changing some parameters we able to achieve the good accuracy and thus we deployed that model in our project. In logistic regression basically we calculate the probability and based on threshold value defined we classify the data. As the logistic regression requires the binary data i.e 0 or 1. It uses the sigmoid function to map the linear data to binary data.

We have done same process of pickling and importing the model as we have done previously for another model. This model is used for predicting the personality of the applicant through the choices given by them in personality test available on applicant dashboard. As the personality of applicant is also matter in recruitment process thus, we are going to store the results and displaying it on the applicant's profile.

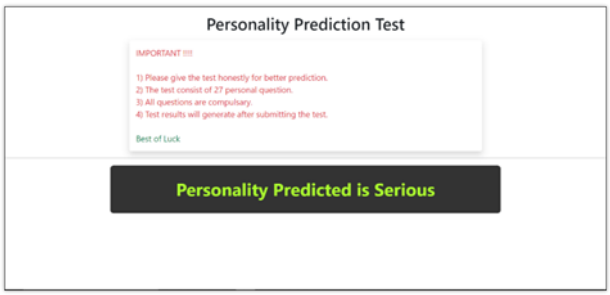

Fig 5.8 Snapshot of Personality predicted on portal

Aptitude test questions are stored in a JavaScript file as an objects, when applicant start the test questions are picked randomly from this file and feed to the applicant. Some rules are implemented on the aptitude test such as copy paste of text is blocked, test always open in full screen, test will auto submit on timeout, etc. There is also negative marking of 0.4 marks.

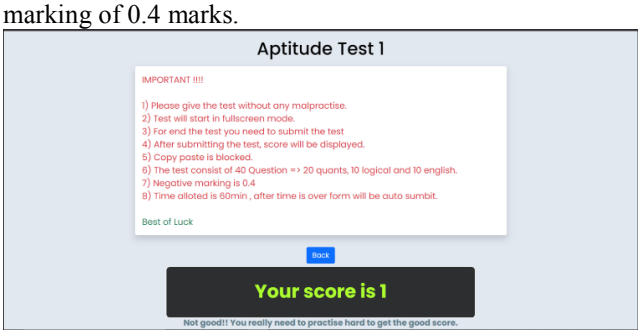

Fig 5.9 Snapshot of aptitude test

Working of nlp Model

For nlp model, we have used spacy library to trained the resume dataset. The dataset available on Kaggle[11] consist of 220 annotated resumes in a json format from which 200 resumes are used for training and 20 resumes are used for testing. Spacy[16] gives us freedom to train the nlp model to identify the required entities such as experience, skills, degree etc. This can be easily done by just updating the NER pipeline during training of model. This model is also deployed in the backend of the portal and used for extracting relevant entities from resume as well as job description.

As we know there are n numbers of resume format are available on internet so it is always advised to build the ATS[12] friendly resume so they can parse correctly. Job portal also has a sample resume format to download for applicants. When the applicant apply for a certain job by uploading resume , the resume is converted into text automatically using PyMuPDF[17] library. The text is then feed to the nlp model to extract the entities and stored it into database in key-value pairs. Same process happens when the recruiters post the job description. When the recruiter click on 'shortlist' , matching of entities from job description with entities from resume takes places. Matching plays a crucial part in calculating the scores for every applicant. When entities matched then the matching of their values takes placed. We have used the regular expression to split the values on delimiters like '/', ':'. '@' etc. When the values matched score value is incremented by 1 and at the end of this process the score is stored into the database. This matching process happens for every applicant resume and scores are generated. Finally, the applicants are shortlisted in descending order of their score. Shortlist contain the applicant's resume and profile.

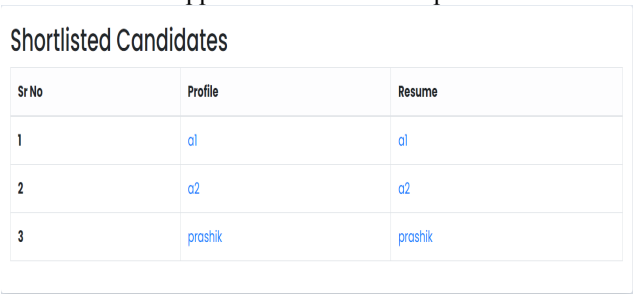

Fig 5.10 Snapshot of Shortlisted Candidates

6. CONCLUSION

The system that we proposed is fully implemented and tested for various test cases. We tried to build a portal with all the combine functionalities that's needed by both recruiters and applicants. We have targeted various problems such as shortlisting, career confusion etc. and tried to overcome this problem with the solution with in our scope. Various models that we used in the project has also shown the accuracy of 93% and 79%. Our system will definitely help the recruiters to select the best candidate for the job by going through automated shortlist and profile of each applicant provided by our portal.

7. FUTURE SCOPE

Web crawler can be used, which will crawl applicant's various online social profile such as LinkedIn, Facebook, GitHub etc. This will be helpful to get the more accurate entities that can used in shortlisting process.

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AET 035

Book Barn

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Abstract— In the current scenario websites or apps allow users to buy new books, sell old books or rent books but none of them provides all of these features on the same platform. There are many websites that are now focusing on E- books as they are easy to maintain and can be read anytime and anywhere the user wants. The proposed system allows user to buy new books, sell old books, rent old books all at the same place. The web-based application would have a recommendation system that would recommend books to users based on various parameters. The recommendation system here would be designed using Machine Learning thus making it almost close to real life recommendations. The system would also have E-commerce features like Product filter, product search option, responsive User Interface etc.

Keywords—E-Books,Recommendation system, Machine learning, Product Filters.

I. INTRODUCTION

Books have been our source for gaining information or learning new things since a long time but recently we have seen a fall in the number of book readers. People have shifted their attention to E-books which are available easily and can be read anytime a user wants whereas a physical book is available in a Library or it needs to be purchased. But a study suggests that a physical book helps the reader to absorb more information than an E-book. It is a need to make books easily available to people or to bring the library online. A physical book helps the reader to stay focused and is easier on the eyes. However, these benefits didn't stop the rise of E-books. To solve this many E-commerce companies like Amazon, Flipkart tried to sell books online and allowed users to sell used books. Amazon provides an extra option to buy E-books. Sites like Padhega India offered a chance to rent books or buy/sell used books. But none of them offered all the services together at a same place. We have tried to improve this by building a platform where a user can do all the above services at the same place and thus provide users with features like Shopping Cart, Product recommendations. The objective is to design a web-based application which would provide users with a variety of books and allow users to buy, sell, rent books with all other services including shopping cart, a recommendation system to recommend books to the user, a responsive user interface and other features that a regular E-commerce website has. Thus, reducing user's efforts to buy a book and saving their time by bringing books to their phones. This would not only allow users to buy books but at the same time boost the sale of physical books.

II. LITERATURE SURVEY

In paper [1] Nayana Vaidya and Prof. Khachane A.R describe recommender system as an information filtering system which recommends the products or items to the user. They further describe Content based recommender system as the system that compares the already purchased or searched items by the user and recommends similar items to the user and Collaborative Filtering as a method where prediction for the active user is done by calculating the weighted average of all ratings of similar users.

In paper [2] Aayush Jain, Shweta Rajeev, Mayank Katiyar, Shreya Sreenivasan, Mr. Mohammed Zabeeulla aimed to build a Web Based Product recommendation and shopping website named OYE, the application made use of MEAN Stack i.e. Mongo DB, Express, Angular, NodeJS. The recommendation system for their application was built using KNN algorithm. OYE was an e-commerce website, developed to use Recommender Systems, it compared the costs of books and eradicated fake reviews while shopping online. It helped the end-users to completely rely on the website while shopping. This project focused on making use of content-based approach in addition to Collaborative Filtering approach to endorse quality content to its users. The project also aimed at using soft computing technologies to create an automated process and develop an intelligent web application.

In paper [3] Kaivan Shah aims to build a Book Recommendation System using Item Based Collaborative Filtering, He studies different approaches for recommendation as well as different approaches in Collaborative Filtering. He uses the goodbooks10K data set for performing Collaborative filtering. The paper contains the implementation of Item Based Collaborative Filtering with Python.

In paper [4] E. Uko Okon, B. O. Eke and P. O. Asagba aim to build a Book recommendation system using Collaborative Filtering. They describe a recommender system as a type of information filtering system that predict the rating or preference that a user would give to an item. Recommendation system describes web applications that predicted response to options.

3 They have further listed the type of recommender systems as Personalized and NonPersonalized Recommendation.

They take reference of MovieLens dataset where the best weak and best strong generalization results are compared. They use Firebase as a database here.

In paper [5] Wei, Fan & Zhang, Qian propose to build a Online Shopping System based on Browser/Server model which is described as a hidden client mode after WEB development. This kind of network structure mode unifies WEB browser as the client-side in order to integrate the core part of system function realization to the server. The reason for using B/S model is that it simplifies system development, maintenance, and usage. The client only needs one Browser under the B/S model, and the browser interact data with database through Web Server. In order to do this the system would use Java. Java Server Page, Spring Architecture which is an MVC (Model-View-Controller) architecture.

In paper [6] Khalid Anwar and Jamshed Siddiqui survey machine learning based book recommender system, their main focus is on Collaborative Filtering, Content Based Recommendation system and Hybrid Recommendation System. The paper further gives a brief idea about existing book recommendation systems built till date and the technology used for the same an further gives detailed information about the each of them.

III. PROPOSED SYSTEM

When the user first visits BookBarn he will be displayed all the available books on the homepage with a navigation bar that would navigate the user to different sections of the website, if the user wants to buy a book, he would have to create an account to begin shopping on our website. If he already has an account, he could simply login/Sign in to the website. After which the user would be taken to the Account page and the user can now carry out all the activities like Selling books, buying books, renting books. The user can edit his account details, at the same time view different products and add them to shopping cart for checking out later. The user can search for books using the search feature provided in the website. He can further add reviews to the book. If an old version of the same book is available then the user would be able to buy/rent the book as per the seller has specified.

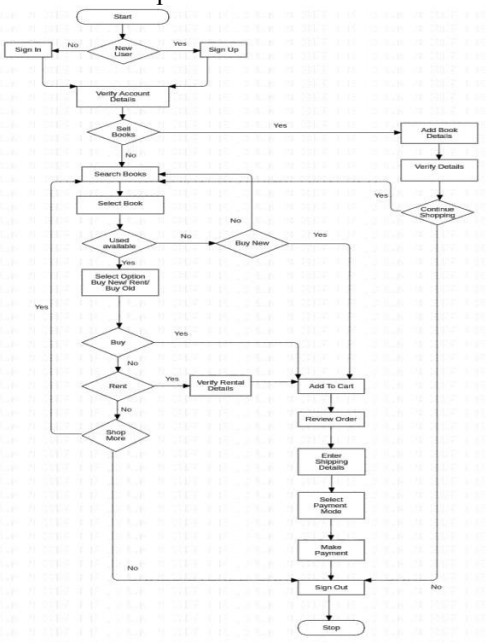

Fig 3.1 Flowchart

Algorithm to be used:

For Recommending books to the user, we would us Collaborative Filtering and content- based Recommendation. Collaborative filtering would use the KNN (K Nearest Neighbor) algorithm which works as follows:

- Step-1: Select the number K of the neighbors (Other users in our case)
- Step-2: Calculate the Euclidean distance of K number of neighbors
- Step-3: Take the K nearest neighbors as per the calculated Euclidean distance.
- Step-4: Among these k neighbors, count the number of the data points(books) in each category.
- Step-5: Assign the new data points to that category for which the number of the neighbor is maximum.

IV. DESIGN

The given diagram shows how application works and how users interact with it.

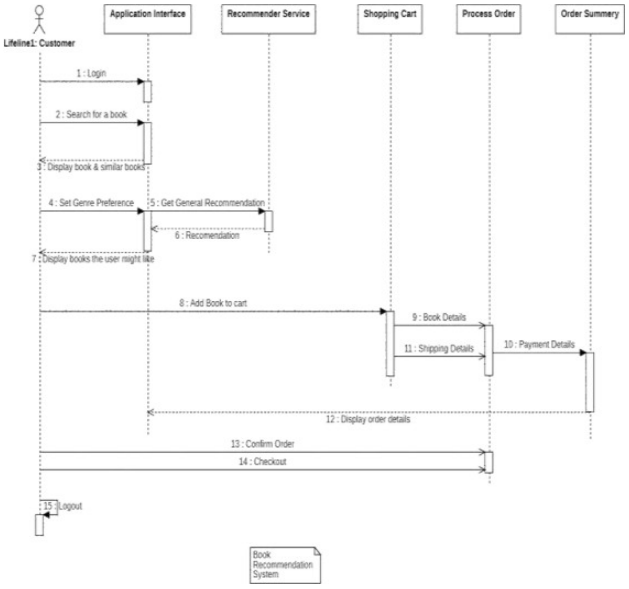

Fig. 4.1 Sequence Diagram

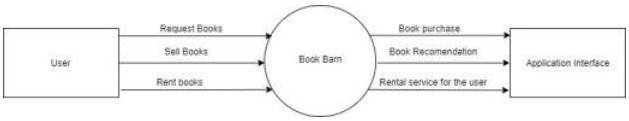

Fig. 4.2 Level 0 DFD

V. SYSTEM SCREENSHOTS

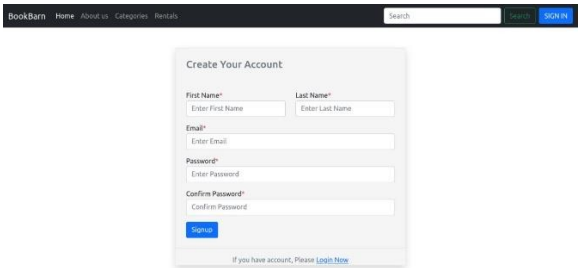

Fig 5.1 User Signup Page

Fig 5.2 Homepage

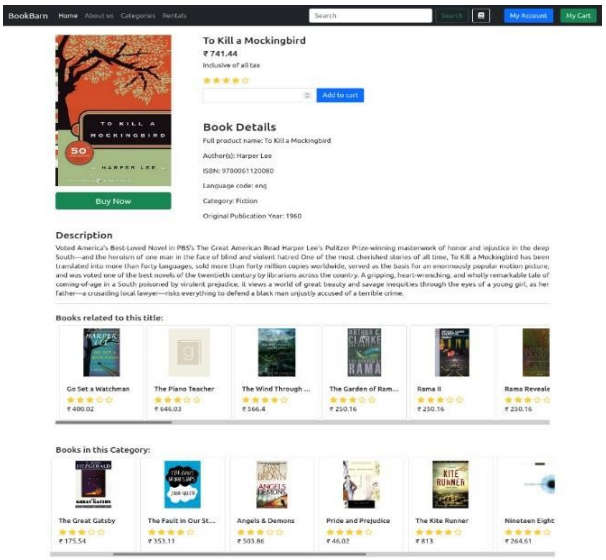

Fig 5.3 Book Description Page

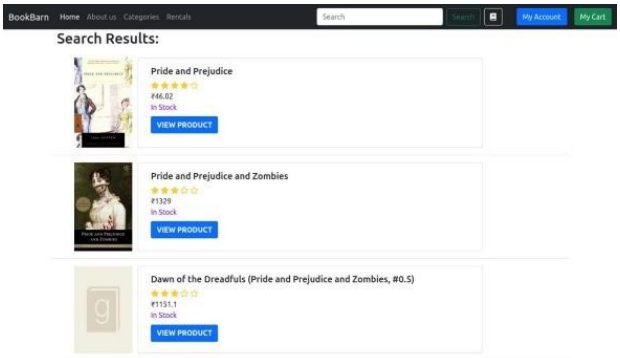

Fig 5.4 Search Page

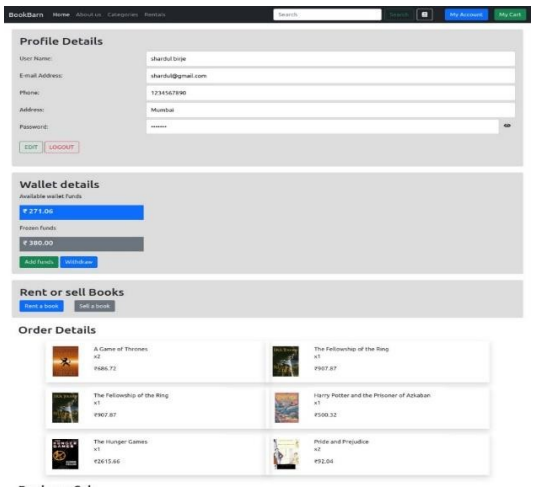

Fig 5.5 User Account page

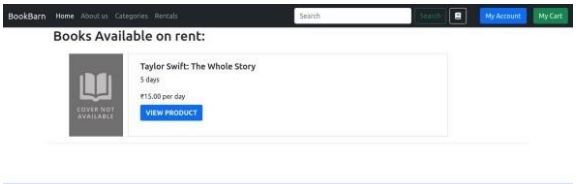

Fig 5.6 Rental page

CONCLUSION AND FUTURE SCOPE

Recommender systems have become an important tool on many websites like NetFlix, Amazon, FlipKart, Spotify. These websites use it for recommending movies, music, products etc. We use this recommendation system to recommend books to users according to their rating history and based on other similar user's experiences. This would thus reduce user's searching time and at the same user could explore more books from our website. This website would further allow users to buy, rent, sell books on the website thus reducing efforts of the user. Thus, the application would be beneficial to user in terms of efforts and at the same time it would save the user's money as a user can rent a book instead of paying full cost. Some features that could be added in the future includes

- The website could be available in multiple languages
- The website can have a Chat Bot to answer user queries
- A point-based system, where a user gets points for reading books could be added to increase user's engagement.
- The website can have a separate section for buying E-Books.
- An Android app could be developed for the same.

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[8] Padhega India: https://www.padhegaindia.in/

[9] Books Wagon: https://www.bookswagon.com/

[10] Sapna Online: https://www.sapnaonline.com/

AET 036

Enhancing Data Security Using Cryptography

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Abstract - Information security has become an important issue in recent decades. Data encryption and decryption has recently been widely researched and developed due to the need for stronger encryption and decryption, which is extremely difficult to decrypt. Encryption plays an important role in meeting these requirements. However, many of the algorithms put forward till date have encountered some problems, including lack of wellness and appropriate time added to delays of packet to sustain the safety of communication channels between terminals. The cloud has many advantages, but its security is an important issue. Also, due to the multi-host, it is less mobile and takes longer to transfer data. Encryption of data is a great approach for achieving data security and privacy. Cryptography technology hides the original content of the data so that it can only be restored using the decryption process . The aim of encryption is to protect your data from unauthorized access when it comes to viewing or modifying it. Cryptography can be implemented using replacement, shift, or mathematical operations. Over the past year, several symmetric key basis algorithms have been developed. Till date, AES , DES , RSA are some of the encryption and decryption algorithms which have been proposed by researchers.

Keywords – Advanced Encryption Standard , Cryptography

I. INTRODUCTION

Due to the security of electronic data is so important, various techniques and methods have been used in the private and public sectors to protect sensitive data from intruders. In network security, encryption gives a way to save or send sensitive information over insecure networks (such as the Internet). So in this a cluster of different algorithms using cryptography is used so that the message can only be read by the intended recipient. Integrated along with the key, the plaintext is converted to the encrypted message (ciphertext) and reconverted to the plaintext on the intended recipient side.

Today, there are several algorithms for encryption and decryption of sensitive data, which are usually divided into three types. The first is symmetric encryption, which uses the same key for encrypting and decrypting of the data. The second is asymmetric encryption which uses two different keys for encryption and decryption. Finally, the cryptographic hash function which does not use the key instead it uses the key to shuffle the data.

Symmetric keys are quite implicit and faster than asymmetric keys. Symmetry algorithms include Advance Encryption Standard algorithm (AES), Simplified Data Encryption Standard algorithm (SDES), 3DES algorithm and Blowfish algorithm. The principal motive of this paper is to provide detailed information about the AES algorithm used for encryption and decryption of data.

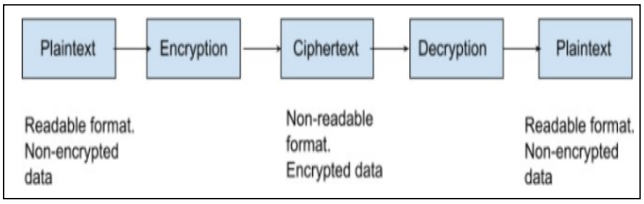

Fig 1 : Cryptography

II. LITERATURE REVIEW

There are various types of cryptography methods used to keep data private and secure. Encrypting data can be broadly classified into asymmetric and symmetric encrypting of data. For the asymmetric encryption , it takes two keys- a public and a private. For the symmetric encryption it makes use of single key which is called the private key. Symmetric encryption is much secured, simple and way faster and since it takes only one key for encryption and decryption it requires less computation power.

A study in paper [1] has performed on divergent secret key algorithms to determine which algorithm can give the best efficacy while crypting the data. For doing that they did the research on four algorithms. To assess these algorithm's contents and capacities of encryption of input files were altered and couple of platforms were taken into consideration to test the algorithms like P-II 266 MHz as well as P-4 2.4 GHz. Corresponding to the outcomes, Blowfish was capable to give the best efficacy related to alternative algorithms and AES got better efficacy than 3DES and DES. It also says that 3DES has one-third throughput to that of DES.

Paper [2] gives the efficacy calculation of symmetric encryption algorithms. This paper was aimed on six algorithms , AES , DES , Triple DES , RC2 , RC6 and Blowfish. To correlate among these algorithms, various fixings were operated on every algorithm like various data types, distinct size of data block, divergent key sizes, battery power consumption also disparate speed for encrypting and decrypting data. Under these settings, there wasn't any denoting yielding when the data types were based on hexadecimal encoding also there was not any

variation while using text or video or other files. Corresponding to the outcomes, Blowfish can give better efficacy, when the packet size changes, which is better than RC6. They also noticed that DES shows high efficacy to that of 3DES algorithm. Also they found out that, time consumption RC2 gave the worst efficacy comparing remaining algorithms. While AES got better efficacy than RC2, DES and 3DES. Nonetheless, we can infer that, when the size of key increases, it requires extra battery and time exhaustion.

Paper [3] check out the efficacy of AES, DES, and RSA for encryption of text files under output bytes, computation time, memory usage. Time required for encrypting was computed to remodel plaintext to cipher text then correlating these algorithms to find which one requires more time. Corresponding to the outcomes they have observed, RSA requires extra time correlated to alternative algorithms. For second parameters RSA requires more space than AES and DES. At last, the resulting byte of every algorithm has taken into consideration. AES and DES generate the equal level of resulting byte while RSA had low level of resulting byte.

This paper concentrates on the Advance Encryption Standard (AES). There are alternative older algorithms which are DES and 3-DES. Data Encryption Standard (DES) makes use of 16-bits block size plaintext and a 56-bits key size to produce a 64-bits Cipher text that is a weaker encryption algorithm. It could be effortlessly solved within a day by using Brute force. That's why it can't be recognized as a safe technique for encryption of confidential medical data. Triple Data Encryption Standard (3DES) is somewhat analogous to DES excluding the key size can have 56 ,112 or 168 bits with same 16-bits block size. AES is superior than DES though exposed to cracking.

III. PROBLEM DEFINITION

Security is important while transferring files and data. It can be obtained by technique of Encryption and Decryption of data. The idea is to make web application that can provide a portal for organizations to store files and encrypt and decrypt them using Advanced Encryption Standard (AES) algorithm. The person who desires access to the file can request a key to the person who uploaded the file and the cipher data of the file can be decrypted with the help of the key and corresponding file can be downloaded.

The proposed system is a three tier architecture model considered as in Fig 2. First layer will be the user interface which will collect the data and this data will be transferred to the middle layer. The encryption of the acquired data will be conducted in the intermediary layer. The middle layer's encrypted data will subsequently be sent to the cloud layer, which is the third tier. In the cloud the final encrypted data will be saved permanently.

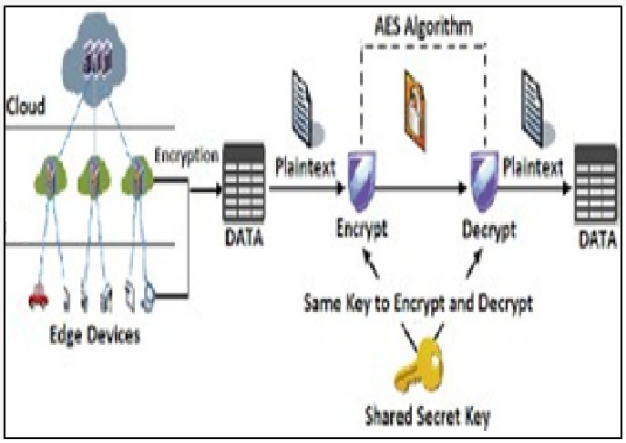

Fig 2 : Architecture of Proposed model [4]

IV. SYSTEM ARCHITECTURE

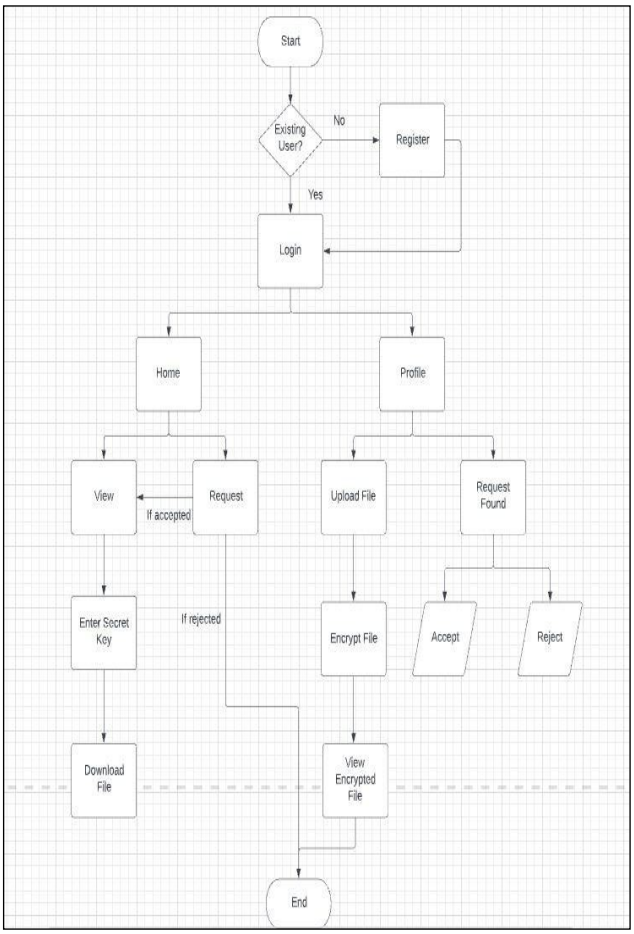

Fig 3 : System Architecture

V. METHODOLOGY

The proposed system consists of following modules :

1. Sign-in System
2. File upload and download with request access feature.
3. File Encryption and Decryption

1. Sign-in System :

This is a basic sign-in system used commonly in various web applications. The user needs to create an account and password for verification . Later the user can log in and log out from his account on any device hence increasing the mobility and flexibility of the system.

2. **File upload and download with request access feature :**
   This module allows the user to upload any type of file on the cloud. The file gets uploaded and gets encrypted generating a key. The key can be shared by the user to the intended person who has requested the access for the file. Once the request has been accepted, the intended person can have access to key which is used to decrypt the file. The same file can be downloaded. This can be understood more easily from the system architecture Fig. 3
3. **File Encryption and Decryption :**
   For this, AES algorithm has been used. The working of the algorithm is given as follows.

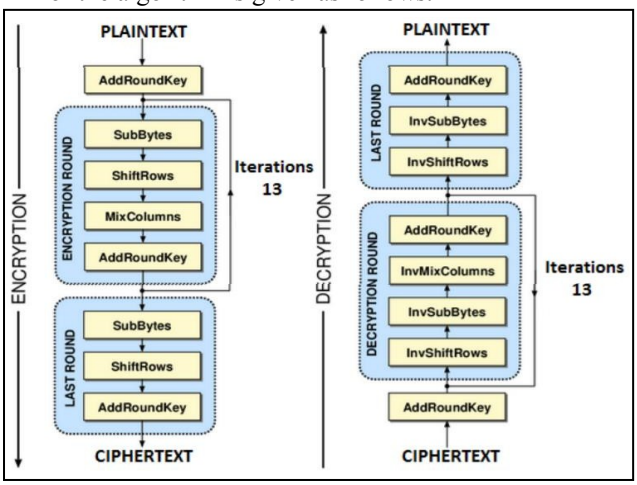

Fig 4 : Architecture of AES algorithm [4]

AES standard uses a symmetric block cipher technique to encrypt and decrypt the data. By applying such a mechanism in the middle layer, data security is doubled, with one at the middle layer and the other at the cloud's traditional security system. AES employs a 16-byte plaintext block with a key size of 128, 192, or 256 bits. When you combine them, you'll obtain a cypher text as an output. The AES algorithm uses a 4*4-column major order matrix. It performs numerous rounds of transformation depending on the key size to convert plaintext to encrypted text. 10 cycles for 128-bits (16 bytes) , 12 cycles for 192-bits(24 bytes) , 14 cycles for 256- bits(32 bytes).

In this paper we will explain the 256-bits key size AES algorithm [5][8].

In AES algorithm [4] each round consist of four steps and the plain text is divided into 16-byte block which is represented into 4×4 matrix. It creates a chain of substitution and permutation network.

Substitution - replacing inputs by specific outputs. Permutation - by rearranging bits around.

Step1: Byte Substitution:

This step includes 16 bytes input being substituted by using the lookup table called the S-box given in the design. S-Box has a 16×16 box size.

```
Void ByteSub ( byte[ ][ ]state )
{
for (int row = 0 ; row < 4 ; row++) { for ( int col = 0 ;
col < N ; col ++){
state[row][col] = SBox[state[row][col]]; }}
}
```

Step2: Shift Rows :

Here each row of the matrix is shifted to the left cell at every row. The shifting pattern follows as: The 1st row of the matrix is not moved. The 2nd row is moved to the left cell by one position. The 3rd row is moves to the left cell by two positions. The 4th row is shifted left cell by three positions. The result is that at every cycle a new 4×4 matrix is generated with same element in the cell but at different positions

```
Void RowShift ( byte [ ][ ]state )
{
byte[ ]s = new byte[4] ;
for (int p = 1 ; p < 4 ; p++){

for ( int q = 0 ; q < N ; q ++) s[q] =
state[p][(q+1)%N];
for ( int q = 0 ; q < N ; q ++) state[p][q] = s[q] ;
}
}
```

Step3: Column Mix :

In this step each column consisting of 4 bytes is transformed to a complete new bytes using a mathematical technique. The result is that at every round a new matrix is made composing of all new 16 bytes.

```
Void MixCol (byte[ ][ ]state)
{ byte[ ] b = new byte [4] ;

for ( int col = 0 ; column < 4 ; column ++ ) { b[0] = (
0x02 #state[0][a])^

(0x03 # state[1][a])^state[2][a]^state[3][a] ;
b[1] = state[0][a]^(0x02 # state[1][a])^
            (0x03 # state[2][a])^state[3][a] ;
b[2] = state[0][a]^ state[1][a]^
            (0x02 # state[2][a])^(0x03 # state[1][a]):
b[3] = (0x03 # state[0][a])^state[1][a]^
            state[2][a](0x02 # state[3][a]
; } for ( int k = 0 ; k < 4 ; k ++ )
            state [k][col] = b[k] ;
}
}
```

At the final round this step will not be included.

Step4 : Add Round Key :

The resulting 16-byte (128-bit) matrix is XORed to the 256 bits of the round key in the AddRoundKey step. The final XORed value will be the cypher text in the last phase, or else the resultant 16-bytes matrix will be used in the next round.

```
Void AddRoundKey (byte[ ][ ]state)
{
for( int col = 0 ; col < N ; col ++ )
{ for( int row = 0 ; row < 4 ; row
++){
state[row][col] = state[row][col]^n[nCount++] ;
}}
}
```

Each step in the AES rounds is invertible and acts on a substitution and permutation network. The steps of

encryption shown in Figure 4 include: (i) a)Key Expansion at the first stage; b)Key Expansion at the second stage; and c)Key Expansion at the third stage (ii)The AddRoundKey step will be done in the initial round. (iii)Rounds, which contain Byte substitution, ShiftRows, and AddRoundKey, and (iv)Final Round, which includes Byte substitution, ShiftRows, and AddRoundKey. It's just the inverse of encryption when it comes to decryption.

VI. RESULT AND DISCUSSION

[1] The figure below shows the Sign-in system . If the user has already sign-up then he can login using username and password.

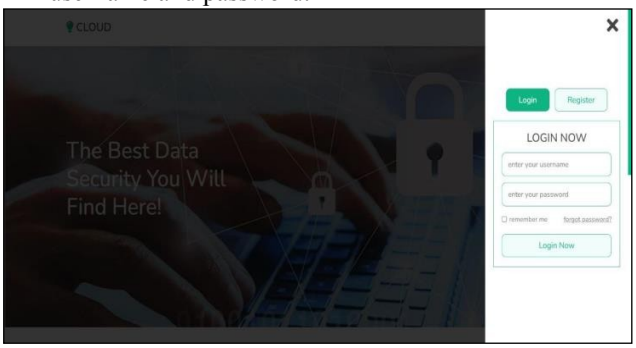

Fig 5: Sign-in System

[2] The figures Fig 6 and 7 below shows the file upload system which can be done in profile section. The user can upload the file and give it a desired name. The file gets encrypted. All files uploaded by various users can be seen on the home section. The user can request access for the file and view the file if the request has been accepted.

Fig 6 : Upload file feature

Fig 7 : Home Section

[3] The below figure shows the generate key feature in the profile section. The key can be generated for the uploaded file by the user. This key is shared to person who wants access to the file. The key is used for decrypting the file.

Fig 8 : Generate Key feature

[4] When the user requests access for the file. The owner (one who uploaded the file) receives the request in 'Request Found' feature in the profile section. The user needs to generate key has shown below and then has to accept the request to grant permission to the file. The is shown in the below figure.

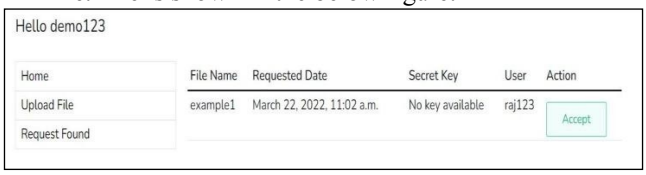

Fig 9 : Request Found Feature

VII.CONCLUSION

To some extent, cryptography is able to circumvent the security issues of traditional cloud architecture. It improves data security, correctness, consistency, latency rate, and overall quality of service by establishing an intermediate layer of data encryption and decryption. This paper proposed a novel method for encrypting and decrypting complicated data. Despite the fact that many academics have worked on cryptography, the majority of existing algorithms contain multiple flaws, either due to a low security level or due to the algorithm's architecture. The suggested technique has been tested against a variety of known attacks and has been found to be secure. As a result, it can be considered as a viable alternative to some applications due to its high level of security and the fact that the average time required to encrypt and decrypt data using the suggested algorithm is significantly less than that required by the AES algorithm.

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AET 037

Swastha: E-Healthcare Application

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Abstract - Advanced access and cost savings for health and quality access requirements are further added. Because the use of information technology to reuse medical data is increasing, most of the most information required to solve these problems is stored in digital format. Information technology that supports websites can access long-distance computer operations and other informational disabilities, and provide funds for effective integration. This describes the web grounded health work. This represents the mobile healthcare system grounded for Android and Web operations. The system provides case support, identifies and selects crockers based on their location and expertise. The system allows you to create a removable case with a crocker and allocates monuments for designated species and vaccinations. The results of surgical approval show great time savings and mobility of croakers and patients.

keywords - android, web, health, healthcare.

I. INTRODUCTION

Many medical surgeries have been developed for smartphones and are widely used by medical professionals and patients. The use of these tasks is convincing because it causes better communication between crooks and cases, and increases the overall quality of treatment. Literary review of health business focuses on various medical fields similar to patient care, and fixed wards, smart phones, weight loss applications and fitness and fitness, weight loss applications and fitness and fitness, fitness and fitness, Fitness, fitness, fitness, communication intelligence. Our proposed healthcare system is based on Android and WebApps. Provides medical support for examples living in delicate and limited areas, and saves blood and case a lot of time. The proposed work determines the system, grounded position, professional and vacuum and croaks registered in vacuum. You can use Crouckers to use Crouchers to assign reminders to the specified properties and immunizations. Paper is configured as follows: First, we present the design of mobile health systems and the design of various operations and maintenance, and then test the results and ultimately output. Healthy business or so-called mhelve results are growing with the global increase in smartphone work. Such mobile applications for health associations will help you provide services with high quality quality control, improved workflow and increased thermal commerce when minimizing cost and complexity.

II. LITERATURE SURVEY

The exploration paper Exigency Case Care System Using Chatbot gives information regarding chatbot system which answers all the questions fed by stoner. This is an exigency services chatbot for cases that helps stoner get answers of queries through natural language processing. The system takes a plain textbook as input and answering all type of questions affair by a good stoner is the affair. The purpose is to give a result to the problem. It uses dialog inflow to make the chatbot. In the A Personalized Medical Assistant Chatbot Medi Bot exploration paper the system tries to enhance the capability of a chatbot from being used just as a tool of communication to prognosticate complaint grounded on symptoms handed as input. We'll be using the speech to textbook point to make our chatbot more stoner friendly and have voice enabled point. In Mr. Doc A Doctor Appointment Application System the main idea of this work is to give ease and comfort to cases while taking appointment from croakers and it also resolves the problems that the cases have to face while making an appointment. This android operation acts as a customer whereas the database containing the croaker's details, case's details and appointment details is maintained by a web point that act as a server. Security Model for Healthcare Application Paper says In Cloud Computing In this paper, My PHR Machines, a pall grounded PHR system answers our exploration question. One of the agreed crucial conditions for share- capability of the EHR is to break the nexus between the EHR and the EHR system. The My PHR Machines armature easily separates PHR data from the software to work with these data. This paper demonstrates how this creates new openings for the request of PHR software services without compromising patient sequestration. Salubrity-A drug memorial operation using android paper says the proposed system is grounded on Android Operating system which will remind the druggies to take drugs on time through announcement and automatic alarm ringing system. The mobile operation can be installed on the android bias. It'll add recreating events to the mobile's timetable and will warn the stoner when he/ she has to take the drug with the image of drugs. Security Model for Healthcare Application In Cloud Computing paper provides a secure and trusting m-healthcare operation, so that druggies can use this operation for their sensitive data without any mistrustfulness of security trouble. It's also a stoner-friendly operation, so druggies can fluently use the operation. 3Applications on Android, it's learnt that Mobile plutocrat operations are accessible, and they're the

future of banking and deals. We're complete in chancing vulnerabilities implicit security issues using this Android application revealed the convenience of mobile money applications and the future of banking and trading behind them. It can be used to find vulnerabilities, potential security issues.

III. PROPOSED APPLICATION FRAMEWORK

3.1 Flowchart and its explanation

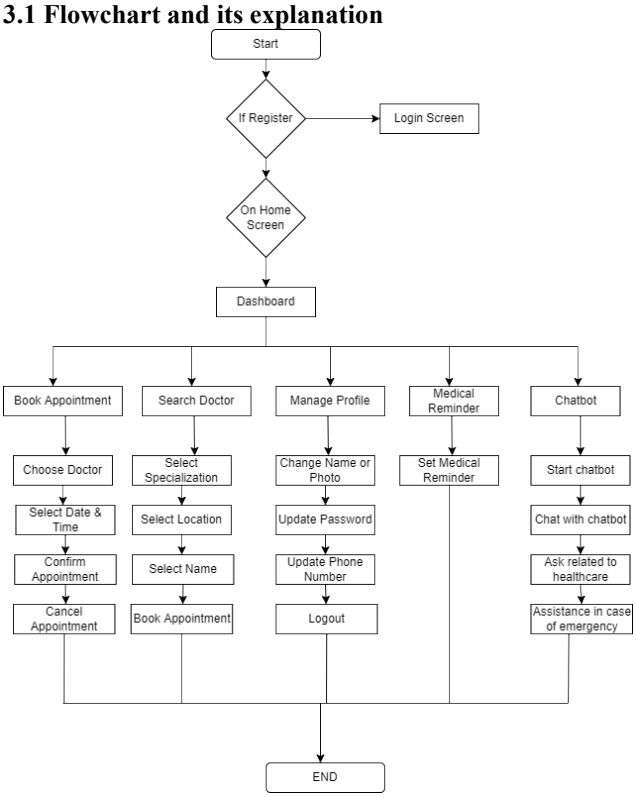


Fig. 3.1.1 Flowchart

Here the user is required to register by providing personal data. The user can then log in directly to use the available features, and the user can use the logout option after completing the task.

IV. METHODOLOGY

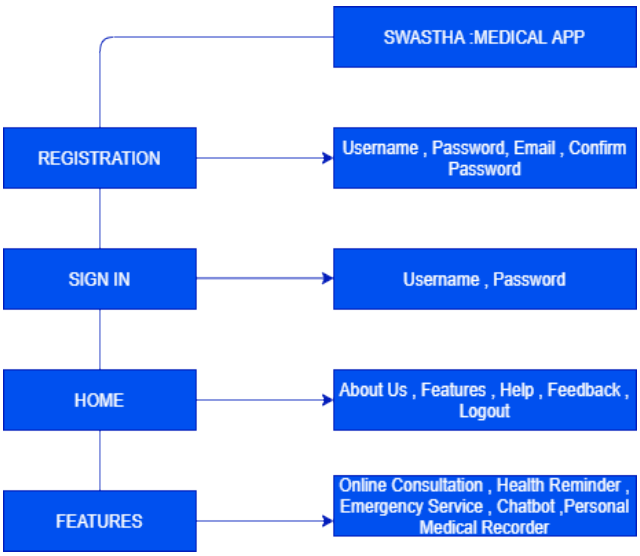


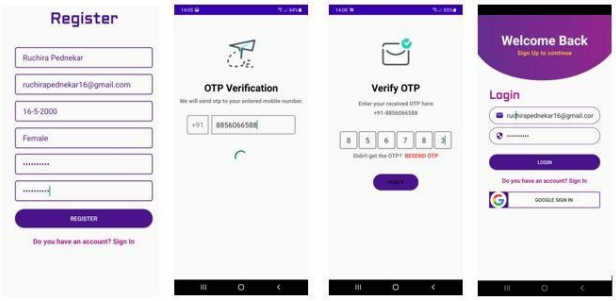
Fig (1).

The flowchart above illustrates the home page of a web page.

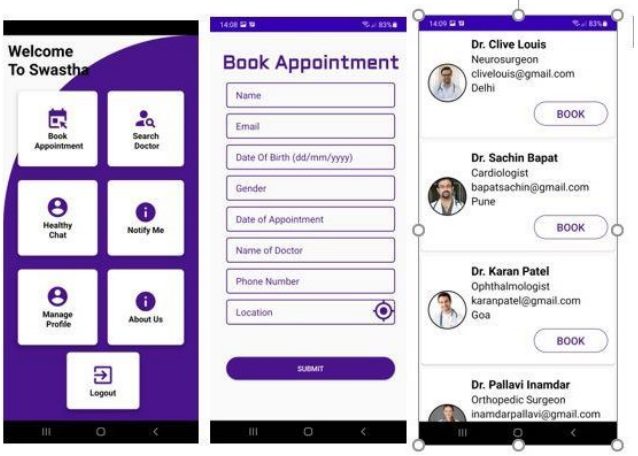
Provides user registration with login and logout functions. The menu bar consists of an "About us" page, a feedback page and all the features available to the user, such as online consultations, personal medical records, health notifications, emergency services and chatbots.

V. RESULTS

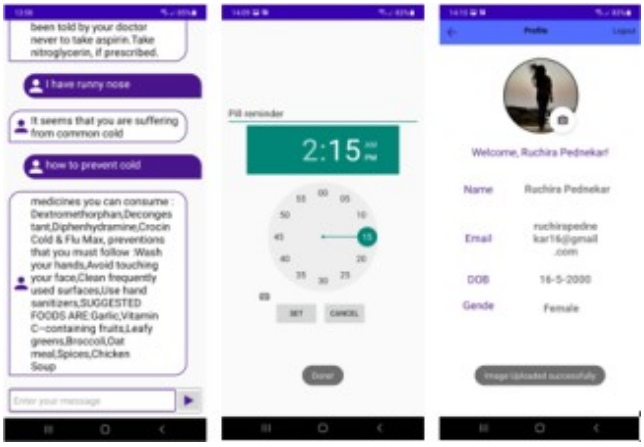
1. Registration:



2. Dashboard, Book Appointment & Search Doctor



3. Chatbot, Health Reminder & Manage Profile



VI. CONCLUSION

Health care is moving into the home decreasingly frequently and involving a admixture of people, a variety of tasks, and a broad diversity of bias and technologies; it's also being in a range of domestic surroundings. The factors driving this migration include the rising costs of furnishing health care; the growing figures of aged grown-ups; the adding frequence of habitual complaint; bettered survival rates of colorful conditions, injuries, and other

conditions; large figures of stagers returning from war with serious injuries; and a wide range of technological inventions. The health care that results vary vastly in its safety, effectiveness, and effectiveness, as well as its quality and cost.

VII.FUTURE SCOPE

We can also integrate online drug orders for medical conventions. Focus on Quality care by automating routine medical processes, this allows healthcare providers to concentrate on patient care. Ameliorate Case Satisfaction by adding feedback and standing system. Due to standardized workflows and automated features like instant access to case records and history of medical treatment, medical providers, can work more effectively, this improves patient satisfaction. Data operation allows medical interpreters to add and store patient information electronically and allows croakers to view it.

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AET 038

Social Media Application for Farmers – Implementation Paper

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Abstract - In India, the gap between the rural sector and digitalization is increasing day by day. As the technology progresses in education, business, tourism the main economical sector of India the agricultural sector has scarcity of technology. Lack of connectivity, no centralized system and irregularity between the planning and action of the agricultural sector has drifted the agricultural sector behind. As the nation keeps progressing there should be an introduction of an application that connects the root level food producers. This application will help them to connect with one of their kind, get to know about various facilities provided to them and progress further in their business.

Social Media application is proved to be a revolution for the Internet. Like Yahoo, Facebook and other social media application that connects users. It not only helps users to be in contact with each other but more important things like News, Trends are reached to user with lightning speed unlike Televisions, Radio with stream the news and other important information on a schedule.

It is observed that around 60% of the food producers use smartphone and 50% of them use social media applications like Facebook, YouTube etc. Developing a social media application that will connect them, provide them information, and features like crop price prediction, daily price will help them for their business.

Key Words: Social Media, Farmers, Application, Crop sources, Price Prediction. Survey

I. INTRODUCTION

Social Media application has proved to be a revolution among its users. Any news and information reach the user at lightning speed. Users can talk freely, share their views, know about others and form their own mindset. Unlike the classical information channel like television, radio which provides only one way communication. Social media provides two way communication in which the user can share his/her views freely. In the first decade of the internet social media websites and application were made available to any type of people. But as the technology kept on progressing more focused social media application came into existence like LinkedIn for Professional Careers, Reddit for Community based groups and much more. These focused applications proved to be more useful to the targeted people because their features were very useful for the users. Many users of LinkedIn can find jobs easily by connecting to the recruiters because it was the basic idea on which LinkedIn was made. Traditionally you would have to find a job posting on newspaper or via internet websites, find the recruiter's email and mail your resume. But LinkedIn has revolutionized this traditional job finding system with more easy and one click system.

Similarly, after researching it came into light that the Government of India provides many facilities, schemes to its primary sector: Agriculture Sector.[1] But the reach of these schemes, is far less because of traditional one-way communication. Via Radio, News, or poster. After researching further, it was known that around 60% [2] of the farmers have access to mobile and internet. These include not only the farmers but the people in their household. Looking into this matter, the idea of developing a social media application for farmers where not only the government will share the schemes but farmers too. With this application the agricultural sector [3] will be revolutionized as no such application exist. Along with adding friends, and chatting other features will also be made available so that the users can make use of these features for their work.

II. PROBLEM STATEMENT

With the increased users of the internet in rural India, there exist no single application where farmers can connect with each other, and get various data like weather, prices, market and so on. The users depend on typical social media applications like Facebook, YouTube to get the daily information which in turn depends on the same news sources.

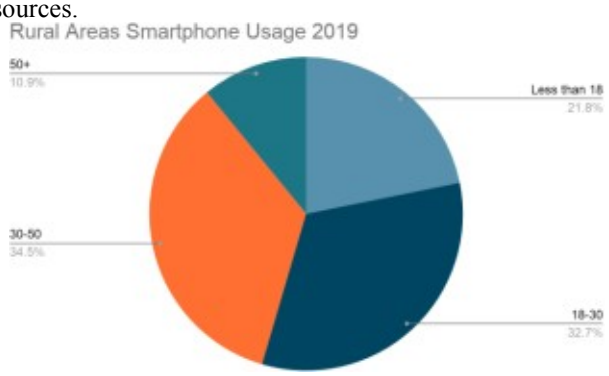

Chart -1: Smartphone usage in rural India

The above figure shows the usage of smartphones In Rural areas on which it can be concluded that the farmers have a channel of communication but aren't able to utilize it completely for their own benefits. We need to design and develop an application that fulfils all the digital needs of the farmer. The application should be simple and multilingual. The features of the application should be

implemented thoroughly such that the user understands the feature and doesn't find it difficult.

III. PROPOSED SOLUTION

Farmos is a social media application. As the name suggest it is the social media application mainly for farmers where farmers can create their accounts, make new friends, chat with them and share post on their timeline. This social media application is made available to all but majorly focuses on features which will be impactful in day to day lives of the primary food producer. The needs of the farmers for their work such as accurate weather forecasting, getting various schemes and plans by the government, knowing about crop calendar and crop prices will be taken into account while developing this application.

Also as we know that the Indian culture is diverse hence the application will be made available in various languages for convenience of the user. The user can change the language and use it on daily basis. This application will revolutionize the agricultural sector. This application will focus on overcoming technical glitches in the existing applications and add new features. Since the existing application are deployed on the typical client server architecture, we will try to deploy on cloud based architecture platforms for faster speed and more power.

IV. OBJECTIVE OF THE PROPOSED SOLUTION

The objective of the application is to overcome various drawbacks in the existing applications.

1. **Slow Process**
   Reason: Due to heavy traffic and low server configurations, the speed at which the data is rendered to application is slow.
   Solution: The solution is to deploy the business logic of the application on faster cloud based PaaS platforms.[7]

2. **Inaccurate Weather Forecast**
   Reason: Weather forecast system in applications can be inaccurate because the data is not constantly updated.
   Solution: The solution is the constantly update weather information with API[8]

3. **Other Technical Glitches**
   Reason: The application was not thoroughly planned and developed.
   Solution: Planning and developing robust application with constant updates to remove less glitches in the application.

V. FEATURES

Following are the features of the proposed solution.

A. User Registration and Sign In
The user will be able to register into its account without any difficulty. The registration details should not create an issue while signing up for the social media. The user will be able to log in with either email or phone number provided. The user will be able to make changes into the profile whenever and wherever. The user will be able to delete the account.

B. Create/View Post
Creating a text based post or picture and text based post and posting it into the feed. Also the user will be able to view other user's post without any difficulty. The user will be provided with two choices for the post upvote or downvote the post.

C. Add and Chat with Friends
The user can search for other users and add them as friends. The friends list will appear on the profile and user can chat with them via internet.

D. Weather Forecast
WeatherAPI is used for weather forecast. This API takes the location of the user and then provides accurate weather information. This information is constantly being updated by the API services and hence user can get weather information on his fingertips.

E. Daily Market Price
The application will share daily market price to the user from which user can know about the current price the market is offering for the crop yield. This data is available on the government[9] website and we only have to render it to the user screen.

F. Crop Calendar
For the young farmers this feature will be impactful as it will show information about planting, watering and harvesting crops. The user can set reminders from here.

G. Crop Price Prediction
This feature will be the most useful as from here the user can predict the price of the crops for 1 week. With this crop price prediction the user can have a small idea whether the price will increase or decrease in the market and sell the crops accordingly. Various data of the previous crops will be taken into account and using previous research on similar topic[10] a good crop price algorithm with high efficiency and low error% should be designed. This feature will use various machine learning algorithms like KNN, Random forest and the most accurate algorithm will be used in the system. The data for the module is available on Kaggle[11] and other government websites.

VI. IMPLEMENTING SOCIAL MEDIA APPLICATION

The application was made using React Native. React Native is a fast cross platform development framework which is based on React.
React Native was chose as the developing platform due to the following reasons.

1. Fast : its developments is fast since it is backed by facebook and the entire open source community.

2. Support : Packages are updated frequently which enhances security and features.
3. Live Updates : Unlike Java, React Native supports live changes to the project which makes development speed faster.

Social Media application requires the following basic features to function.

1. Account creation: The account of the user created with simple and secure method. Firebase backend services were used to store the accounts. Registration and Login page are made and user is able to login with only email and password.
2. Profile : A profile page is made available to the end users so that they can view their details and posts.
3. Posting : Users can post on the main page like status.
4. Interactive Designs : The designs of the application is kept simple so that it will be easier for the end users to use the application.

Following are the screenshots of the application social media.

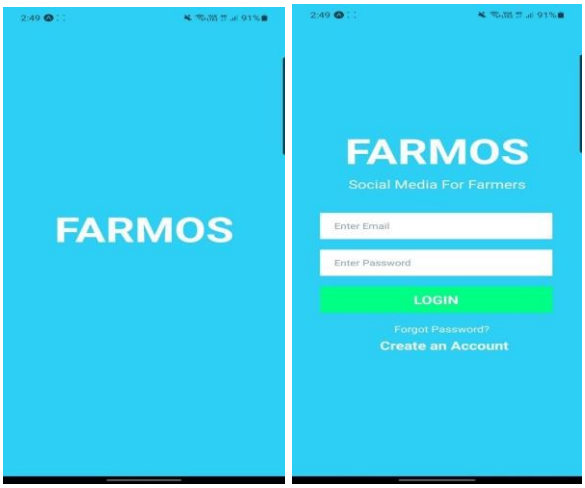

fig 6.1 Splash and Login

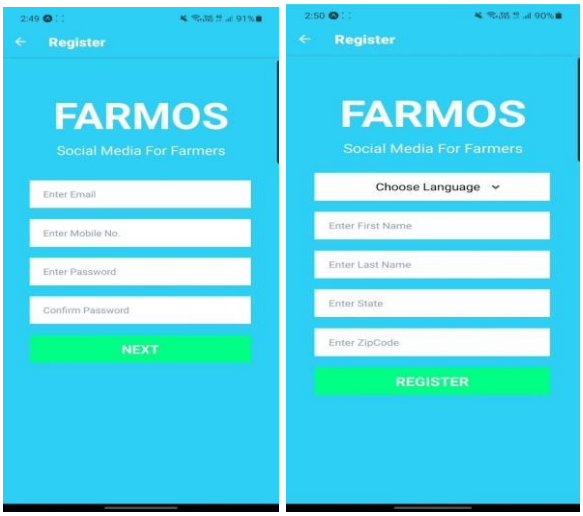

fig 6.2 Register

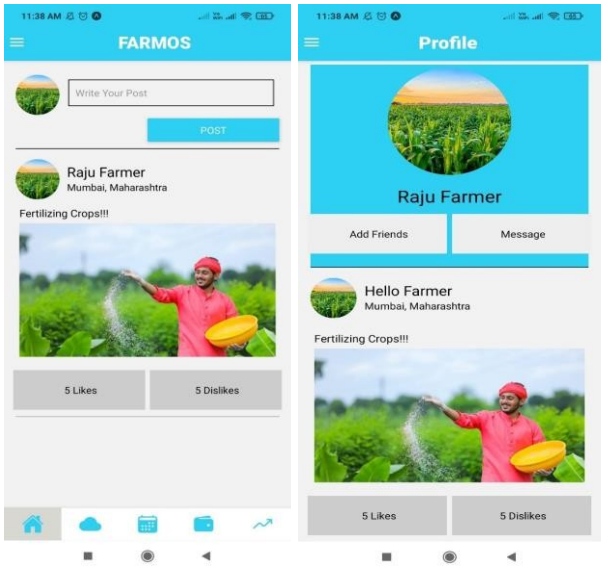

fig 6.3 Home and Profile

VII. IMPLEMENTATION OF EXCLUSIVE FEATURES.

I. Weather Forecast.

Weather forecast feature is implemented in the application. OpenWeatherAPI is used to get Weather Forecast. To make this work the location of the user is necessary. Weather forecast of next 7 days are made available to the end user.

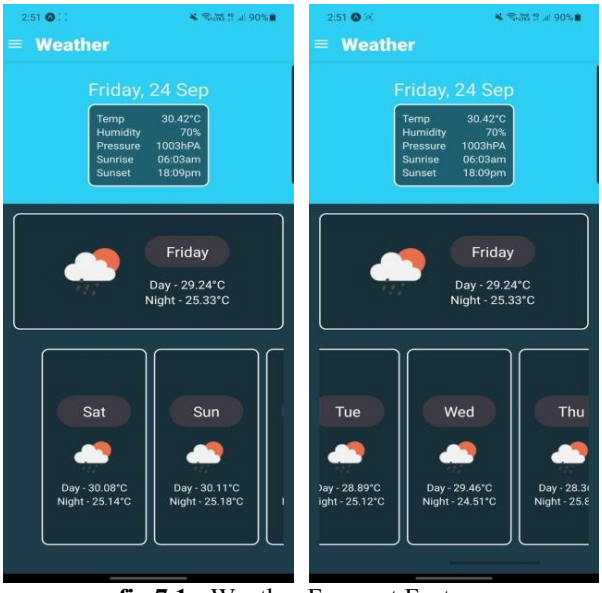

fig 7.1 : Weather Forecast Feature

II. Daily Market Price

Every day on evening the APMC market of mumbai releases the daily market price at which the crops and good were sold.

Link :http://www.mumbaiapmc.org/uplaodeddocuments/dail yrates.pdf

This link shows the recent updated price every day. Django is used to extract prices from here and store it into the database. [SQLite3]

And Open API is made available so that the application can fetch the daily rates whenever it wants.
Link to github : https://github.com/jayesh-w/CropPrices

Link to OpenAPI [GET] : https://farmos- api.herokuapp.com/api/dailyprice

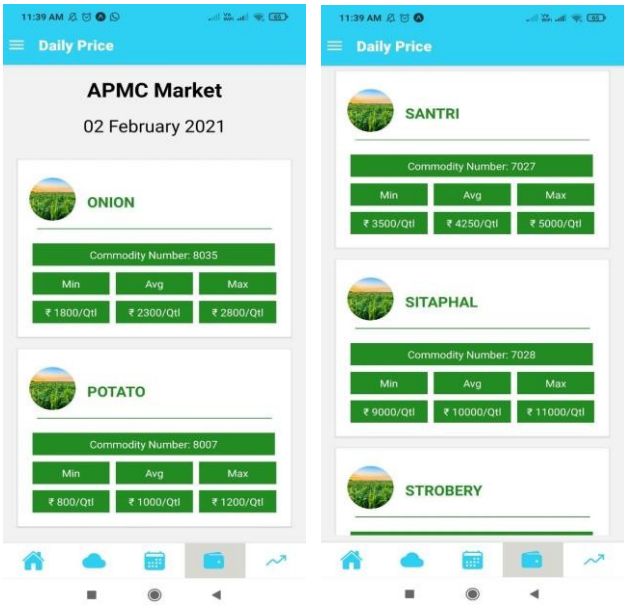

fig 7.2: Daily Price Feature

III. Crop Price Prediction

Crop price prediction works on a machine learning model which is deployed using python.
The following are the steps by which the crop price prediction model is developed and deployed.

1. Data Collection

Data from apmc weekly market price was collected between the months of October to February. This data has the following parameters.

Place : The Place of market
Arrived : The total Arrived product in quintals or nag.
Commodity Number : The unique commodity number.
Quality : The quality of the product.
Min Price : Minimum price at which the product was sold
Max Price : Maximum price at which the product was sold.
Avg Price : The average price of the product for the current date.
This data was collected and cleaned for any kind of abnormalities. To avoid outliers.

2. Model Training

To Train the models following algorithms were used :
Random Forest (84%)
Linear Regression (89%)
Logistic Regression (79%)
Random forest and logistic regression tend to predict more about classes rather than prices.
And therefore Linear Regression Algorithm was used to build ML model of Crop Price Prediction.

Link to github : https://github.com/jayesh-w/CropPrices
Link to OpenAPI [GET] : https://farmos-api.herokuapp.com/api/crop-price

3. Deployment.

The Model was made using python and deployed with Django Server. This server was further deployed on Heroku Free PaaS server.

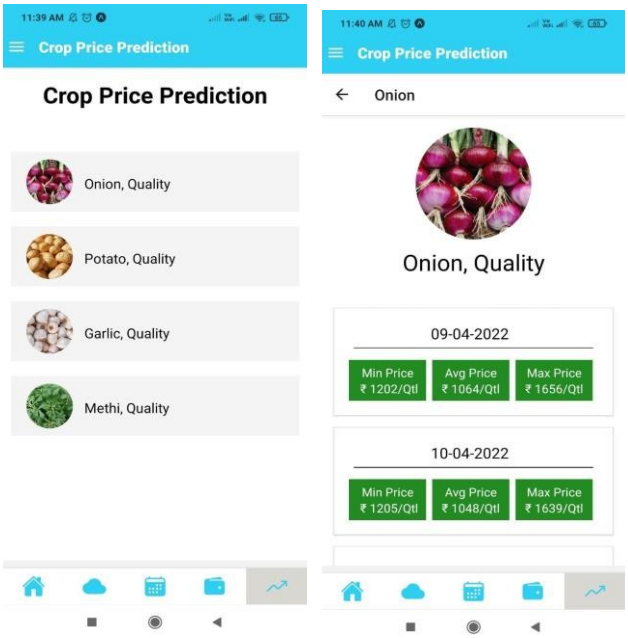

fig 7.3 : Crop Price Prediction Feature

IV. Government Schemes

Farmers find it difficult to get information about various schemes. The reason is because that most of them don't know about the correct source of the information. They have to turn to the news and wait for scheme related news or visit the nearest farmer help center. Kisan Call center helpline was made available to farmers but it is quite difficult to remember the schemes on call.

To address this issue, a feature named as government schemes is made available to the farmers. Here they can view about the various government schemes in their native language with just a click.

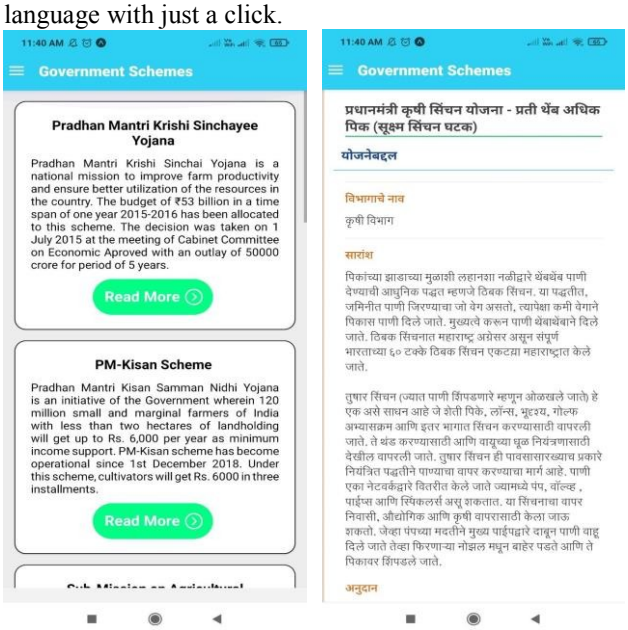

fig 7.4 : Government Schemes Feature

V. Crop Calendar

This feature is made in such a way that details about various crops like their varieties, harvest period, sowing time, water is made available.

This application promotes the on boarding of new generation farmers that fall in short of knowledge of various crops. Also many crops which can be grown in the farm but farmers are unaware of. Hence Crop Calendar feature is made to help the end user.

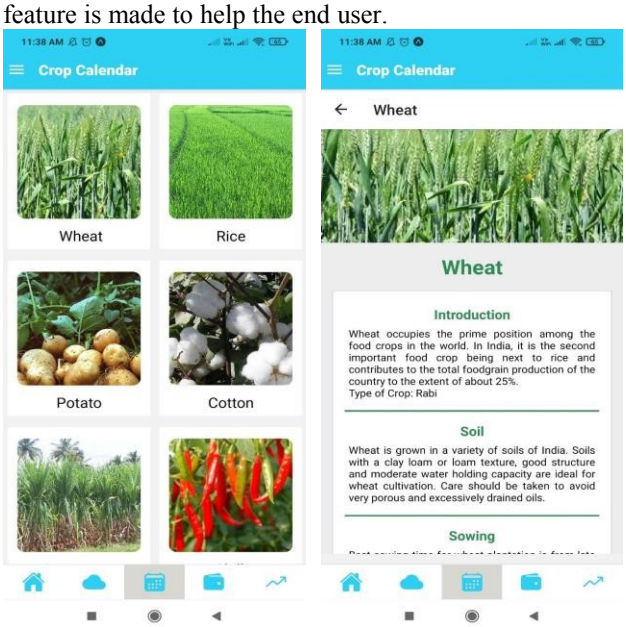

fig 7.5 : Crop Calendar Feature

8. CONCLUSIONS

Farmos Application makes sure that no farmer is left out on the onboarding of technological revolution. This application solely focuses on the well being and profiting the primary food producer of India. Farmos along with its feature will be proven quite useful for the rural as well as urban India.

A good initiative started by the Farmos can only be successful if it proves helpful for the farmers. To make it more helpful constant updates, making the application more interactive, and making the features less complex will add to the user satisfaction.

This application will only focus on creating a centralized place for farmers where they can get whatever help they want without any long process.

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AET 039

vTeams : Project Communication Platform

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Abstract - Communication and collaboration with other people has become the need of the hour. In the current era, real-time communication apps have become an inseparable part of our lives. Everyday millions of people in the world communicate through real-time communication and chatting applications. Developing projects that help make the world a better place by solving real life problems is something that every student aims to do. Currently students make use of multiple different platforms to collaborate with other team members for coordination of project activities. Using multiple platforms for performing a single task is not efficient and often results in confusion and chaos. This scenario emphasizes the need of a single app that helps to coordinate all activities required in project development like chatting, voice and video calling and more.

Key Words: Communication Platform, Chatting, Realtime

I. INTRODUCTION

Communication and collaboration with team members is an essential part of any project development activity. There are a few initiatives taken by start-ups and individuals, but most of the products they produce are only beneficial to a certain level and/or not scalable as they are unable to reach a huge number of needy people. Hence, many people are unable to get the best project development experience. It is necessary that these initiatives and efforts to develop a project communication platform are carried out with a systematic approach. This will help students and developers to solve the problems more efficiently. One of the approaches could be a web application designed for this purpose. This web application would be accessible through any device with an active internet connection and will support all major browsers with Chrome being the recommended browser. The web application called 'vTeams' will be a complete package with functionalities like real-time chatting, topic-based channels, video and voice calls, customizable UI and more to help in every phase of project development activity. The application targets students specifically and aims to provide solutions for all final year project development related activities. Each registered and verified user will be able to create a topic specific channel and will be able to invite other users to join the channel. People can send text messages as well as images in the channels. Users will also be able to make video calls which will further increase efficiency and productivity.

II. EXISTING SYSTEM

Current there are multiple apps to help people interact with each other but each app focuses on one particular thing. For complete communication requirements there are a few apps like google meet and MS teams but they are extremely expensive and closed source so cannot be modified according to requirements.

III. REQUIREMENT ANALYSIS

Following are the requirements:

1. Database Server
   Database Server which is high performant and can provides data at high-speeds in realtime is required. People will use this app as a realtime chatting app and thus quick write/read of large amount of messages should be performed quickly. The database must also support fast storage and retrieval of non-text data and file types like jpeg/png/pdf, etc.

2. Web Server
   As vTeams is to be implemented as a web app, a highly scalable web server is a must. All the clients will send tons of requests and payloads to the web-server. The web server must process them at high speed and take the appropriate action / action requested by the client.

3. Computing Device
   A computing device like a computer or smart phone with an active internet connection is a must to avail the functionalities of vTeams. Without it it would not be possible to interact with the servers and exchange data.

IV. PROBLEM STATEMENT

To develop an app which will provide a complete solution for carrying out all project development related activities. Should facilitate text, voice, video chat and provide functionalities to easily manage version of the project.

App should be real-time and should support multiple operating systems.

V. PROPOSED SYSTEM

vTeams, a project collaboration platform is an online platform which aims to meet all the communication and collaboration needs of a student for developing a quality project. The application is aimed to help students to find all tools required for effective collaboration in one single app.

vTeams will be open-sourced and completely free to use and modify as needed. vTeams will be a centralized platform with no area limitations and will be accessible to all individuals. Clubbing together the best from all other applications, along with an extremely user-friendly user interface, vTeams aims to provide the best collaboration platform for students.

VI. AIM AND OBJECTIVE

- To create authentication functionality
- To facilitate text, voice and video chat
- To allow teachers and students to create channels
- To provide various tools and functionalities to manage software version
- To provide a platform to showcase the project developed

VII.IMPLEMENTATION

The website's front-end is built with React JS which is an open-source, front-end, JavaScript library for building user interfaces or UI components. It is maintained by Facebook and a community of individual developers and companies. Users first need to log in using their email address. Now users can access all the functionalities of the web app including creating and communicating in channels and making calls.

The website's backend is powered by Node.js which is an open-source, cross-platform, backend JavaScript runtime environment that runs on the V8 engine and executes JavaScript code outside a web browser, and the data is stored on Firebase Realtime database.

Any action undertaken by the user sends the info about the action to the firebase which updates the data in its real-time database. It provides hooks which update the same data to all the other users who are the intended recipients of the data.

VIII. ALGORITHM

1. Start.
2. Login into the app using a verified email id
3. Navigate to the channel you want to communicate in
4. Send / Read text and multimedia messages
5. Make a video call if required
6. Depending on user action store appropriate data in realtime database
7. Send the stored data to all intended recipients
8. Forward their reply to the base user
9. End.

IX. RESULT

The following are some of the result snapshots of the system:

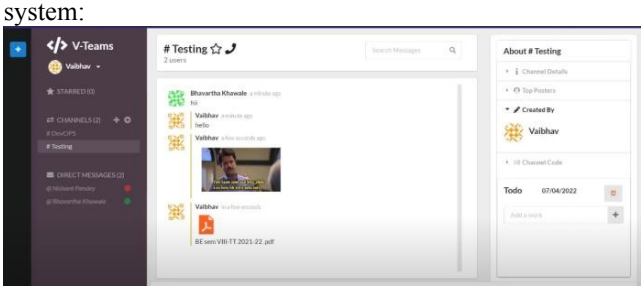

Fig. 1: Home screen of vTeams

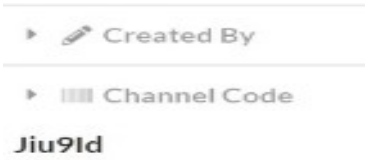

Fig. 2: Channel Code which can be used by other users to join the channel

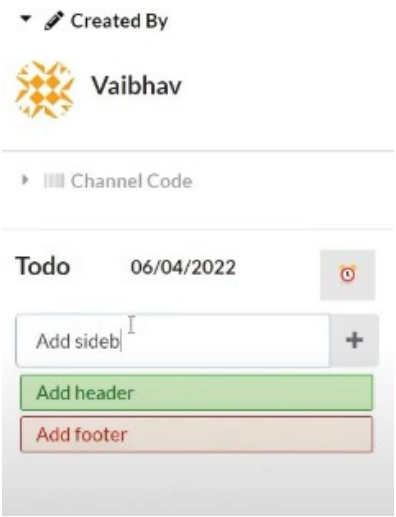

Fig. 3: Todo List to keep track of project status and other activities

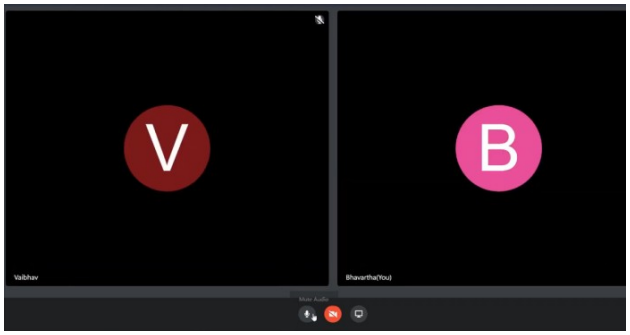

Fig. 4: Video calling

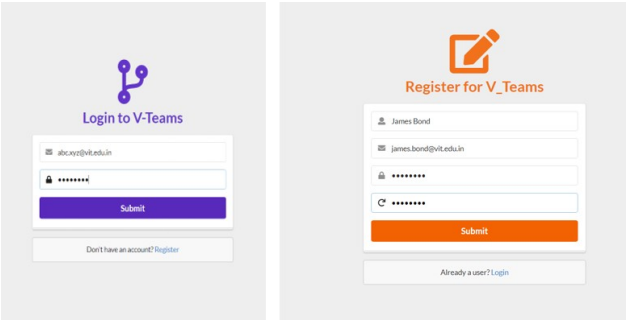

Fig. 5: Login and Registration

Fig. 6: Creating a new channel

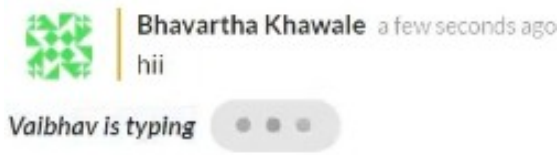

Fig. 7: View when someone is typing

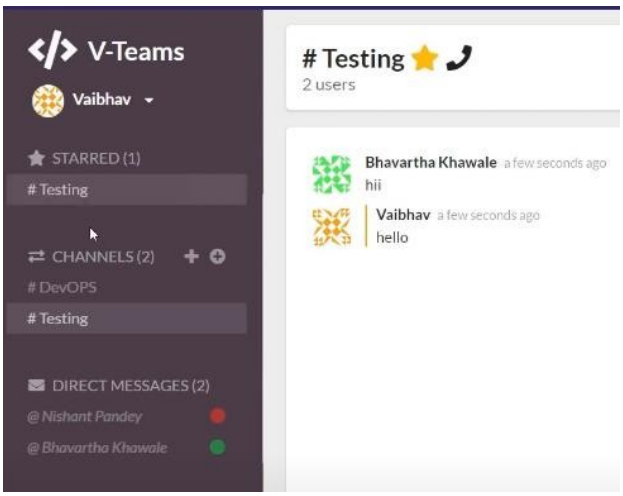

Fig. 8: Star marking channels for quick access

X. CONCLUSION

vTeams fulfils the goal of providing a fast and efficient project collaboration platform. Being a web-based application, it ensures that anyone using any configuration and operating systems and located anywhere in the world can access it. Users have to verify email and need invite code for joining channels which helps to reduce unnecessary spam texts and interruptions. Unlimited messages and calling without any type of limits all for free provides a great deal for the users.

XI. FUTURE SCOPE

In future, there can be integration for other productivity apps like text editor, spreadsheet, drawing boards, etc. A native app for android and iOS platform can be developed to further improve user experience.

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AET 040

ATM System using Augmented Reality Technology

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Abstract - The existing Automated teller machine (ATM) is the typical cash distribution machine with classic card swipe and pin technology. However, there is a lot of touch between your hands and the machine, and given the current circumstance, flattening the curve by inhibiting the spread of COVID-19 is crucial. According to research, the COVID-19 virus can spread through commonly used public objects such as ATM keypads. Additionally, existing ATM cabins have cameras installed for security purposes, however with advances in hacking, these cameras might be exploited, and ATM pins could be disclosed by screening fingerprints. The suggested method eliminates the need for human contact throughout the process, and the model includes software that is based on Augmented Reality, allowing everything to be done with just a smartphone camera and no other special hardware or software. Furthermore, because no intruder/hacker has access to the ATM pin, the system is very capable of maintaining its confidentiality. As a result, no physical contact is required to type the pin or pick any other system parameters. Furthermore, touchless Augmented Reality-based ATM systems are simple to use because they reduce the possibility of card skimming. And, given the current COVID-19 situation, it's a great start in limiting the virus's transmission.

Key Words: Augmented Reality, Mobile Banking, COVID-19, User Experience, Mobile Application.

I. INTRODUCTION

The pandemic of Covid-19 has necessitated the development of equipment that allows people to avoid touching electronic devices. The COVID-19 virus has been proven to be transmissible by regularly used public objects, according to studies. Before the outbreak, the world struggled to comprehend the relevance of intangible technology, but this scenario was overlooked. Without research labs, discovery-based technologies that have been approved for study have not been particularly popular. The global pandemic, on the other hand, has transformed that perspective; today, the typical individual can appreciate the value of seamless communication. Not only for health care workers who interface with medical equipment, but also for the rental of ATMs, sales equipment, and learning devices, this technology is critical.

There are numerous issues with the appearance, development, and acceptance of such technologies that must be addressed as quickly as possible. Augmented reality technology, which uses sensory control sensors and communications to establish a bridge between the physical and virtual worlds, allows for non-contact communication.

The following areas of research have also tested intangible communication technologies such as non-touch technology in touch-based technology provision, the use of low- resolution sensors in touch-based medical imaging interactions, and interactions with Kinect and Leap Motion devices that aren't surgical. As a result, it would be preferred to use a technology that allows the user to utilize the keypad without having to touch it. At the same time, there is an option of taking into account the cost of the most recent software or upgrading. A visual keypad can be integrated into a digital image in real-time by exploiting the unpopularity of taxes. There is no need for additional hardware or an external camera. It is all about a smartphone app that is fueled by real-world taxpayer unpopularity.

II. EXISTING SYSTEM

The COVID-19 virus can spread through public objects that are similarly used by numerous people throughout the day, such as ATM keypads, gas station keypads, and grocery store self-checkouts. It is just not feasible to disinfect and sanitize the keyboard after each use. In today's ATM system, there is a lot of touch between your hands and the machine, and given the current circumstance, preventing COVID-19 from spreading is vital to flattening the curve. Additionally, existing ATM cabins have cameras installed for security purposes, however with advances in hacking, these cameras might be exploited, and ATM pins could be disclosed by screening fingerprints.

III. REQUIREMENT ANALYSIS

Following are the hardware components that are required to construct the cash dispensing mechanism:

1. Arduino Nano
   The Arduino Nano is an open-source software and hardware development environment based on the low-cost System-on-a-Chip (SoC).
   The Espressif Systems features all of the essential components of a computer, including a RAM, CPU, Wireless Fidelity (Wi-Fi), and even a current OS and Software Development Kit. Hence it is a great fit for a variety of IoT- based projects. The Arduino Nano is available in several different packaging options. In all of the designs, the core is employed. In designs based

on the architecture, the traditional 30-pin arrangement has been maintained.

Some designs have a small (0.9″) footprint, while others have a wide (1.1″) footprint — this is a crucial distinction to keep in mind. The Amica (which uses the conventional narrow pin spacing) and the LoLin (which has a wider pin spacing and a larger board) are the two most popular Arduino Nano models. The open-source nature of the base allows the market to create new Arduino Nano variations regularly.

2. Tower Pro MG995 Servo

The MG995 Metal Gear Servo Motor is a high-speed standard servo that can swivel 180 degrees (60 degrees in each direction) and is used in airplanes, helicopters, RC automobiles, and other RC models. At 4.8V, it delivers 10kg/cm, and at 6V, it delivers 12kg/cm. It's a Digital Servo Motor that accepts and processes PWM signals much more quickly and efficiently. Internal circuitry is complex, allowing for good torque, holding power, and rapid updates in response to external pressures.

They come in a tight, robust plastic container that keeps the water and dust resistant, which is a great feature for RC planes, boats, and monster trucks, among other things. It comes with a 3-wire JR servo connector that is also compatible with Futaba connectors.

3. HC-05 Bluetooth Module

The HC-05 is a common wireless two-way (full-duplex) module that can be used in a variety of projects. You can use this module to communicate between two microcontrollers, such as an Arduino, or with any Bluetooth-enabled device, such as a phone or laptop.

Many Android applications are already available, making the process much easier. The module communicates with a microcontroller through USART at a rate of 9600 baud, making it simple to connect to any microcontroller that supports USART.

Using the command mode, the user can also change the module's default values. So, if the user is looking for a Wireless module that can send data from its computer or mobile phone to a microcontroller or vice versa, this is the module for it.

4. Jumper Wires

Jumper wires are normal wires having connector pins on both ends of them, that can be used to connect two places without the use of solder. Jumper wires are commonly used with breadboards and other prototyping tools to allow for quick circuit changes as needed. It's quite straightforward. Among all the electrical components, jumper wires are the most fundamental ones. Male-to-male, male-to-female, and female-to-female jumper wires are the most common. The distinction between them lies in the wire's terminating point.

Male ends have a protruding pin and can be plugged into items, but female ends do not have a projecting pin and are used to plug into things. Male-to-male jumper wires are the most frequent and the ones you'll most likely need. A male- to-male wire is required for connecting two ports on a breadboard.

IV. PROBLEM STATEMENT

In today's ATM system, there is a lot of touch between your hands and the machine, and given the current circumstances, stopping COVID-19 from spreading is vital to flatten the curve. According to research, the COVID-19 virus can spread through commonly used public objects which count under essentials such as ATM keypads which have to be kept open irrespective of a critical situation such as a lockdown. Additionally, existing ATM cabins have cameras installed for security purposes, however with advances in hacking, these cameras might be abused, and ATM pins could be disclosed by screening fingerprints. As a result, a technology is required that allows users to control the ATM without having to physically touch it. Simultaneously, the data confidentiality must be evaluated as well as the expense of a new system or enhancement.

V. PROPOSED SYSTEM

The proposed solution eliminates the need for hands-on interaction during the procedure.

The model uses Augmented Reality software that allows everything to be done with just a smartphone camera and no other special hardware or software.

Furthermore, the technology is extremely competent in maintaining the ATM's confidentiality. As a result, no physical contact is required to type the pin or choose any other system parameters.

VI. AIM AND OBJECTIVE

The proposed system aims to eliminate the possibility of the COVID-19 virus spreading and strengthen the communication infrastructure.

The concept includes Reality-based software unpopularity that is seen, where everything can be done with a smartphone camera and no other hardware or software is needed.

Augmented reality is a sort of virtual reality in which the physical environment is replicated on a computer. It is seen as a medium that provides people with new attractions and experiences. According to a prior study, the usage of Augmented Reality in Banking provides users with a tactile experience during the procedure. Because of the interaction and experience of sending money from an ATM without touching the keypad, the smartphone app can be considered one of the ways to promote AR. The goal of Augmented Reality is to create a system in which the user is unable to distinguish between the real world and its virtual augmented version. Furthermore, because there is no intruder or eye attacker, the method is quite competent in keeping the ATM pin secret. As a result, no physical contact is required to type a pin or select other system options.

Objectives:

1. Assisting in the best possible promotion of augmented reality technologies.
2. Avoid frequent contact with the ATM keypad to break the transmission chain. This will keep you safe from the disease.

3. The COVID crisis has taught everyone to value every cent and to spend money wisely on necessities. The suggested system will eliminate the possibility of ATM pins being smoked, resulting in more secure financial transactions.

4. The project will save not only human lives but also financial assets.

VII. IMPLEMENTATION

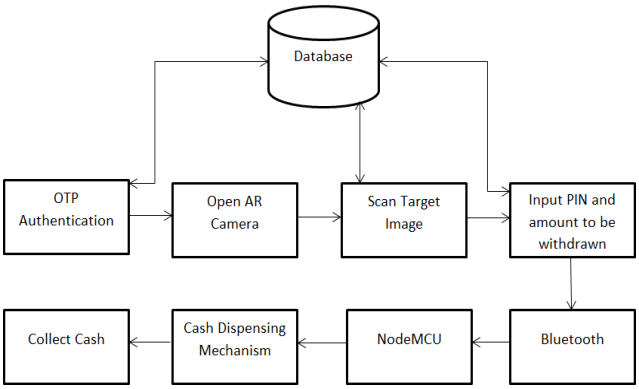

Fig.1 Block Diagram

The system can be divided into three modules: Hardware, Android Application, and the Augmented Reality setup.

For the hardware, an Arduino Nano is used along with a servo motor, and both the components are connected using jumper wires, and an acrylic hinge is attached to the servo motor, which is used to demonstrate the cash dispensing mechanism. The Arduino Nano is coded in Arduino IDE software.

The AR-based mobile application is developed using Android Studio, and the augmented reality functionality is integrated into the android application in Unity using the Vuphoria Engine. A target image is placed on the hardware which is used to trigger the augmented reality functionality in the AR ATM application.

Once the user successfully logs in to the application by entering its PIN, it can then withdraw the cash by entering the amount and clicking on dispense cash.

The Bluetooth module then transfers the command to the Arduino Nano, which then sends the signal to the servo motor, and with the help of the hinge, the cash is dispensed.

VIII. ALGORITHM

1. Start.

2. Login into the app using OTP sent to the registered mobile number and open AR Camera.

3. Now scan the image from AR Camera and match it with the target image in the database.
4. If a match is not found, then go to step 3.

5. If a match is found, then display the Homepage AR user interface and wait for user input.

6. Now match the input pin from the user with the database.

7. If a match is not found, then go to step 5.

8. If a match is found, then display the account type select and then amount page and wait for user input.

9. Enter the amount to be withdrawn.

10. If the user has a sufficient balance then the command will be sent to the cash dispensing mechanism and the cash is dispensed.

11. End.

IX. RESULT

The following are some of the result snapshots of the system:

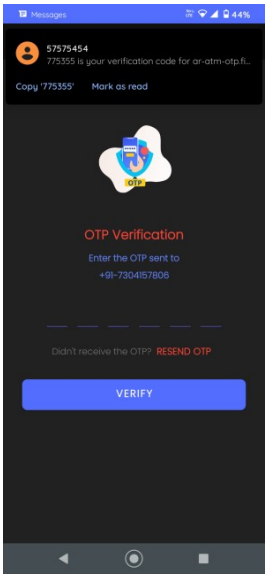

Fig. 2

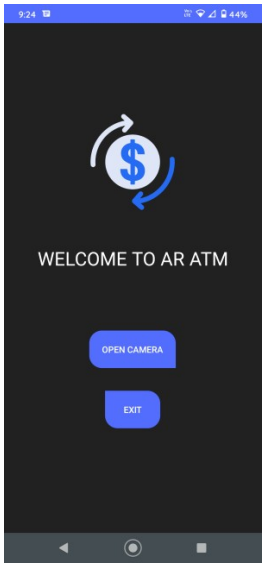

Fig. 3

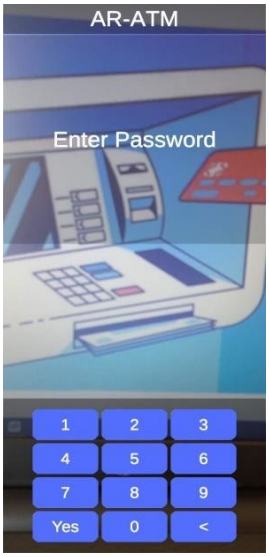

Fig. 4

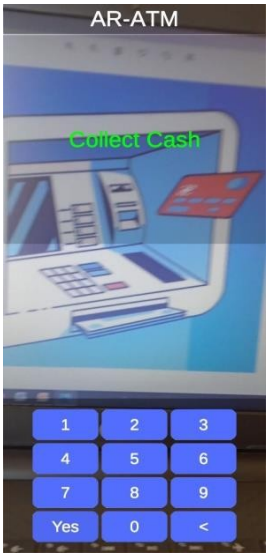

Fig. 5

Fig. 2: OTP received after the user enters its phone number and clicks on 'Get OTP'.

Fig. 3: After the user enters the correct OTP, it is directed to the interface where it can either select the option to open the camera or exit.

Fig. 4: After the target image is scanned, the AR interface gets triggered and asks for the user's ATM pin.

Fig. 5: Once the user enters the amount and has a sufficient balance in their account then a message is displayed indicating to collect the cash.

X. CONCLUSION

A mobile application may be considered one of the strategies to promote Augmented Reality technology, because of the interactivity and virtual experience that the user can dispatch money from an ATM without touching the kiosk's keypad. As a result, no physical contact is required to type the pin or select any other system parameters.

XI. FUTURE SCOPE

To improve efficiency, a suitable note counting and precise amount dispensing mechanism module could be introduced in the future. In the authentication section, the security can be improved even more by using a face ID or iris scanner module instead of a pin to make the system more secure and futuristic. More modules, such as an e-receipt generator and UI changes, can be added to the mobile application in the future. This contactless system concept can be applied to any vending machine to turn it into a contactless vending machine.

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AET 041

Course Analyzer: A pitstop for all online courses

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Abstract - When new college students enter academics and choose their degrees, they have to decide where to start by selecting courses in the academic catalog. However, many new college students have various doubts about selecting courses and depend heavily on various online educational sites. This project is established as a way to help college students by creating a place where all the courses from various educational sites are available. This app named course analyser incorporates different features to increase user engagement. This paper reports on the design and the development of the course analyzer. The paper discusses: the project background, the rationale of the design, the goal of the system, the underlying concepts, the methodology used in the design, system limitations and future scope.

I. INTRODUCTION

Recently the number of online educational sites have grown in huge numbers and so has their content. While each one of them claims to provide the best help it is tedious for someone to compare the courses of a specific domain provided by each one of them and choose the best for the users. Course Analyzer does all the tedious job and brings all the significant details about online courses / tutorials offered by various educational sites to a single platform and all one has to do is choose the most appropriate one for him/her and start studying.

So you would think what makes a course analyzer essential? There are many things to look at. First of all, every user has it's way of learning. For example some are comfortable by learning through video or some by reading. But it's very hard to find courses according to their mode. So in our project we are using multiple filters one of which is of type which has two options, video and blog which will help the user to choose according to their choice. Another thing is the review option. Users can give their feedback which will be displayed under the course every time any user clicks on the course which will be very beneficial for everyone. We are also planning to integrate a chatbot for dynamic searching through our platform for better user experience. The main feature of our application is how it has all the courses from many educational sites at one place like Udemy, Medium, Coursera, YouTube to name a few. These will ensure that the users choose from the best course possible for their learning needs.

We have used this paper to support our point of needing a course analyzer. This paper analyses the various platforms available and each of their advantages and disadvantages. It also has a comparison of the platforms on the basis of various factors.

Among the various features included in this project, the compare feature is the one which stands out the most. This feature allows the user to compare upto 4 different courses at one time which helps them to check the attributes side by side and make the correct choice. Another feature which is quite user friendly is the recommendation feature. This feature chooses the best course in every specific domain and pins it at the top of the stack which makes it prominent to new users.

II. LITERATURE SURVEY

The increase in demand: Nowadays, MOOC is the hottest way used to offer online courses, globally. MOOC are the massive courses designed to support unlimited (logically) participation and are offered through a platform. It's gained a lot of recognition since the time of its development in 2008. As of December 2016, approximately 58 million students are subscribed for the online courses, provided by more than 720 universities and approximately 6850 courses, provided through various providers like Coursera, edX, Udacity.
In India after the USA, the universities with the organizational capabilities along with the help of governing authorities are trying to fulfill the educational hunger of the users, by offering MOOCs in the whole country. The massive enrollment is ensuring that the overwhelming majority of the growth in enrollment of learners is happening from India, and will surely increase in coming years.[1]

Need for a course analyzer: With the rise in e-commerce and online business, the amount of users interested in online Web services has increased. Both MOOC companies and online websites advertise their courses and services while users look for courses that match their interests and needs . In these situations, recommender systems play a crucial role, and have attracted the eye of researchers. Recommendation systems are algorithms and functions that recommend similar and relevant courses to the user according to their interests, information about which comes from user profiles and histories collected by the systems. Recommendation systems help MOOC companies grow and users find more appropriate and customized services made to their personalities and needs.[2]

Effect of Course Credentials: MOOCs are a growing factor in strategic decision-making in education. However,

since only a little percentage of enrollees complete MOOCs, it's important to know participants' preliminary expectations and motivations. This is particularly important for research and engineering MOOCs because they require professional understanding, analytical capabilities, and the ability to handle abstract topics. Hence, the goal of this study was to look at the motivating factors of normal users who successfully completed a MOOC in nanotechnology and nanosensors, while comparing between university students and normal users. Analysis of knowledge , collected via a web survey, forum posts, and email messages, identified three motivational themes: career, personal, and academic . The results indicated that volunteers from both groups were motivated by general interest, personal growth, and success. However, while the university-affiliated students were oriented toward improving their knowledge and receiving a certificate, the overall users were oriented toward research and professional advancement. Our findings suggest that the planning of educational MOOCs should target at both promoting the understanding of latest concepts and generating new skill sets.[3]

Filters in Recommendation System: Recently, we've witnessed a huge research expansion in Recommender Systems (RS). RS are information filtering systems which give facilities to perform predictions. They are useful to many fields, such as book recommendation (Amazon), Google Play Store Apps , YouTube videos and music of Apple Music . Among these, RS for course selection are more complex, which can provide support for college kids to seek out an optimal path to accomplish their learning goals.

The primary focus of this research article is to research different approaches want to develop and assist students to pick the foremost appropriate degree programs or subjects which suit their preferences. Effective academic counseling guidance received by a student are crucial to their overall academic plan and it can make a great impact on their career success. These counseling recommendations should include various factors such as employment opportunities, user interests, academic results, attitudes and aptitudes and therefore, course selection is tedious.[4]

III. PROPOSED SYSTEM

The proposed system is to bring all the MOOC courses from various platforms like Udemy, Coursera, etc to one single platform. The proposed system would have features like searching courses, filtering courses, viewing the latest tech news (so the user can get familiar with the latest technologies), upvoting the tutorial, and adding tutorials to favorites. The user can also add domains and tutorials which will be available to all users using this app. This system will also recommend one course from each domain considering all the factors of the tutorial like average rating, skill level, and many more which will help the user to choose the best possible course for him/her. For the implementation we will be using React.js as the frontend library supported by a backend server built using Node.js and MongoDB as the database. The entire web application will have a modern UI with the dark theme, designed using UX's principles, so it doesn't require any unnecessary logins and unnecessary forms filling. The application will be desktop, laptop and mobile responsive.

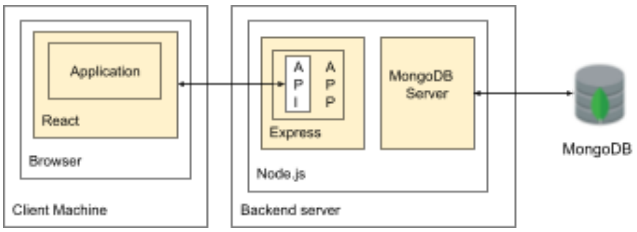

Figure 1: Basic Block diagram

Algorithm:

For recommending courses from the selected domain, we would use a specially customized recommendation function based on the points system. This function compares all the courses of the selected domain using javascript's "reduce" method and returns one course which has the maximum points. These points are based on various aspects of the tutorial like average ratings, reviews given by other users, total upvotes, total domains taught in the tutorial, etc. If 2 or more tutorials have the same points, then the function returns the course which wins the tiebreaker. In the tiebreaker, more obvious results are taken into consideration.

E.g If 2 courses have the same number of points but one is paid and the other is free, then the free course wins the tiebreaker.

IV. DESIGN

It shows the interaction between different users of the application. The diagram represents an organized and structured behavior as a series of sequential steps over time. The diagram shows the interactions between objects in the sequential order.

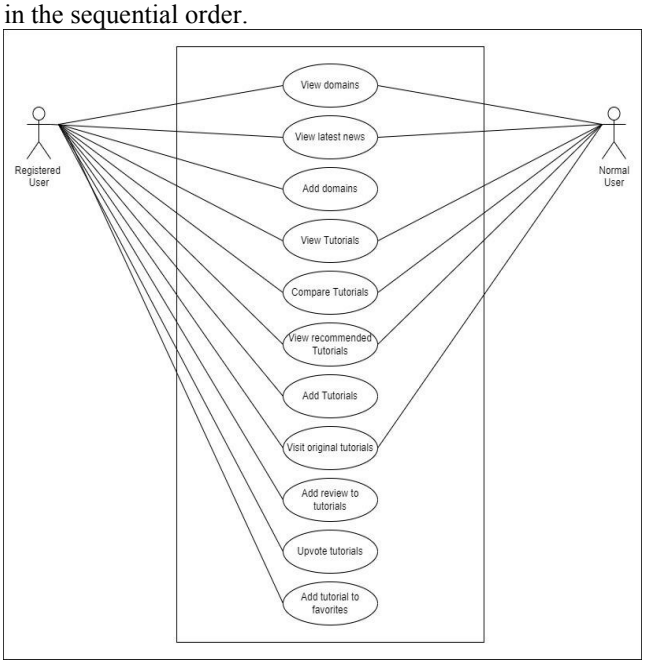

Figure 2. Use Case Diagram

V. SYSTEM SCREENSHOTS

I. DESKTOP VIEW:

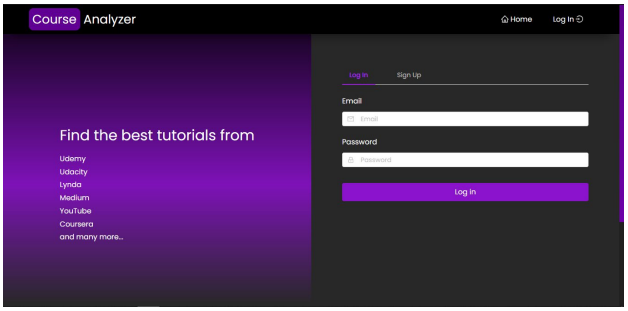

Figure 3: Login screen

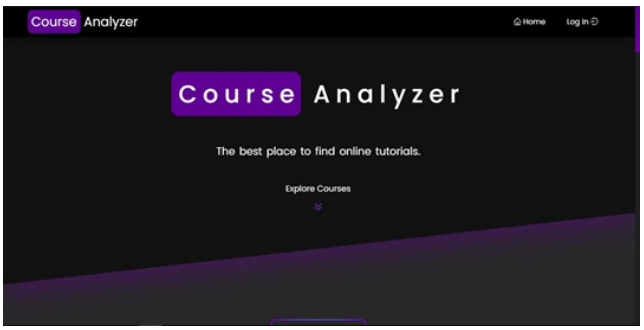

Figure 4: Home screen

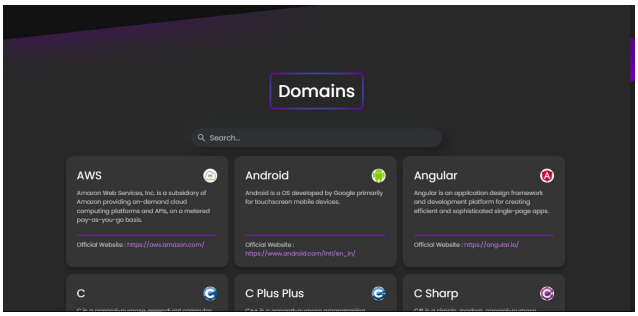

Figure 5 : Various Domains

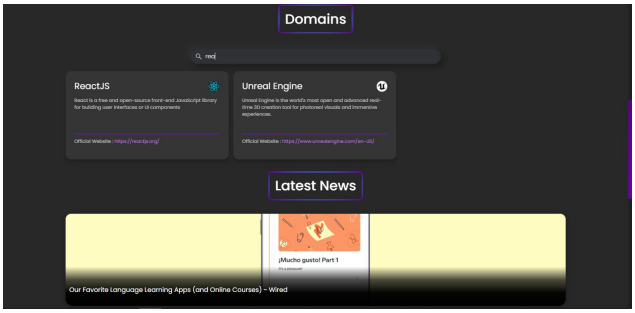

Figure 6 : Domains after searching

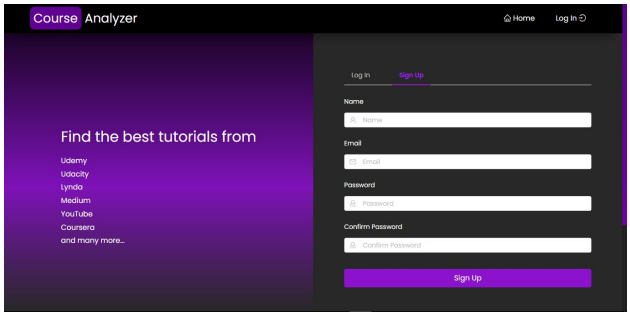

Figure 7 : Sign Up Page

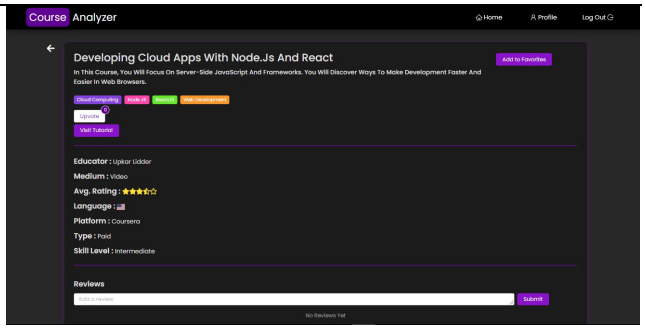

Figure 8 : Tutorial main page

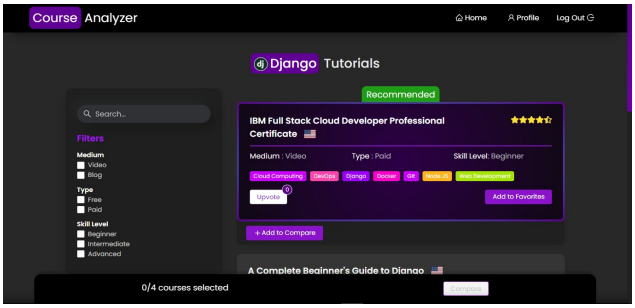

Figure 9 : Tutorials of specific domain

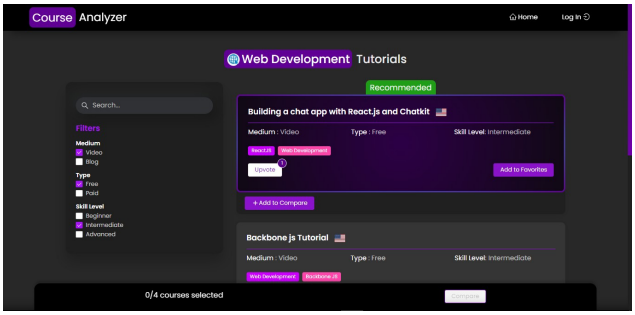

Figure 10 : Available tutorials after applying filters

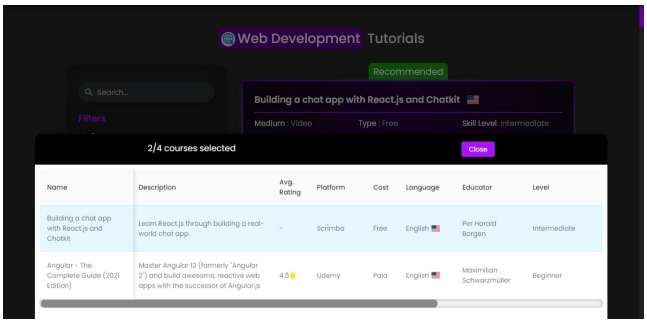

Figure 11 : Comparing tutorials

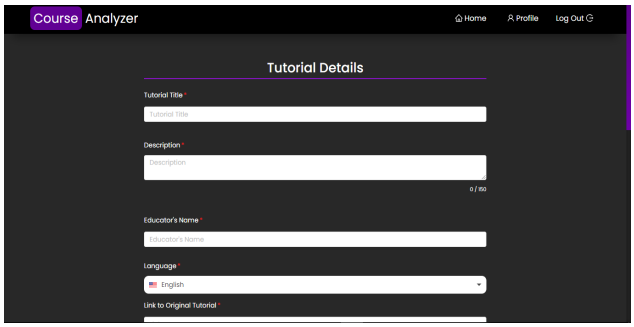

Figure 12 : Add tutorial page

II : MOBILE VIEW

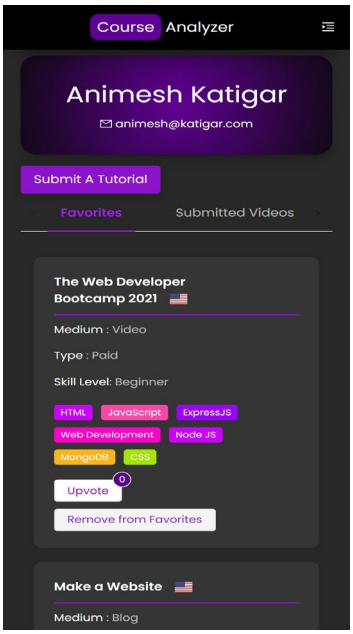

Figure 13. Profile Section

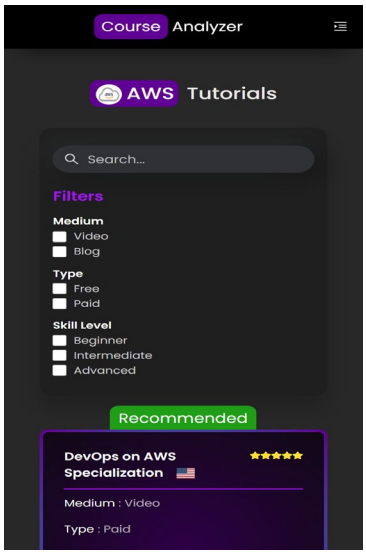

Figure 14. Tutorials

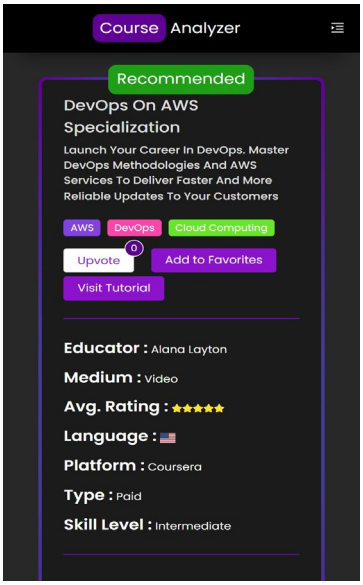

Figure 15. Tutorial page

VI. FUTURE SCOPE

Our project could be an exciting new step in the field of MOOC industry. If implemented efficiently our project can help lots of people, like professionals and students. We can also keep our project up-to-date with regular updates and modifications. With new frameworks which are released frequently nowadays, there is a lot of scope towards improvisation for this project.

VII.CONCLUSION

Course Analyzer does all the tedious job and brings all the significant details about online courses / tutorials offered by various educational sites at a single platform and all one has to do is select the most suitable one for himself / herself and enjoy learning. Some users are comfortable by learning through video or some by reading. But it's very hard to find courses according to their mode. So, in our project using multiple filters the user can choose according to their choice. Another thing is the review option. Users can give their feedback which will be displayed under the course every time any user clicks on the course which will be very beneficial for everyone. The important feature of our project is how it has all the courses from many platforms at one place like Udemy, Medium, Coursera, YouTube to name a few. These will ensure that the users choose from the best course possible for their learning needs.

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AET 042

Application For Diabetes Control And Its Management

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Abstract- One of the most prevalent illnesses affecting a significant population worldwide is Diabetes. The growing incidence of this disease raises the strain on the management of personal diseases and thus also affects the quality of life. If well diagnosed and monitored, it would lead to improvement in health and thus allow a healthier life for people suffering from diabetes. In this paper, we are implementing and developing a mobile application for diabetic diagnosed patients which will help the patient to connect with the doctor on one-to-one basis, interpret the patient's daily food log and exercise routine to the concerned doctor and it will also keep a track of the schedule of appointments and records of test results performed from time to time. This application will help to support data collection pertaining to a person's metabolism. A transfer of measured values from a glucometer to the application was implemented. Medication and nutrition data could be entered based on the doctor's recommendation and patient's preference. Besides monitoring, continuous data can be documented and made available to the treating physician. Digital health technology, especially digital and health applications ("apps"), have been developing rapidly to help people manage their diabetes. Numerous health-related apps provided on smartphones and other wireless devices are available to support people with diabetes who need to adopt either lifestyle interventions or medication adjustments in response to glucose-monitoring data. This application is a 2-way communication channel between a doctor and a patient.

Keywords— Diabetes, Type1 and Type2, Daily log, Exercise schedule, medications.

I. INTRODUCTION

Diabetes is the No. 1 cause of kidney failure, lower limb amputations, and adult blindness. In the last 20 years, the number of adults diagnosed with diabetes has more than doubled. Diabetes is a chronic (long-lasting) health condition that affects how your body turns food into energy.

Diabetes apps accounted for 16% of the total number of disease-specific apps available to consumers, second only to mental health apps.

Most of the food you eat is broken down into sugar (also called glucose) and released into your bloodstream. When your blood sugar goes up, it signals your pancreas to release insulin. Insulin acts like a key to let the blood sugar into your body's cells for use as energy.

If you have diabetes, your body either doesn't make enough insulin or can't use the insulin it makes as well as it should. When there isn't enough insulin or cells stop responding to insulin, too much blood sugar stays in your bloodstream. Over time, that can cause serious health problems, such as heart disease, vision loss, and kidney disease.

There isn't a cure yet for diabetes, but losing weight, eating healthy food, and being active can really help. Taking medicine as needed, getting diabetes self-management education and support, and keeping health care appointments can also reduce the impact of diabetes on your life [1]. There are three main types of diabetes: type 1, type 2, and gestational diabetes (Diabetes while pregnant).

Type 1 diabetes is thought to be caused by an autoimmune reaction (the body attacks itself by mistake) that stops your body from making insulin. Approximately 5-10% of the people who have diabetes have type 1. Symptoms of type 1 diabetes often develop quickly. It's usually diagnosed in children, teens, and young adults. If you have type 1 diabetes, you'll need to take insulin every day to survive. Currently, no one knows how to prevent type 1 diabetes.

With type 2 diabetes, your body doesn't use insulin well and can't keep blood sugar at normal levels. About 9095% of people with diabetes have type 2. It develops over many years and is usually diagnosed in adults (but more and more in children, teens, and young adults). You may not notice any symptoms, so it's important to get your blood sugar tested if you're at risk. Type 2 diabetes can be prevented or delayed with healthy lifestyle changes, such as losing weight, eating healthy food, and being active [2].

Gestational diabetes develops in pregnant women who have never had diabetes. If you have gestational diabetes,

your baby could be at higher risk for health problems. Gestational diabetes usually goes away after your baby is born but increases your risk for type 2

diabetes later in life. Your baby is more likely to have obesity as a child or teen, and more likely to develop type 2 diabetes later in life too.

As someone with diabetes, you will likely need to visit your doctor and healthcare team on at least a semiregular basis. It's essential to maintain a good relationship with your healthcare team. But, these back and-forth visits to the doctor's clinic or the hospital may not be feasible to every patient diagnosed with diabetes. Therefore, this app is a major help as the components of self-management of diabetes include diabetes education, healthy eating, physical activity, medication, and device usage; monitoring and using patient-generated data to adjust behaviour and medication doses; preventing, detecting, and treating acute and chronic complications; coping with psychosocial issues; and problem solving.

II. LITERATURE SURVEY

2.1 History

The term diabetes is the shortened version of the full name diabetes mellitus.The term diabetes was probably coined by Apollonius of Memphis around 250 BC. In ancient times and medieval ages diabetes was usually a death sentence. Sushruta (6th century BCE) an Indian healer identified diabetes and classified it as "Madhumeha". Here the word "madhu" means honey and combined the term means sweet urine. The ancient Indians tested for diabetes by looking at whether ants were attracted to a person's urine. The Korean, Chinese, and Japanese words for diabetes are based on the same ideographs which mean "sugar urine disease". It was much later in the 18th and 19th century that Johann Peter Frank (1745–1821) differentiated between diabetes mellitus and diabetes insipidus. Joseph von Mering and Oskar Minkowski in 1889 discovered the role of pancreas in diabetes. They found that dogs whose pancreas was removed developed all the signs and symptoms of diabetes and died shortly afterwards. In 1910, Sir Edward Albert Sharpey-Schafer found that diabetes resulted from lack of insulin. He termed the chemical regulating blood sugar as insulin from the Latin "insula", meaning island, in reference to the insulin-producing islets of Langerhans in the pancreas. [3]

2.2 Types

Diabetes is a prolonged disease which is caused by the presence of too much glucose in blood as the result of body's inability to produce insulin or of improper use of insulin. Currently, there are over 463 million people with diabetes all over the world which is estimated to be 578 million by 2030 [4]. There are two main types of diabetes mellitus:

- **Type 1** diabetes results from failure of the pancreas to produce enough insulin due to loss of beta cells. This form was previously referred to as "insulin-dependent diabetes mellitus" or "juvenile diabetes". The loss of beta cells is caused by an autoimmune response. The cause of this autoimmune response is unknown. Although Type 1 diabetes usually appears during childhood or adolescence, it can also develop in adults.[5]
- **Type 2** diabetes begins with insulin resistance, a condition in which cells fail to respond to insulin properly. As the disease progresses, a lack of insulin may also develop. This form was previously referred to as "non-insulin-dependent diabetes mellitus" or "adult-onset diabetes". Type 2 diabetes is more common in older adults, but a significant increase in the prevalence of obesity among children has led to more cases of type 2 diabetes in younger people. The most common cause is a combination of excessive body weight and insufficient exercise.

Previously this disease was considered as the disease of aged people but most of the people with diabetes are aged from 20-79 years and are from Africa and Middle East. However, in recent time, diabetes has not stayed limited only to the aged group. A survey shows that about 1.1 million children and adolescents (whose age is less than 20) have type 1 diabetes around the world. Due to weaker health-care infrastructure and lack of proper facilities, diabetes has become a serious challenge in health sector mostly in developing countries. Especially Type-II diabetes, is a major public health concern among developing countries.

2.3. Epidemiology

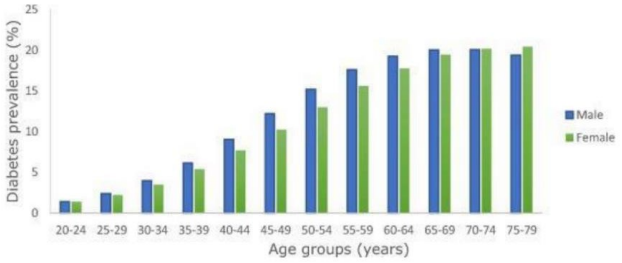


FIG. 2.1 GLOBAL AND REGIONAL DIABETES PREVALENCE ESTIMATES FOR 2019 AND PROJECTIONS FOR 2030 AND 2045[6]

According to the estimates of the International Diabetes Federation (IDF), globally 415 million people are suffering from diabetes (with global prevalence: 8.8%) of which 75% live in low- and middle-income countries. With this trend, by 2040, the world will have 642 million people suffering from diabetes. Type-II DM is the predominant clinical form rather than type-I DM. The majority of the diabetes population (87-91%) in high-income countries have type-II diabetes. Data for relative proportions of type-I and type-II diabetes is not available for low- and middle- income countries. Globally the type-I diabetes population increases each year by approximately 3 %.[7]

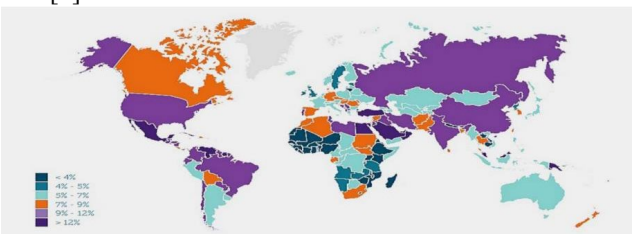


FIG. 2.2 ESTIMATED GLOBAL PREVALENCE(AGE ADJUSTED) OF DIABETES IN ADULTS (20-79 YEARS), 2015 [7]

Nowadays, ICT has blessed us with user friendly smart mobile devices and the developing countries are also enjoying the benefits of it. These are not only

commercially successful and popular, but also have great potential for innovative healthcare solutions which are much appreciated in the developing world because of their reasonable costing and affordability. These smart devices have enhanced ease of access for the users and that has grown interest in the development of innovative healthcare applications [8]. Recent studies have shown that diabetes management is such a field where interactive mobile applications and health monitoring systems can be put to great use which could potentially enhance the quality of life of the patients [9]. Many software apps are being developed for smartphones these days and these apps have potential to become valuable tools in the management of chronic diseases including diabetes if designed especially for this purpose. Specially designed apps help patients to maintain their diet and medications, provide ease of access with communication tools by communicating with their physician and improve adherence [10].

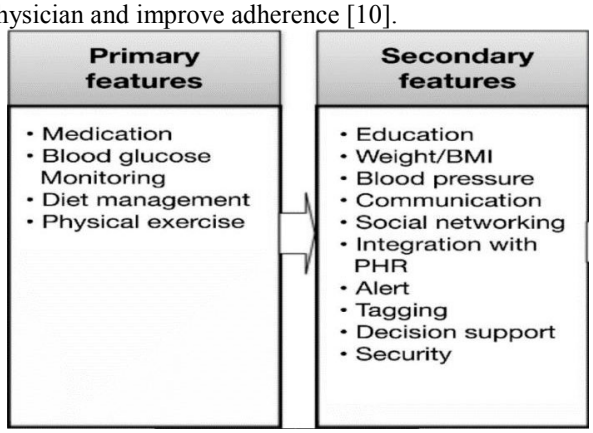
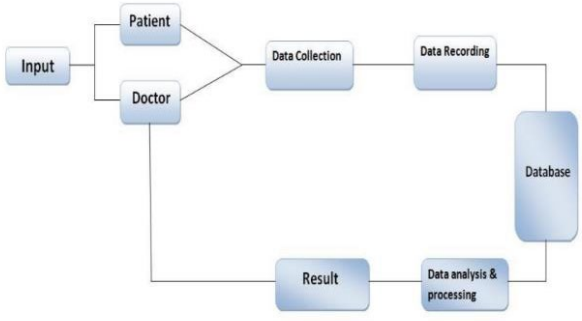


FIG 2.3: APPLICATION FEATURES FOR DIABETES SELF-MANAGEMENT[7]

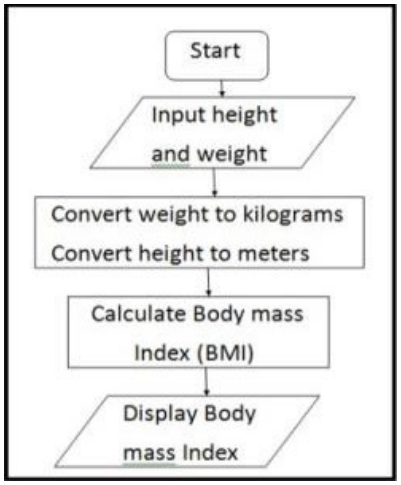
A survey was conducted between the months of May and June 2020, focusing on diabetes apps in both the iOS App Store and Google Play Store, showed that there are 390 apps in the iOS app store and 380 for Android regarding diabetes. The survey states that, there was no diabetes related app in Android in 2008 while the Apple's App Store had 6 apps. Then in 2009, Android had only 1 app against 23 apps in the App Store. The scenario changed drastically over the next few years as in 2012, android had 108 new apps on diabetes while the apple store offered 104 apps. The ratio changed so dramatically that in 2013, Android store had 87 new apps while the apple store offered only 20 app in total. It was observed that most of the iOS apps are to be bought whereas almost all the Android apps are free. For iOS apps, out of 276, 172 (62.3%) apps are paid apps [11].

III. DESIGN AND IMPLEMENTATION

3.1 Working of the Frontend WebApp



3.1 Proposed Block



3.2. Calculation of BMI

Diabetes patients stand to benefit the most from telehealth because the built-in mechanisms for reminders and medication adjustments have the potential to enhance self-management. One thing that has become abundantly clear is how essential telehealth has become for diabetes care. First, there is the vulnerability of the population. Between the comorbidities of the disease and other factors, diabetic patients are at greater risk for complications if they become ill.

From the Block diagram given in the proposed system section, the workflow of the application is explained below.

1) **Input-** The application will receive data input from the doctors and patients.

- Doctor – The doctor will first login using an email-id and password from which he/she signed up. Then he/she will be asked to enter personal details which includes Gender, Clinic address, medical license number and will have to upload a copy of his/her license. He/she will then be directed to the patients' report of those registered under him/her.
- Patient – The same procedure goes for the patient till the personal details section in which the patient will be required to enter their Date of birth, gender, Blood group, Type 1 or Type 2 diabetes and body measurements i.e., height and weight (based on which BMI will be calculated).

2) **Data Collection –**The data acquired from the patient will be collected and stored in the application.

3) **Data Recording –**
After the personal details of the patient are collected and stored, based on if they are Type 1 or Type 2 diabetic a daily log schedule of food intake and physical activity/exercise will be suggested.

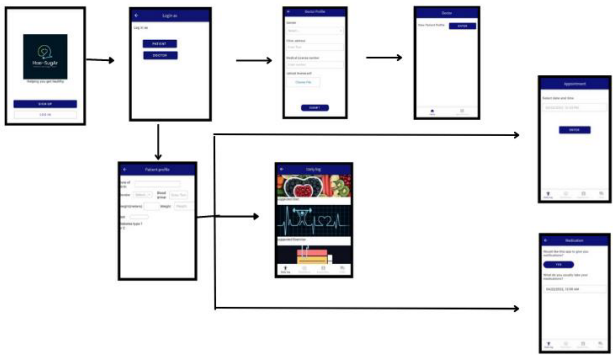
- Food Intake- The food chart/diet chart will be suggested to the patient based on any additional abnormal conditions experienced by the patient such as if he/she is lactose intolerant, overweight, has any allergies, high/low BP problems etc.
- Physical activity/exercise schedule – This will also be suggested to the patient based on any additional abnormal conditions experienced and also on the patients' daily time availability i.e., 20, 30, 40 minutes. The physical activities include walking,

swimming, jogging, dancing, yoga, weight training or any other sport.

The "Medication" section stores the record of medicines taken by the patient and the doctor will prescribe, if any, during the examination or routine check-up. There will also be a "Doctor Communication" section which will help the patient communicate with their respective doctor and will schedule appointments when required. A "FAQs" section will allow the users to ask questions and provide informational guide regarding the facts and myths associated with diabetes.

4) **Database design –** In this application, the main part is to store data and make personalized recommendations based on the values. The main purpose of the database section is to get in details of how the database is designed to store the inputted body measurement values i.e., height and weight, diet charts, physical activity details and at the same time give recommendations on the stored data.

3.2 Flowchart of the system



IV. CONCLUSION

Diabetes is a serious life-threatening disease and must be constantly monitored and effectively subdued with proper medication by adapting to a healthy lifestyle. As diabetes cannot be cured and only be controlled, the main goal is to avoid complications as it is very important that one suffering from diabetes ensures his/her wellbeing through effective self-management techniques in everyday life. As the major complications of diabetes are related to blindness, kidney damage and heart attack, a regular check on the blood sugar levels should be done including food habits. Self-management of diabetes using a mobile application is the easiest, quickest and feasible way of managing diabetes without one's need of actually going to a hospital or clinic on a regular basis thus saving ones' time and travel costs. Smartphone apps prove incredibly useful for doing basic tasks repetitively without error such as monitoring of glucose. Though it has its advantages, there are also some shortcomings which include constantly updating software, lack of 100% accuracy which can lead to harmful consequences, cybersecurity risks etc.

V. FUTURE SCOPE

The following changes are expected for the future development of the proposed application:

1. Inclusion of special feature of detection of Diabetic Retinopathy which is one of the complications associated with diabetes through image processing technique.
2. Adding more dietary and exercise options to provide people with more options and more accuracy while choosing their perfect diet.
3. Along with Diabetes Mellitus (Type 1 and 2), addition of Diabetes Insipidus and its due treatment course and options.
4. Video call facility for one-on-one interaction of patient and doctor.
5. In the future if this application creates blood glucose monitors that can be directly attached or synced to a smartphone instead of the manual entering of the data by the patient, then this could be a major development for this application and help this application to become a major help for diabetic patients.

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AET 043

Measurement of Complex joint kinematics With WearableOptical Fiber Sensor System

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Abstract- Measuring joint angles is an important task for therapists to monitor and evaluate a patient's recovery progress in physical rehabilitation, professional sports and performance arts. This paper proposed the fiber-optic goniometer with modified fiber tips to measure joint angles. Light passing through a joint between two fibers undergoes intensity modulation due to the angular misalignment between them. This intensity change, recorded as a voltage change by a photodiode, is then used as a measure of the joint angles. Inverse polynomial models were applied to directly obtain and display the joint angle change in real time with the Lab-VIEW program. The reference joint angle correlated well with the calculated output angle over the test range. The propose method is simple, cost effective and can evaluate the joint angle in real time.

I. INTRODUCTION

Long-term measurement of human movement in the field is an important need today.[1] This type of monitoring is quite beneficial to the therapist, allowing a better assessment of human motor control, and tremor or functional use of a body segment, over long periods of time. Evaluating a patient's daily life activities allows a more reliable assessment of a patient's disabilities, and aids in developing rehabilitation treatments and programs, as well as assessing a treatment's effectiveness. [1] In addition, the recognition of deviations in joint movement patterns is essential for rehabilitation specialists to select and implement an appropriate rehabilitation protocol for an individual. [2] To better develop and optimize total joint replacements, for instance, a detailed record of a patient's daily activities after such a replacement is required. [3]In pulmonary patients, it is often desirable to precisely quantify the amount of walking and exercise performed during daily living, since this is a fundamental goal in improving physical functioning and life quality. Furthermore, physiological responses, such as changes in heart rate or blood pressure, often result from changes in body position or activity, making the assessment of posture and motion an essential issue in any type of continuous, ambulatory monitoring. [4] For all types of body-mounted sensors, the issues of comfort and wearability are of major importance, if a patient has to wear the monitoring device for extended periods of time. Furthermore, such home-use wearable sensors need to be put on and off every day without close supervision of a medical professional. Proper registration of the sensor is therefore a crucial requirement for deploying wearable sensors to the home environment.

The goal of this paper is therefore to develop a new method for continuous monitoring of human movement by measuring single or multi-axis joint angles with a wearable sensing garment that is non-intrusive and non-cumbersome. A new method is presented here for joint monitoring using conductive fibers incorporated into comfortable, flexible fabrics. Fiber-optic sensors are frequently used for human joint angles monitoring. Usually the sensor for this application is based on intensity modulation, and the most common implementations are based on intensity modulation due to bending of optical fiber. All that is needed is a one-time calibration with a standard goniometer, and a conductive fiber sensor garment is then able to continuously detect joint movement and measure specific single or multi-axis joint angles. This type of wearable sensor would allow extended home monitoring of a patient, and is no harder to put on than a typical article of clothing. [5]

In the following, the principle and design details of this wearable device will be presented, along with effective algorithms for allowing a patient to perform long-term, unsupervised monitoring in the home environment. Experimental feasibility tests will also be presented on a prototype wearable sensor for both single-axis and multi-axis joints. [5]

II. OBJECTIVE

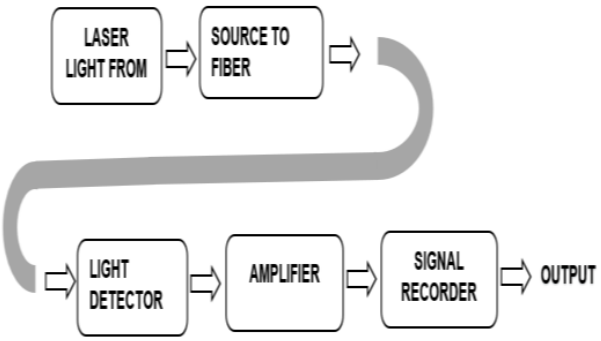
- H Providing a non-invasive, nonintrusive and
- Electrically safe device which is suitable for medical and sports applications.
- To provide easy monitoring and evaluation of patient's recovery progress for therapists in rehabilitation.

- Development of flexible, light weight and wearable wireless human joint monitoring.
- To provide a possibility of remote human joints monitoring over the internet with lab view software.

III. PROBLEM STATEMENT

The practice of continuous, long-term monitoring of human joint motion is one that finds many applications, especially in the medical and rehabilitation fields. Monitoring human biomechanical movement is necessary for the analysis and development of kinaesthetic exercise techniques in physical rehabilitation, professional sports, and performance arts. [6] There is a lack of acceptable devices available to perform such measurements in the field in a reliable and non-intrusive way over a long period of time. Optical fibre technology offers an attractive solution to motion capture sensing in terms of size, robustness, signal fidelity, and efficiency. [6] The purpose of our project is to develop such a wearable joint monitoring sensor capable of continuous, day-to-day monitoring.

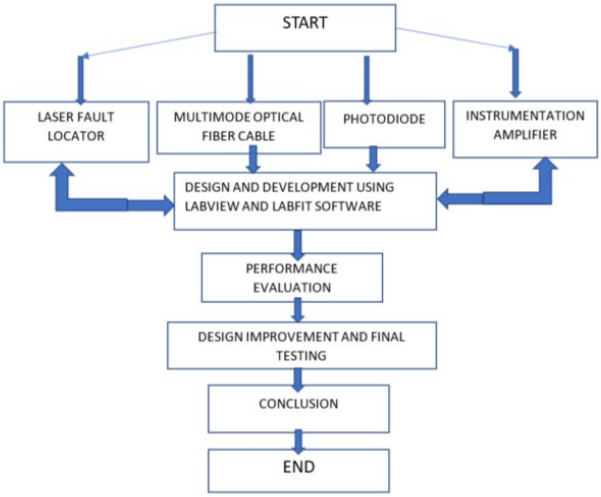
IV. PROPOSED SYSTEM



V. WORKING PRINCIPLE

When a particular joint on the human body moves, skin around the joint stretches, along with any clothing surrounding the joint as well. A former study by the textile industry has shown that body movements about joints require specific amounts of skin extension. Lengthwise across the knee for example, the skin stretches anywhere from 35–45% during normal joint movement. When a particular joint moves, fabric around the joint will either expand or contract accordingly, assuming the fabric is form fitting to the skin, and has the necessary elastic properties. To assure comfort and freedom of body movement, stretchability of 25 to 30 percent is recommended for fabrics fitting closely to the body. [5] Laser light from fault locator is given to the multimode optical fiber cable. By incorporating conductive fibers into such a fabric surrounding a joint, the conductive materials will necessarily change length with joint movement. The electrical resistance of the conductive material will change as well, and can be directly measured and correlated to changes in the orientation of the joint. Laser light from multimode optical fiber will then fall on the photodiode which is connected to aruduino board. Using labview software light loss can be calculated which causes due to joint movement.

VI. FLOW CHART



VII. INSTALLATION

Garment Movement Measurement and Error Analysis Error introduced into a wearable sensor signal by garment-related parameters is evident in many application areas. Sensor movement affects most wearable sensors, but is particularly problematic for inertial sensing units (accelerometers, magnetometers, and gyroscopes, which sense position and movement). The most common approach to managing movement noise in wearable sensors is prevention: through tight mechanical coupling by attaching the sensor to the body using elastic, straps, adhesive, or a skin-tight garment. In cases where improving mechanical coupling in surface sensors is not sufficient to reduce or remove motion artifact (such as in situations where the garment cannot apply sufficient force to the body, or where the wearer's movement is sufficiently vigorous), other countermeasures have been investigated, such as arrays of redundant sensors. have undertaken significant study of the impact of garment movement on sensor signal quality, both in measuring the effects and in modeling the impact of sensor orientation and textile folds using a simplified model of textile and garment properties Their work focuses basically on the effects of movement and fabric wrinkles on inertial sensors. Our previous work established a method of measuring the movement and position of a garment relative to the body surface (which is implemented here as well), and used this method to explore the variability in error measured over the upper body.

Textile-Based Bend Sensing.

Bend Sensing has not been investigated in depth in our experiments yet. I believe it can potentially be used as an alternative to Stretch sensing or as a hybrid solution. We have added a method based on garment stitched sensor for detecting bend Sensor responses to folding showed good correlation with elbow bend angle and repeatability. developed and tested Garment-Integrated Plastic Optical

Fiber (POF) sensors for monitoring for elbow joint . Results showed that the sensor is capable to provide reliable and accurate measurements. Stretching and Bending capabilities combined with the ease of integration with textiles and garments make both sensors well suited to monitor body movement, especially in measuring simple joint articulations such as Flexion or Extension. If multiple sensors are used in strategic ways, more complex articulations such as Rotation can be detected. The elbow is a type of hinge joint that permits motion only in one plane where the movement is Flexion/Extension. In terms of utility, the elbow supports the whole weight which is carried in hand, thus it tends to be more susceptible to injuries than other joints.

VIII. COMPONENT SELECTION

a) Hardware

Laser Fault Locator: The laser fault locator is used as the source of light in our project which will be transmitted through multimode mode optical fibre cable which would be kept in attachment in wearable skin fit fabric around elbow joint. Multimode Optical Cable: Multi-mode fiber is a type of optical fiber designed to carry multiple light rays or modes simultaneously, each at a marginally different reflection angle inside the optical fiber core. [7] Photo Diode: We will be using photo diode as a receiver on both the end to detect the intensity of delivered power after passing through optical fiber cable.
Arduino UNO: ATmega 328 microcontroller is used. Amplifier: Some signal distortion occurred so amplifier is used to amplify the signal.

b) Software

Labview: LabVIEW is used to perform a huge number of mathematical and logic functions. It offers a real-time compilation and the ability to execute function blocks without requiring development of a test case. [8] Arduino IDE: Arduino IDE (Integrated Development Environment) is the software for Arduino. It is used for writing code, compiling the code to check if any errors are there and uploading the code to the Arduino.

IX. FUTURE SCOPE

Since it is flexible and light in weight, we can also use IMU technology for proprietary wireless motion tracker which can be applied to the suit for tracking upper limbs, trunk and neck.

X. CONCLUSION

Wearable, portable motion capture applications require robust sensors to detect limb positioning and movement. An elastomer-gel combination was used to fabricate optical fiber sensors of diameters of 3 mm and 5 mm with strains up to 60%. The experimental stress-strain properties were matched .The optical response to stress-dependent strain was also investigated. It was observed that a laterally applied stress induced higher loss in the fibers, suggesting that high curvature regions attenuated light propagation more severely than linear strain. The fiber sensor were used to demonstrate the real-time evaluation of the elbow joint angle. In this implementation, both fiber diameters exhibited a monotonously decreasing loss due to flexion (causing strain). At complete flexion corresponding to a 60°joint angle, a loss of 30 dB was observed. The 5 mm diameter fibers were capable of measuring the complete range of motion of the elbow. Our results demonstrate a viable, inexpensive, and robust material solution due to the high strain ratios and strain independent electro-optical properties of PDMS optical fibers. This implementation offers a biocompatible, real-time, optical solution for biomechanical movement and kinesthetic sensing via joint angle tracking.

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AET 044

Equipmed

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Abstract - Equipmed is designed to compare the price and review of equipment and services from a range of providers, which will help consumers in making decision to choose right products that, will save their money through online. Considering the customers' busy lifestyle especially those who are living in the city area, most of the consumers prefer to buy their needs through the internet because it saves their time. Besides, consumers always go for the cheaper price in purchasing products therefore by using price and review comparison website, customers don't have to travel from shop to shop only to survey the price offered by different shops for the same product. They can just check it from the website itself and decide which products they should buy. This project, named as Equipmed is the place where consumers could find the right product. Even though not all consumers are buying online, but it is one of the ways to help consumers increase their awareness. Consumers have the right to know whether the prices they are seeking in the shops are good deals as it is claimed or not. The website also beneficial to the vendors as they will be able to advertise their companies and promote their products at the same time. They just need to provide the price information regularly and the admin of the website will do the rest.)

I. INTRODUCTION (HEADING 1)

This project is aimed at developing a Web application that depicts online comparison of Biomedical Equipments. Using this Web application one can improve the efficiency of their services by comparing the equipments of different companies to know which one is best. Online Comparison is one of the applications to improve the marketing of the company's products.

Equipmed is designed to compare the price and review of equipment and services from a range of providers, which will help consumers in making decision to choose right products that, will save their money through online. Considering the customers' busy lifestyle especially those who are living in the city area, most of the consumers prefer to buy their needs through the internet because it saves their time. Besides, consumers always go for the cheaper price in purchasing products therefore by using price and review comparison website, customers don't have to travel from shop to shop only to survey the price offered by different shops for the same product. They can just check it from the website itself and decide which products they should buy. This project, named as Equipmed is the place where consumers could find the right product. Even though not all consumers are buying online, but it is one of the ways to help consumers increase their awareness. Consumers have the right to know whether the prices they are seeking in the shops are good deals as it is claimed or not. The website also beneficial to the vendors as they will be able to advertise their companies and promote their products at the same time. They just need to provide the price information regularly and the admin of the website will do the rest.

As per observation a lot of people usually choose to buy products online because of their busy schedule. Therefore this website will be useful for consumers to buy medical equipment's by reviewing and comparing the prices and products of different companies, as well as it is also useful for vendors of different companies so that they can promote their products and it will be easy for them to reach out to consumers.

The EQUIPMED (Medical Products Electronic Commerce) Portal provides the electronic means for medical-equipment needers to look for their products while supporting the Purchasing Process. The Portal offers a powerful Internet-based search tool for finding medical products and manufacturers. Its main advantage is the fast, reliable and upto-date retrieval of information while eliminating all unrelated content that a generalpurpose search engine would retrieve. The Portal accepts end-user requests and generates a list of results containing text descriptions of devices, UMDNS attribute values, and links to manufacturer Web pages and online catalogues for access to moredetailed information. Device short descriptions are provided by the corresponding manufacturer. The Portal offers technical support for integration of the manufacturers' Web sites with itself. The network of the Portal and the connected manufacturers' sites is called the EQUIPMED system.

I. AIMS AND OBJECTIVE

A. AIM

This project is aimed at developing a Web application that shows online comparison of Medical Equipments available on the internet.

B. OBJECTIVE

Using these Web application buyers can compare the equipments available on different sites based on their manufacturing company, specifications, customer ratings and reviews, best offering price.

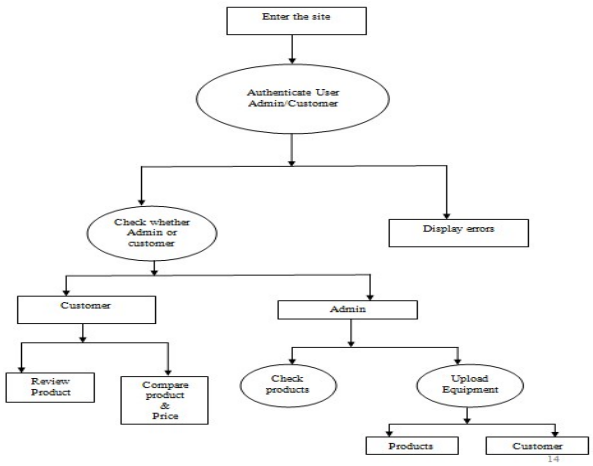
II. PROBLEM STATEMENT

During this pandemic, we have realized the need of basic medical equipments in their houses but while purchasing they lack the knowledge of actual prices and best companies to choose. It is important for a web comparison website to return results with the right prices as what the customers want but accurate results also important so that customers can get what they really want. Most of the working people do not have time to buy these products as per their need. As consumers, they have the right to choose which company is offering the best price for a certain medical product. However, to check on price offered by each company is time consuming and due to limited time that they have, they are not able to compare the prices and end up buying certain product with higher price. The other problem that occurs to the vendor or company side, in order for them to promote their products. Moreover, as compared to the big markets like pharmeasy or netmeds that have their own website, owners of the small health stores found it is hard for them to reach out their customers. So, this project will be beneficial for them to get people know about them and their products.

IV. SCOPE

As per observation a lot of people usually choose to buy products online because of their busy schedule. Therefore this website will be useful for consumers to buy medical equipment's by reviewing and comparing the prices and products of different companies, as well as it is also useful for vendors of different companies so that they can promote their products and it will be easy for them to reach out to consumers. Authors and Affiliations.

V. PROPOSED SYSTEM



VI. METHODOLOGY

- By looking at problem statement we came to know the need of having basic medical equipments at our houses.
- So, this website will help us to work on the problem and solve it efficiently.
- This website will work as following :-
  For Consumers,
- The consumer will enter the site.
- If the consumer has existing account he/she will login into the site with their credentials or he/she will create the new account and will sign up into the site.
- On the appeared web page the consumer will search for desirable product or will go through the products already appearing on the website.
- By clicking on the desired product the consumer will enter into another webpage containing different companies, ratings, reviews and different prices of the respective product.
- By comparing every parameter the consumer can choose the right product.
- Also consumers can click on the product link given in the description of the product they desire to buy and will be redirected to the site from which they can buy the product.
  For Admins,
- The admin will enter the site.
- If the admin has existing account he will login into the site with his credentials or he will create the new account and will sign up into the site.
- By creating account and logging in he will be redirected to the homepage of the website where he will have options for uploading his equipment on the website.

VII. DESIGN AND IMPLEMENTATION

- Design

Block Diagrams

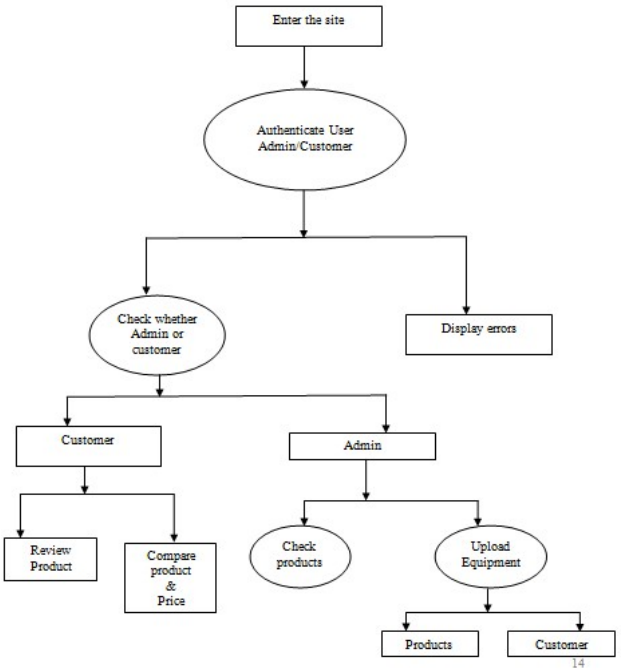
Data Flow Diagram

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 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.

Dataflow diagrams can be used to provide the end user with a physical idea of where the data they input ultimately has an effect upon 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 saved in database and maintained by appropriate authorities.

VIII. PROCESS MODEL



IX. SOFTWARE REQUIREMENTS

- PROJECT CATEGORY:
  RDBMS - SQL
- Languages used:
  Front End:
  HTML, CSS, SASS
  Back End: JavaScript, PHP Versions:
  1. Xampp – 05.1.3
  2. Apache – 8.0.5
  3. PHP – 8.0.5
  4. My SQL – 8.0.5

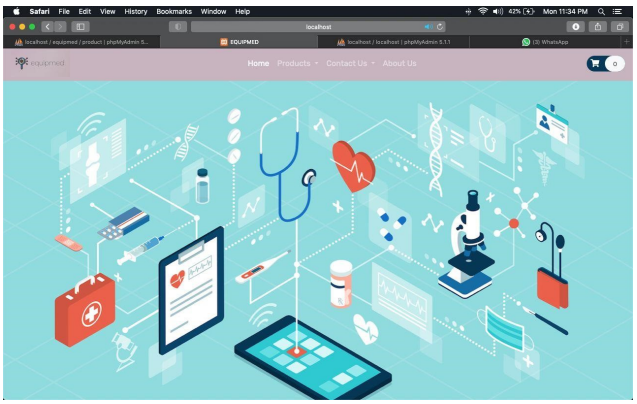
Why SASS?

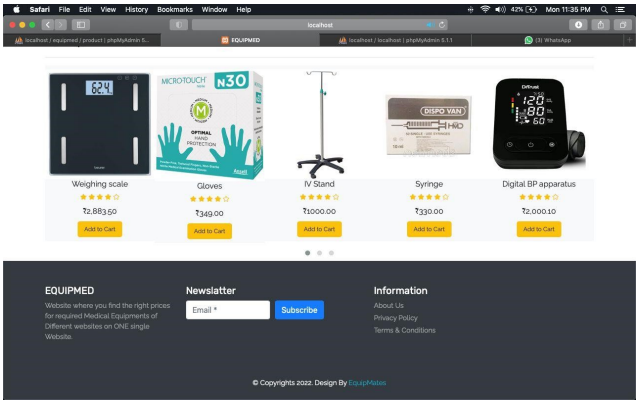
- Sass is completely compatible with all versions of CSS. We take this compatibility seriously, so that you can seamlessly use any available CSS libraries.
- Sass boasts more features and abilities than any other CSS extension language out there. The Sass Core Team has worked endlessly to not only keep up, but stay ahead.

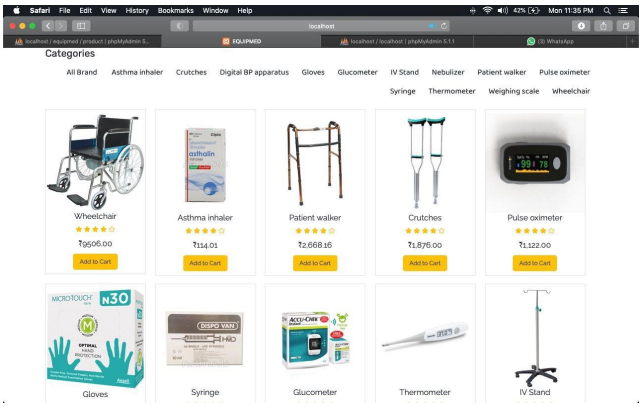
JSON

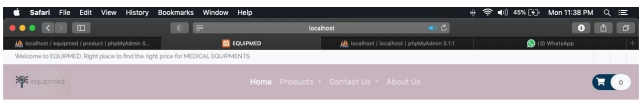
- JSON (JavaScript Object Notation) is a lightweight data-interchange format. It is easy for humans to read and write. It is easy for machines to parse and generate. It is based on a subset of the JavaScript Programming Language Standard.
- JSON is a text format that is completely language independent but uses conventions that are familiar to programmers of the C-family of languages, including C, C++, C#, Java, JavaScript, Perl, Python, and many others. These properties make JSON an ideal data-interchange language.

X. SNAPSHOTS









About Us And This Website:

About This Website:-

Prefer comparing prices before buying? Our website has got you covered. During this pandemic we have faced a major need of general medical equipment's at our households on regular basis. but certainly we cannot just buy any medical equipment directly without knowing its right price and specifications. You can use Equipmed to compare specifications and most importantly prices of general medical equipments .You can also compare different features of equipments and specifications along with the best price you could ever have. Also Compare products from mg , netmeds and indiamart . So, know the right price and go for the best !

About Us:-

We are Students of Vidyalankar Institute of Technology, from Biomedical Engineering Dept. We Developed a Medical Equipment Website for our Final Year Project, Our Group Consist of Three Members:

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Pratiksha Joglekar, Email Id: pratiksha.joglekar@vit.edu.in
Atharva Mantri, Email Id: atharva.mantri@vit.edu.in

The Website is Developed By using languages such as PHP, JAVA, HTML, SQL, CSS, SASS. We Collected data from different Websites like Netmeds, 1mg, Indiamart. And created a easy option for customers to easily browse through these websites from a single webpage of Our Website- EQUIPMED.

XI. FUTURE SCOPE AND CONCLUSION

As per observation a lot of people usually choose to buy products online because of their busy schedule. Therefore this website will be useful for consumers to buy medical equipment's by reviewing and comparing the prices and products of different companies, as well as it is also useful for vendors of different companies so that they can promote their products and it will be easy for them to reach out to consumers.

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AET 045

Development of Speaking System for Mute People Using Hand Gesture

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Abstract - It is very difficult for voice impaired people to communicate their messages to regular people because regular people are not educated. Hand sign language, contact is becoming very difficult. Therefore, I suggest a speech device that will make it possible for stupid and mute people to convey their messages to normal people through hand gestures. The proposed method, the use of hand gesture reading system fitted with gestures and flex sensors linked to each finger and Linked as input to the RF Transmitter along with the speaker unit. This machine is operated by a battery-powered circuitry. Just run it. Also, this device will include various terms and phrases that will help mute people send simple messages. This is the Device reads the hand gesture of a stupid person for various differences in the movement of the hand. The processor is continuously receiving input Sensor values and then process them, then look for a corresponding message for a set of sensor values. Once it has been found in memory, an interfaced speaker retrieves the message and speaks it using text for speech processing This study's data was given. The data was gathered using structured open and closed questionnaires that were only provided to the participants in my study. Data: Data The study was conducted using MP Lab software. Finally, the results have been positive for my research goals and have been Planned to be Support the target group in the business.

Key word:– Flex Sensor, IC Microcontroller, LCD Display 16*2, Resistor, Bluetooth module, IC7805

I. INTRODUCTION

It is very difficult for mute people to communicate their message to the general public. Communication becomes very difficult because most people are not trained in hand sign language. In an emergency or other circumstance, when a mute person traveling or interacting with or conveying a message to new people becomes very difficult. Here we suggest a smart speech device that allows mute people to express their message to ordinary people by using hand movements and gestures. The system uses a hand motion monitoring system fitted with motion and flex sensors and a 0speaker unit. A microcontroller can be used for data processing and device operation. The device consists of about 10 recorded messages such as "need help," "where is the toilet/washroom" and so on to help mute people communicate simple messages. The machine reads hand gestures of individuals for various variations of hand movements. It also comprises of a trigger sensor to signify that the person wishes to enable the device and to speak something. This means that the computer is silent while the person makes involuntary hand movements. The processor of the microcontroller continuously receives input sensors data and then analyses them. Now searches for compatible messages for a range of sensor data. Once located in memory, these messages are recovered and spoken using text for speaker identification via a communicated speaker. Thus, we have a fully functioning smartphone system that helps mute people interact with regular people using a simple, wearable system.

II. LITERATURE SURVEY

In the previous chapter we saw a brief detail about the hardware of the project and also the control requirements of it. In this chapter we'll see the literature behind why Development of speaking system for mute using microcontroller and also research and international journals that provide a strong foundation for our project.

A. Literature

The use of speech and gestures in human communication is thoroughly organized. As a result, we decided to make 'Gesture' the focal point of our project. Computer gesture and sign language identification is the recognition of gestures and sign language.

III. METHODOLOGY

A. Block diagram and implementation

In this paper, the method used for communication between normal people and mute people can be processed in certain steps. There are five Flex sensors connected to microcontroller, basically flex sensor gives output according to hand gesture or movement of hand in the form of variable resistances, when a bending motion occurs in the flex sensor, the resistance of the flex sensor increases, and this changing resistance is given to the microcontroller. We have programmed the microcontroller with binary codes (0000- 1111) according to the resistance value between straight and bending action of flex sensor, Microcontroller contain some messages in it according to binary values (output of flex sensor), microcontroller

compares that output with the stored messages and processes it with respect to resistance of flex sensor. The microcontroller gives this output to LCD and Bluetooth module. Bluetooth module acts transmitter between microcontroller output and speaker (cell phone).

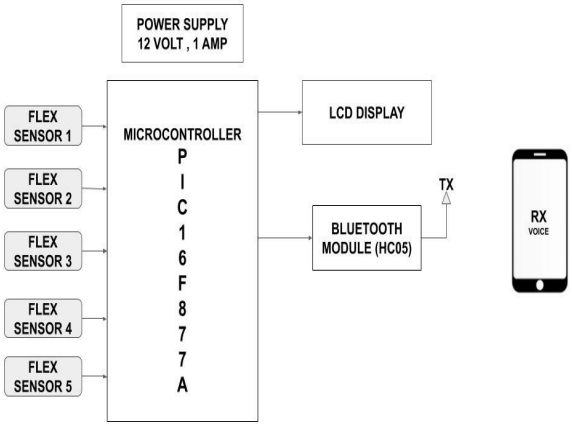

Fig. 1. Block diagram

B. Software-Hardware Specific Requirements

1) PIC Microcontroller: The word PIC stands for Peripheral Device Controller. It is the offspring of the brain. Technology for Microchips, USA. This was originally designed as a supporting system for the control of its peripheral devices by PDP computers, and hence called as PIC, Peripheral Interface Controller. To classify their single chip micro controllers, they have coined this name. Now, in industrial automation and embedded applications, etc., these 8-bit micro controllers have become quite significant. PIC16C6x/7x is one of the earlier models of PIC Microcontrollers. There is an increase in the Analog to Digital converter capabilities of the 7x family. A number of capabilities bundled in both dual in-line (DIP) and surface mount packages are available for these cs. These are available in a surface mount kit of 28 pins DIP, 40 pins DIP, 44 pins etc. Any of the PIC controllers are numbered with the letter A. The appearance of A indicates the brown-out reset function, which causes the PIC to reset when the power supply voltage drops below 4.0v.

Fig. 2. PIC Microcontroller

2) Flex Sensor: A flex sensor, also known as a bending sensor, measures the amount of deflection or bending. Typically, the sensor is fixed to the surface, and bending the surface changes the resistance of the sensor component. It is used as a goniometer and is also known as a flexible potentiometer since the resistance is directly proportional to the bend.

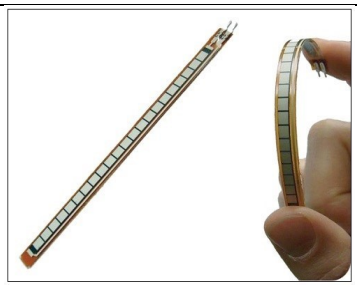

Fig. 3. Flex Sensor

3) LCD display: Liquid crystal displays are popular in digital watches and a variety of portable computers. A liquid crystal solution is sandwiched between two sheets of Polarising material in LCD displays. The electrical current that flows through the liquid causes the crystals to align, preventing light from passing through as a result, each crystal acts as a shutter, either allowing light to pass through or blocking it. LCDs have become very popular for displaying information in many smart devices in recent years. The utensils. Microcontrollers are commonly used to operate them. They simplify the operation of complex machinery. LCD's come in a variety of shapes and sizes, but the most popular is a backlit 20-character x 4-line display. It only needs 11 connections: eight data bits (which can be reduced to four if necessary) and three control lines (we have only used two here). It takes just 1mA of current and runs on a 5V DC supply. Moving the voltage to pin 3 of the monitors. usually with a trim pot, will change the display's contrast.

Fig. 4. LCD Display

4) Bluetooth module: The HC-05 Bluetooth module is a MASTER/SLAVE computer. The factory settings are SLAVE by nature. Only AT COMMANDS can trigger the Module Function (Master or Slave). Slave modules are unable to establish a connection with another Bluetooth computer, but they do accept connections. The Master module may establish a link with other devices. It can simply be used to replace a serial port when connecting to another Bluetooth device.

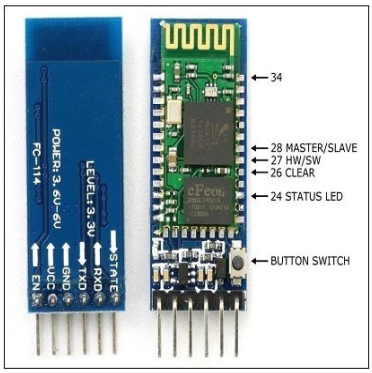

Fig. 5. Bluetooth Module

5) Resistor: A resistor is a passive electrical two-terminal component that as a circuit element implements electrical resistance. Resistors are used, among other applications, in electronic circuits to decrease current flow, change signal levels, separate voltages, bias active components, and terminate transmission lines.

Fig. 6. Resistor

6) IC 7805: The IC 7805 is an integrated circuit for voltage regulators. It is a member of the IC fixed linear voltage regulator sequence 78xx. In IC 7805 a circuit, the voltage source may have variations and would not give the output of the fixed voltage. The voltage regulator IC preserves at a constant value the output voltage. The xx in 78xx displays the fixed output voltage that it is supposed to have. 7805 supplies a controlled power supply of +5V. Depending on the respective voltage levels, condensers with appropriate values may be attached to the input and output pins.

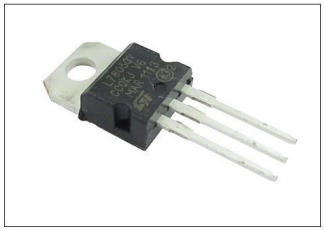

Fig. 7. IC 7805

C. Software Requirement

1) Software Development: Microchip Technology's MP LAB IDE is a proprietary integrated freeware development framework for the development of PIC and ds PIC microcontroller embedded applications. MP LAB is designed to work with MP LAB-certified computers, such as MP LAB ICD 3 and MP LAB REAL ICE, to program and debug PIC microcontrollers using a personal computer. MPLAB provides PICK programmers as well. MP LAB X supports automatic code development with the MP LAB Code Configurations and MP LAB Harmony Configuration plugins. MPLAB X is the most recent iteration of the MPLAB IDE, which was created by Microchip Technology and is based on the open-source NetBeans platform. For editing, debugging, and programming, MPLAB X supports Microchip's 8-bit, 16-bit, and 32-bit PIC microcontrollers. MPLAB X is the first version of the IDE to provide cross-platform support for macOS and Linux operating systems in addition to Microsoft Windows.

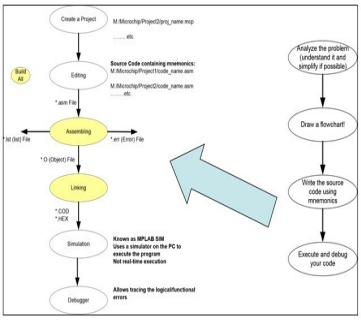

Fig. 8. MATLAB

D. Implementation Methodology

In this paper, the method used for communication between normal people and mute people can be processed in certain steps. There are five Flex sensors connected to microcontroller, basically a flex sensor produces variable resistances in response to a hand gesture or movement. When a bending motion occurs in the flex sensor, the resistance of the flex sensor increases, and this changing resistance is sent to the microcontroller. We have programmed the microcontroller with binary codes (0000-1111) according to the resistance value between straight and bending action of flex sensor, Microcontroller contain some messages in it according to binary values (output of flex sensor),microcontroller compares that output with the stored messages and processes it with respect to resistance of flex sensor. The microcontroller gives this output to LCD and Bluetooth module. Bluetooth module acts transmitter between microcontroller output and speaker (cell phone).

IV. CONCLUSION

Sign language may be a useful tool for facilitating contact between the mute or deaf community and the general public. The aim of this project is to bridge the contact gap between the mute community and the rest of the world. The proposed approach translates text into expression. The system helps mute people overcome their time constraints and improves their quality of life. In comparison to the current scheme, the proposed structure is more compact and portable. This machine turns the language into a passing voice and display that is easily understood by both blind and elderly people. To assist mute people, the language is translated into a kind of text that is projected on a digital display screen. This machine is useful in the real world for mute people who are unable to communicate with elderly people. The gesture recognizer in this project is unique in that it can be used as a stand-alone device in a typical living environment. It can also be used for speech disabled and paralysed patients who are unable to communicate properly, as well as Intelligent Home Applications and industrial applications.

Fig. 9. Conclusion

V. OUTPUT

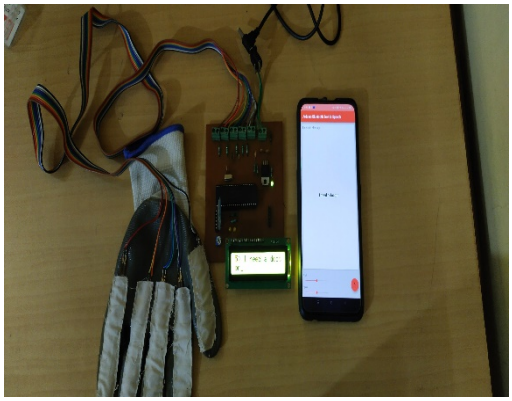

Fig. 9. Output

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AET 046

Pre-Analysis of Anterior Cruciate Ligament Injury

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Abstract- The anterior cruciform ligament is one in every of the 2 cruciform ligaments that facilitate stabilize the ginglymus. it's the foremost usually out of action ligament within the knee and is often seen injured in volleyball, soccer and basketball players. The ginglymus is that the second most ordinarily out of action piece once the articulatio talocruralis and also the main reason for sports-related surgeries. Ginglymus injuries, particularly anterior cruciform ligament (ACL) injuries, square measure one in every of the foremost economical sports injuries and typically need costly surgery and rehabilitation. Thus, we have a tendency to square measure developing associate ACL hindrance device that may facilitate players to watch their condition whereas enjoying sports and might get feedback once the sport is over. It will facilitate them to correct their body posture like running, jumping, sliding etc when we will alert them that they're perilously about to obtaining associate ACL injury. The device will first record the player's data through the angle-based Arduino sensor, and then with the help of the Arduino software, we will evaluate whether the data is within the required range, and then provide feedback to the user, which will help them track their parameters and therefore take the necessary Steps to overcome their problems.

INTRODUCTION

An anterior cruciform ligament (ACL) injury is a rupture or sprain of one of the strong bands of tissue that connects your thigh bone (femur) to your tibia (shinbone) (tibia). ACL injuries are common in sports including football, basketball, soccer, and adventure sports that require quick stops or changes of direction, jumping, and landing. You will hear a pop or feel your knee sink when the damage occurs. Pain and edoema usually start within twenty-four hours. An ACL injury can result in a protracted time of rest, causing a player to miss critical games and possibly losing their position to others. ACL knee injuries are widespread and can occur as a result of sports, accidents, poor body posture, or missing a limb. This project is based on the abduction angle which is the angle formed by the knee, fibula, and tibia. If the angle formed by chance of getting an ACL injury. The analysis of knee abduction angle has different applications: it can be used for athletes to improve their performance or it can be applied in terms of health improvement. Researchers found that the height knee abduction angle and therefore the peak abduction moment throughout a landing were important predictors of ACL injury. Studies from videos of ACL injuries showed that valgus collapse happens in most feminine cases. ACL injuries were believed to occur instantly once ground contact, and one study instructed that a fast increase within the knee abduction angle throughout the first landing part was a mechanism behind ACL injury. Therefore, evaluating knee abduction management throughout the first landing part additionally because of the peak knee abduction angle and therefore the knee abduction moment throughout landing is vital.

Anterior cruciform ligament (ACL) injuries are one of the foremost serious sports injuries. Previous studies have investigated varied aspects of ACL injury together with incidence rates, severity, medical specialty factors, mechanisms of injury, and also the impact of programs to stop ACL injuries in athletes. Treatment consists of the "RICE" medical care, which incorporates rest, ice, compression of the affected knee, and elevation of the affected lower extremity. This activity describes the analysis and management ways for such injuries and stresses that is based on anterior cruciform ligament injuries in several sports [1].

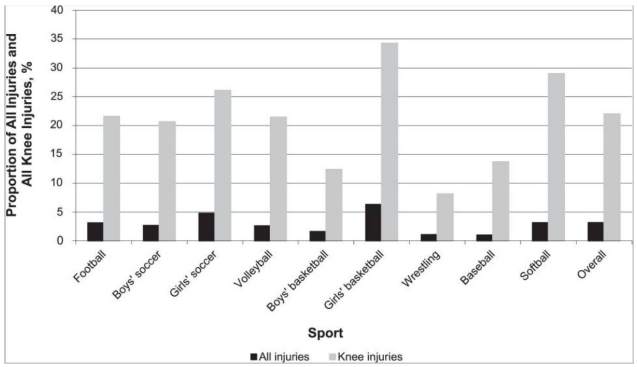


Figure 1: ACL injuries as a proportion of all type's injuries and all knee injuries [3]

Many existing ACL injury hindrance programs target non–contact related injuries. for instance, several programs teach applicable movement patterns like jump-landing

techniques as a result of movements like inappropriate cutting and stopping motions additionally cause ACL injuries [4]. However, the mechanisms of the reason for ACL injuries don't seem to be restricted to noncontact injuries. That is why having an affordable cheap device to prevent ACL injury is necessary also contact ACL injuries may be additional divided into direct injuries that involve direct trauma to the knee and indirect ACL injuries that involve direct trauma to the opposite body components.

Knee abduction angle exhibited comparable dependability with knee abduction moment for ACL injury risk identification. body simulation knowledge is cipher to estimate in vivo ACL strain. Athletes who went on to ACL injury exhibited bigger knee abduction and bigger ACL strain than did healthy controls throughout landing. Knee abduction angle was bigger for athletes and those athletes went on to develop injury than for healthy controls ($P < .01$). Knee abduction angle at initial contact foretold ACL injury standing with seventy-eight sensitivity and eighty-three specificities, with a threshold of 4.6° of knee abduction [5].

I. METHODOLOGY

An ACL injury is one of the leading causes of knee injuries in sports players. During the activity, the ACL controls however so much forward the shin will "slide" relative to the femur: it acts to forestall an excessive amount of forwarding movement. whereas a point of motion or slippery is traditional and is needed for a knee operation, an excessive amount of motion could harm alternative structures within the knee which might result in future issues in some patients. The most common mechanism is that of a sudden pivoting or cutting manoeuvre throughout the sporting activity, that's usually seen in a football game, basketball, and soccer. The ligament could tear as a result of work injuries or automobile accidents. It is thus vital to possess a tool that may give warning whenever you've got a risk of obtaining an ACL injury, to create it work it's necessary to wear the device whenever the user head to play or going somewhere wherever additional physical load is a gift in legs. The device can still monitor the user and create the user aware if its leg is on the point of having an ACL injury.

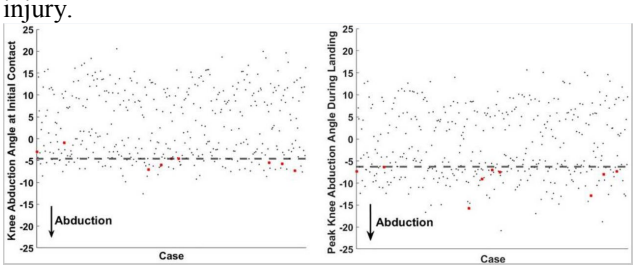


Figure 2: Knee abduction angle at initial and peak contact during landing [5]

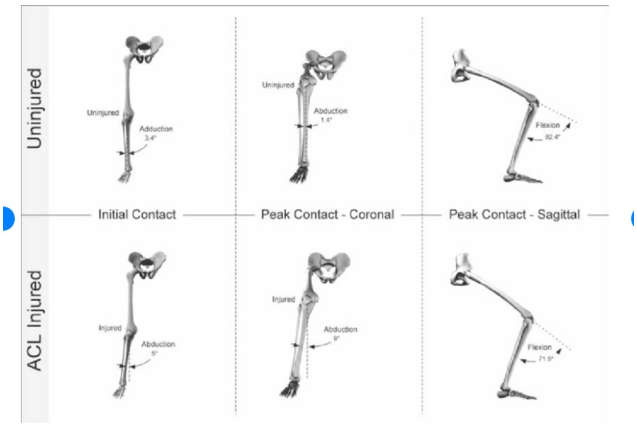


Figure 3: Comparison between injured and uninjured during initial, peak and squat position [6]

Anterior symmetric ligament (ACL) injuries square measure usually thought to be a selected concern for feminine athletes. However, of the nine sports studied, soccer had the most important variety of ACL injuries and also the highest competition-related ACL injury rate.Athletes were seven times additional probably to sustain ACL injuries in competition than in observation.Overall, 76.6% of all ACL injuries resulted in surgery. However, 29.2% of the ACL injuries were assessed by an Associate in Nursing athletic trainer and a general medical man and 12.8% of these failed to end in surgical repair.The ACL injury rates and mechanisms varied by sport and sex, indicating that targeted interference effortscan probably be only.

This system will tell the user whether his current form while doing some activities is good or not in regards to getting an ACL injury.

Methodology for Analysis

- Full-length standing scanogram (FLSS)
- Three Scanner Technique

Full-length standing scanogram (FLSS)

The ASIS, the knee, and the proximal tibia can all be seen clearly on a full-length standing scanogram (FLSS). The PC and TT, on the other hand, are difficult to inspect. The patella and the TT, on the other hand, may be accurately defined in three dimensions using magnetic resonance imaging (MRI). More accurate assessment of the Q-angle can be achieved by transferring the location of both anatomic landmarks from a magnetic resonance picture to a FLSS. As a result, the problem of the quadriceps femoris relaxing or contracting can be avoided. To the authors' knowledge, however, utilising a FLSS to measure Q-angles has been rarely explored in the literature. As a result, a potentially great and practicable technique has been overlooked. We expected that a FLSS could help to overcome the limitations of clinical measurement.

(i) To use MRI to assist in defining the PC and TT on the FLSS (consequently, measurement of the Q-angle on the FLSS might become more accurate and convincing)

(ii) to determine the difference between clinical and imaging measurement techniques

(iii) to investigate whether the Q-angle is different between genders and the possible reasons.

For the second investigation, FLSS from individuals with persistent unilateral lower extremity injuries were employed.

For this study, radiographs of the FLSS of 100 young adult patients (50 men and 50 women) were used retrospectively from April 2009 to March 2014. These patients ranged in age from 20 to 40 years old (average age 36) and were treated with a FLSS for unilateral femoral or tibial nonunions or malunions. It took an average of 1.2 years from the time of the accident to the revision surgery (range: 0.9–1.8 years). The number of operations per person ranged from 0 to 4. (average, 2.0). For ambulation, 73 individuals used crutches or a walker. All patients taking the FLSS for unilateral lower back pain met the study's inclusion criteria.

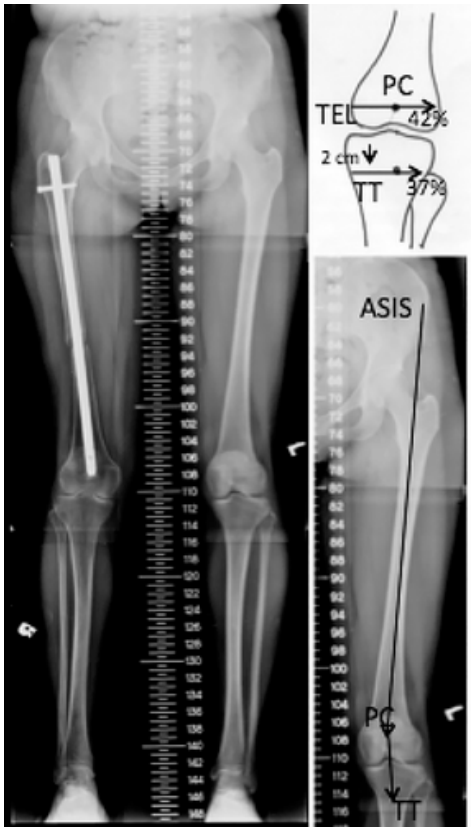


Figure 4: FLSS

Q- Angle

The measurement of lateral line of pull of the quadriceps relative to the patella is referred to as Q-angle. The Q-angle is formed by 2 lines. One line connecting from the anterior superior iliac spine to the middle of the patella and the other connecting from the middle of the patella to the tibial tuberosity.

Muscles Affected – Quadriceps and Hamstrings

- Joints Affected- Knee joint
- Quadriceps Angle (θ - Angle) ◦ The angles- the angle between me Quadrilateral and the patella and patellar tendon.

Q - Angle measurements

- First line is drawn from the Anterior superior I line spine (Asis) to the Centre of the patella.
- Second line is drawn from centre of patella to tibial tubercule.
- Angle formed by the 2 lines is called Q-angle.

Range (Flexsion and Extension)

- Male : 8- 14 degrees
- Female : 11-20 degrees

A Problem with using the Q angle as a measure of the lateral pull on the patella is that the line between the ASIS and the mid-patella is only an estimate of the line of pull of the quadriceps and does not necessarily reflect the actual line of pull in the patient being examined.

If a substantial imbalance exists between the vastus medialis and vastus lateralis muscles in a patient, the Q angle may lead to an incorrect estimate of the lateral force on the patella because the actual pull of the quadriceps muscle is no longer along the estimated line.

Furthermore, a patella that sits in an abnormal lateral position in the femoral sulcus because of imbalanced forces, will yield a smaller Q angle because the patella lies more in line with the ASIS and tibial tuberosity.

Increase in Q angle is associated with:

Femoral anteversion

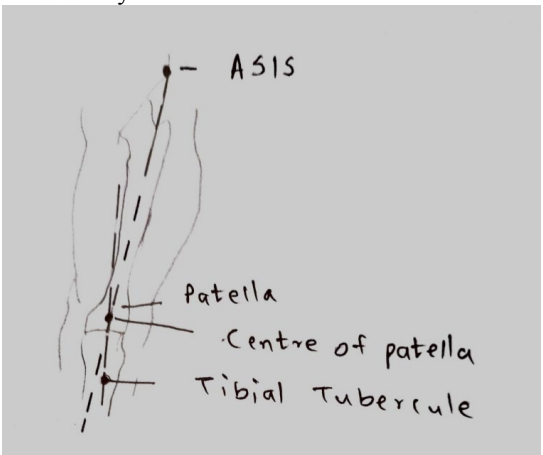
- External tibial torsion
- Laterally displaced tibial tubercle
- Genu valgum: increases the obliquity of the femur and concomitantly, the obliquity of the pull of the quadriceps.

II. IMPLEMENTATION AND OUTPUT

A. Results

Three points of Importance

- ASIS- The anterior superior iliac spine (abbreviated: ASIS) is a bony projection of the iliac bone, and an important landmark of surface anatomy. It refers to the anterior extremity of the iliac crest of the pelvis. It provides attachment for the inguinal ligament, and the sartorius muscle.
- Patella- The patella is a small bone located in front of the knee joint — where the thighbone (femur) and shinbone (tibia) meet. It protects the knee and connects the muscles in the front of the thigh to the tibia.
- Tibial Tubercule- The tuberosity of the tibia or tibial tuberosity or tibial tubercle is an elevation on the proximal, anterior aspect of the tibia, just below Where the anterior surfaces of the lateral and medial tibial condyles end.



III. FUTURE SCOPE AND CONCLUSION

This system will tell the user whether his current form while doing some activities is good or not in regards to getting an ACL injury.
Also gives appropriate solution to prevent getting the injury it may be rehabilitation, icing, correcting posture, surgery, stretching, exercise, etc.
Helps to monitor the user 24 hours anytime anywhere regardless of place and natural elements.
Will save long-term pain and time for the user be it be a player's career, family troubles, or disability for half a year.

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AET 047

Hair Loss Analysis Using AI

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Abstract - Artificial Intelligence is being used in many fields for different purposes. Medical diagnosis is one of the major purposes. In the field of medical, classification plays an important role as the main aim of the doctor is to classify whether a person is suffering from the disease or not.

Hair is an appendage of the skin that plays an important role in the beauty of people's face. Daily averages of 50 to 80 hairs are shed naturally. Various factors are effective in hair loss. In this paper using the eight influence attributes of gender, age, genetic factors, surgery, pregnancy, Zinc deficiency, iron deficiency, anemia and the use of cosmetics, the amount of hair loss is predicted.

Many people suffer from scalp hair problems such as dandruff, folliculitis, hair loss, and oily hair due to poor daily habits, imbalanced nutritional intake, high stress, and toxic substances in their environment. To treat these scalp problems, dedicated services such as scalp hair physiotherapy have emerged in recent years. This article proposes a deep learning-based intelligent scalp inspection and diagnosis system, as an efficient inspection and diagnosis system for scalp hair physiotherapy as part of scalp healthcare.

The objective of this project is to evaluate AI for the detection of alopecia in human beings and to provide solution for this condition. With the help of proposed model, the user will be able to get a opinion that will help them to take proper decisions for diagnosing the presence of this disease in patients. This second opinion is crucial due to many factors while doing disease identification. These factors include increased population, environmental pollution, growing demands for proper medication, and less availability of medical experts to cope up with this increasing demand. Also, the dynamic nature of disease symptoms plays an important role in correct diagnosis of a certain disease.

I. INTRODUCTION

Many people suffer from scalp hair related problems such as dandruff, folliculitis, hair loss, and oily hair for reasons that include poor daily habits, imbalanced nutritional intake, high stress, and toxic substances in their environments. At least 30% of these problems result in hair loss. Rajput evaluated the causes and clinical expressions of hair loss due to air pollution.

The World Health Organization (WHO) reported that approximately 70% of adults have scalp hair problems. The causes of scalp hair problems include endocrine, genetic, disease, or other internal factors. Misery et al. evaluated the severity of sensitive scalps and symptomatology by adopting a severity score of abnormal sensations. Misery et al. found that dandruff, scalp pruritus, and related symptoms occur in the French population. Other related studies in children conducted in the USA and Australia have shown that dandruff is present in 18% of children. Therefore, both adults and children can have scalp hair problems.

Hence, how to effectively prevent scalp hair-related problems and scalp hair maintenance are important. To process such increasingly serious scalp problems, dedicated services, including scalp hair physiotherapy, have emerged in recent years. Under the current most common processing procedures in scalp hair physical therapy, the condition of the patient's scalp hair is determined by manual inspection. However, such manual inspections are dependent on the skill level of the physiotherapist; thus, they can lead to different results and concerns regarding the scalp hair condition and the diagnosis.

Consequently, two key problems exist related to haircare services in the current hairdressing industry, which are summarized below.

1) THE EXTREMELY HIGH COST OF EDUCATION AND TRAINING

In contrast to ordinary hairdressers, scalp hair physiotherapist must be able to determine the scalp hair health condition of the customer's scalp hair directly from microscopy images. These images are acquired by a dedicated inspection instrument and can reveal the status of internal and external factors affecting scalp hair health. Acquiring such skill takes at least a half-year of education and training. Generally, the training cost is 14,000 U.S. dollars for each new employee in the hairdressing industry in Taiwan. However, the frequent turnover of employees in the hairdressing industry has led to companies investing considerable time and cost due to the need to continuously cultivate physiotherapist skillsets.

2) THE INTERPRETATION OF SCALP HEALTH CONDITION VARIES BETWEEN INDIVIDUALS

The interpretation of scalp hair microscopy images differs among professional physiotherapists even when they have received the same professional training. Such differences in diagnostic result interpretation also occur due to lack of experience. Confusion often occurs between customers and hairdressing companies, highlighting the need for a scientific and systematic quantitative benchmark

II. METHODOLOGY

System testing is a critical phase implementation. Testing of the system involves hardware devise and debugging of the computer programs and testing information processing procedures. Testing can be done with text data, which attempts to stimulate all possible conditions that may arise during processing. If structured programming Methodologies have been adopted during coding the testing proceeds from higher level to lower level of program module until the entire program is tested as unit. The testing methods adopted during the testing of the system were unit testing and integrated testing.

UNIT TESTING:

Unit testing focuses first on the modules, independently of one another, to locate errors. This enables the tester to detect errors in coding and logical errors that is contained within that module alone. Those resulting from the interaction between modules are initially avoided.

INTEGRATION TESTING:

Integration testing is a systematic technique for constructing the program structure while at the same time to uncover the errors associated with interfacing. The objective is to take unit-tested module and build a program structure that has been detected by designing. It also tests to find the discrepancies between the system and its original objectives. Subordinate stubs are replaced one at time actual module. Tests were conducted at each module was integrated. On completion of each set another stub was replaced with the real module.

FUNCTIONAL TESTING:

Functional testing is a technique in which all the functionalities of the program are tested to check whether all the functions that where proposed during the planning phase are full filled. This is also to check that if all the functions proposed are working properly.

This is further done in two phases: One before the integration to see if all the unit components work properly Second to see if they still work properly after they have been integrated to check if some functional compatibility issues arise.

III. HAIR AND HAIR PROBLEMS

Hair is an appendage of the skin that comes out it as thin filaments. This member for lack of nerve is any sense. Each hair is made up of sections and layers. Natural hair color is considered as one of the main characteristics of hair and this is a direct function of race. The hairs have different diameters. According to hair appearance, three categories of straight hair, wavy and frizzy can be divided. The speed of hair growth, not only in different parts of the body, but also in different parts of the head is different. Different hair colors and forms have a direct impact on people's faces beauty. Daily averages of 50 to 80 hairs are shed naturally. In some cases, hair loss is over this determined range [. If the hair loss reaches a significant level sooner or later, the scalp will be visible from amidst the hair. Hair loss in men and women follow of a certainpattern. Thus, in men started from the temples and crown and then advances more. But hair loss in women is dispersed. Borders of the hair usually do not disappear. Meanwhile the onset of the hair loss in women is delayed for about ten years. Hair loss in women has more periodic changes than men. Women's hair volume is usually little with increasing age and some people genetically has thin and sparse hair and since the child were less hair, this is normal and does not need special treatment. Factors such as disease, hormone changes and consumption of drugs and environmental factors and genetic cause complete hair loss. These cases require medical treatment or surgery. Many people think only men are bald and women do not lose their hair, but the truth is something else. Millions of women in the world suffer from baldness and every year their number is increasing. Another powerful factor in the baldness is inheritance. Hair loss has several types, and each has different reasons. Reasons like genetic factors, diseases, poor nutrition, vitamin deficiencies, anemia, iron deficiency, stress, using cosmetics and so are effective on hair loss. These factors are mentioned more fully in the next section. To recognize the amount of hair loss, artificial neural networks are used. Some effective factors in hair loss are used in neural networks as input parameters that the physicians and hair experts consider as effective. The actual data have been collected from several physicians who worked at clinics.

Due to growing population, hard timelines, and increased pressure on experts, it is a real challenge for experts to detect the disease timely and accurately under such pressure. In case of hair fall, alopecia is sometime being confused with a temporary imbalance of hormones or due to stressful conditions, thyroid, or other hormonal issues, leading to wrong medications which can worsen the patient’s condition. To avoid such misinterpretations of disease symptoms and false diagnosis, an automated system can be of a great help.

Alopecia is an auto-immune disorder that concludes in hair loss on the scalp and other parts of the body. It can range from small, individual smooth patches of hair loss to total loss of all hair of the body. It can impact individuals of all age groups, sexes, and ethnicity, and generally affects amid adolescence. Figure 1 shows the effect of alopecia on the scalp.

Figure 1: Effect of alopecia on scalp

There are three types of alopecia as shown in figure 2 namely, Alopecia Areata in which two to three patches of hair loss on the scalp. Alopecia Areata Totalis, in which there is complete baldness on the scalp. Alopecia Areata Universalis in which there is complete baldness on the body. It has been shown by previous studies that patients with Alopecia Totalis or Alopecia Universalis more often are affected by a poorer forecast, and wrong treatment.

The impact of alopecia includes a high probability of unconstrained hair reduction. The more drawn out the time frame of hair loss and the bigger the region of scalp gets affected by this disease. Consequently, there are some medications available to treat this disease, but none of these is effective after delayed diagnosis of alopecia.

Figure 2: Types of alopecia

Hair

Hair is very effective in the face beauty. This member for lack of nerve has no sense so when it is cut with scissors, there is no pain. Each hair is composed of two main parts, Stem, the part of the hair that is located off the skin and root of the hair that is located under the skin surface. Hair is composed of three layers of the brain, shell and cover. The brain of hair is the innermost layer that does not have any specific performance. Shell forms the strength and ability for the hair elasticity. External surface of the hair is composed of a protective layer called the cuticle. This layer with such squamate structure like a fish covers the hair surface and is responsible for protecting hair against damaging environmental factors

What is Hair loss?

Hair loss may occur for various reasons. Every hair has a lifetime. When a hair falls, it is replaced by another. So, naturally hair falling rate equals with their replacing rate. When hair loss is considered as an injury or illness, the disorder occurs in the growing new hair to replace the missing hair. Daily averages of 50 to 80 hairs are shed naturally. In some cases, hair loss is determined over the range. If the hair loss reaches a significant level, sooner or later the scalp is visible from amidst the hair. This case is called alopecia or hair loss.

The most common type of hair loss is baldness that men and women have been plagued over many years. At the age of 25, 25 percent and at age 50, 50 percent of men lose their hair more or less. Hair loss in men and women follow a certain pattern. In some cases, hair loss in women follows the male's pattern, unlike in some other, men hair loss follows that of female's pattern.

To confirm the abnormal hair loss and its severity, take out 50 to 100 hairs with fingers with a gentle pull. Normally 4 to 5 hair is pulled, if it is more than that, the hair loss is abnormal. An accurate method to evaluate the type of hair loss is checking the 50 to 100 hair strings under the microscope. If the hair loss is less than 10 strings in each comb, there is no loss and if this number is between10 to 20, the hair loss is mild and if they are between 20 and 30, that is a medium hair loss and if it is more than 30 hairs, the loss is severe. In Figure 4, we can see the different patterns of hair loss.

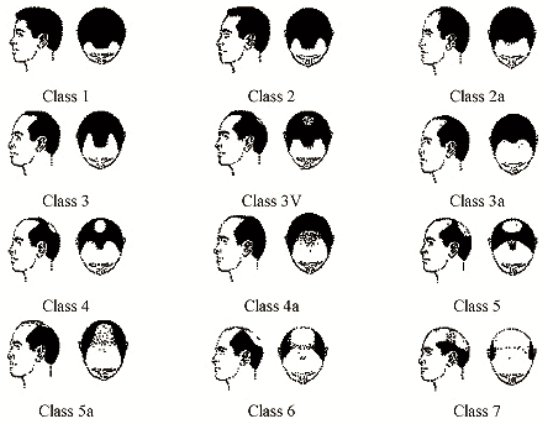

Figure 3. Hair loss patterns

Effective factors in hair loss

Normally 90% of hairs are in growth phase and 10% are in the resting phase and on average, about 50 to 80 hairs during washing and combing are falling. So, when a hair falls, a new hair takes its place. The problem begins when the falling hair is further and faster than the growth of new hair or their growth cycle is short and fails to reach the maximum growth of anagen. In this case, after some time, the total number of hairs is reduced, or hair is thinner, and person may notice a decrease in the volume of hairs. This is the main cause of hair loss. Hair loss in men and women are different. 90% of men have some degree of alopecia. This factor is related to both genetic and hormonal reasons. Also, there are many different causes in women hair loss. One of the most common causes of female hair loss is iron deficiency. Because of monthly bleeding and difficulty impotence diet that some of them take, suffering from anemia or their bodies iron stores are reduced. Usually what is seen in the women is reduction of density of hair, not bald. Various factors are effective in hair loss, some of which are only effective in women and some in men.

Some of them are mentioned below:

Genetic factor

This is considered as the most effective hair loss factor in men and women. Androgenetic Alopecia or AGA is often used to describe a type of hair loss which is characterized by a pattern in men and women who are prone to genetic causes of hair loss. The word Andro is used to show the effect of androgens that are testosterone and Dihydro -testosterone (DHT), which are involved in men's hair loss. Genetic implies the fact that AGA is a genetic problem inherited from the parent genes. This kind of hair loss in men is called Male Patterned Hair Loss (MPHL) and in women Female Patterned Hair Loss (FPHL).

Diseases

Some diseases such as polycystic ovarian disease, thyroid, connective tissue diseases like lupus after menopause, different kinds of cancer, diabetes, cholesterol, etc. can cause hair loss.

Iron deficiency

This factor, especially in women who have heavy menstrual bleeding and who are at iron deficiency risk, can be considered as a powerful factor in the hair loss.

Drugs

Medications such as drugs, blood diluting drugs such as Warfarin and Heparin, anti-convulsion medications like Dilantin, an anti-gout drugs such as Allopurinol and Colchicine, anti-pressure drug especially Beta-blockers, anti-inflammatory drugs such as Prednisolone, antidepression drugs such as Lithium, contraceptives, high intake of vitamin A, drugs related to atrophy are effective in hair loss.

Cosmetics

Hair dye, hair gel, non-standard softeners, hair ironer and using a hair dryer are effective in hair loss.

Stress and depression

It has been known that there is a relationship between emotional and physical stress such as serious illness or surgery and hair loss. Depression resulting from separation, job loss, fever, infection, and so on has a remarkable effect on hair loss.

IV. REQUIREMENTS ANALYSIS

Hardware Requirements:

- 1 GB RAM.
- 200 GB HDD.
- Intel 1.66 GHz Processor Pentium

Software Requirements:

- Windows 10, Windows 7,8
- Visual Studio 2019
- Microsoft Sql Server

ASP.NET

ASP.NET is more than the next version of Active Server Pages (ASP); it is a unified Web development platform that provides the services necessary for developers to build enterprise-class Web applications. While ASP.NET is largely syntax-compatible with ASP, it also provides a new programming model and infrastructure that enables a powerful new class of applications. You can migrate your existing ASP applications by incrementally adding ASP.NET functionality to them. ASP.NET is a compiled .NET Framework -based environment. You can author applications in any .NET Framework compatible language, including Visual Basic and Visual C#. Additionally, the entire .NET Framework platform is available to any ASP.NET application. Developers can easily access the benefits of the .NET Framework, which include a fully managed, protected, and feature-rich application execution environment, simplified development and deployment, and seamless integration with a wide variety of languages.

.net Framework:

The .NET Framework is Microsoft's Managed Code programming model for building applications on Windows clients, servers, and mobile or embedded devices. Microsoft's .NET Framework is a software technology that is available with several Microsoft Windows operating systems. In the following sections describes , the basics of Microsoft .Net Frame work Technology and its related programming models.

C# is a language for professional programming. C# (pronounced C sharp) is a programming language designed for building a wide range of enterprise applications that run on the .NET Framework. The goal of C# is to provide a simple, safe, modern, object-oriented, high-performance, robust and durable language for .NET development. Also it enables developers to build solutions for the broadest range of clients, including Web applications, Microsoft Windows Forms-based applications, and thin- and smart-client devices.

Microsoft SQL Server

Relational database management:

A relational database management system uses only its relational capabilities to manage the information stored in its database.

Information Representation:

All information stored in a RDBMS is represented only by data item values, which are stored in the tables that makeup the database.

Logical Accessibility:

Every data item value stored in a relational database is accessible by stating the name of the table it is stored in, the name of the column under which it is stored and the value of the primary key that defines the row in which it is stored.

Representation of Null Values:

The database management system has a consistent method for representing null values. For example, null values for numeric data must be distinct from zero or any other numeric value and for character data it must be different from a string of blanks or any other character value

Catalog Facility:

The logical description of the relational database management system is represented in the same manner as ordinary data. This is done so that the facilities of the relational database management system itself can be used to maintain database description.

Data Language:

A relational database management system may support many types of languages for description data and accessing the database. However, there must be at least one language that uses ordinary character strings to support the definition of data, the definition of views, the manipulation of data, constraints on data integrity, information concerning authorization and the boundaries for recovery of units.

View Updating:

Any view that can be defined using combinations of base tables, that are theoretically updateable, is capable of being updated by the relational database management system.

Insert, Update and Delete:

Any operand that describes the results of a single retrieval operation is capable of being applied to an insert, update or delete operation as well.

Physical Data Independence:
Changes made to physical storage representations or access methods do not require changes to be made to application programs.

Logical Data Independence:
Changes made to tables, that do not modify any data stored in that table, do not require changes to be made to application programs.

Integrity Constraints:
Constraints that apply to entity integrity and referential integrity are specifiable by the data language implemented by the database management system and not by the statements coded into the application programs.

Database Distribution:
The data language implemented by the relational database management system supports the ability to distribute the database without requiring changes to be made application programs.

Not Subversion:
If the relational database management supports facilities that allow application programs to operate on the table's a row at a time, an application program using this type of database access is prevented from bypassing entity integrity or referential integrity constraints that are defined for the database.Business today demands a different kind of data management solution. Performance scalability, and reliability are essential, but businesses now expect more from their key IT investment.SQL Server 2005 exceeds dependability requirements and provides innovative capabilities that increase employee effectiveness, integrate heterogeneous IT ecosystems, and maximize capital and operating budgets. SQL Server 2005 provides the enterprise data management platform your organization needs to adapt quickly in a fast changing environment.

Benchmarked for scalability, speed, and performance, SQL Server 2005 is a fully enterprise-class database product, providing core support for Extensible Markup Language (XML) and Internet queries.

Easy-to-use Business Intelligence (BI) Tools:
Through rich data analysis and data mining capabilities that integrate with familiar applications such as Microsoft Office, SQL Server 2005 enables you to provide all of your employees with critical, timely business information tailored to their specific information needs. Every copy of SQL Server 2005 ships with a suite of BI services

Self-Tuning and Management Capabilities:
Revolutionary self-tuning and dynamic self-configuring features optimize database performance, while management tools automate standard activities. Graphical tools and performance, wizards simplify setup, database design, and performance monitoring, allowing database administrators to focus on meeting strategic business needs.

Data Management Application and Services:
Unlike its competitors, SQL Server 2005 provides a powerful and comprehensive data management platform. Every software license includes extensive management and development tools, a powerful extraction, transformation, and loading (ETL) tool, business intelligence and analysis services, and analysis service, and such as Notification Service. The result is the best overall business value available.

V. SYSTEM DEVLOPMENT LIFE CYCLE

The System Development Life Cycle is the process of developing information systems through investigation, analysis, design, implementation, and maintenance. The System Development Life Cycle (SDLC) is also known as Information Systems Development or Application Development.

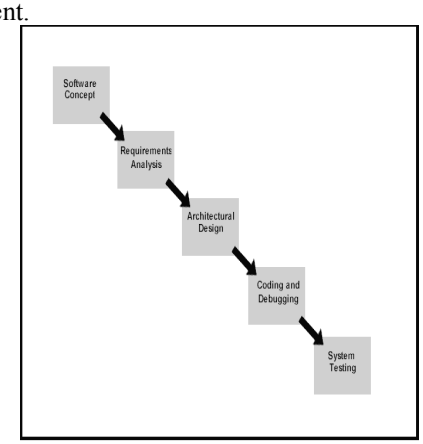

Figure 4. System development life cycle

è Steps involved in the System Development Life Cycle:
Below are the steps involved in the System Development Life Cycle. Each phase within the overall cycle may be made up of several steps.

Step 1: Software Concept
The first step is to identify a need for the new system. This will include determining whether a business problem or opportunity exists, conducting a feasibility study to determine if the proposed solution is cost effective, and developing a project plan.
This process may involve end users who come up with an idea for improving their work. Ideally, the process occurs in tandem with a review of the organization's strategic plan to ensure that IT is being used to help the organization achieve its strategic objectives. Management may need to approve concept ideas before any money is budgeted for its development.

Step 2: Requirements Analysis
Requirements analysis is the process of analyzing the information needs of the end users, the organizational environment, and any system presently being used, developing the functional requirements of a system that can meet the needs of the users. Also, the requirements should be recorded in a document, email, user interface storyboard, executable prototype, or some other form. The requirements documentation should be referred to throughout the rest of the system development process to ensure the developing project aligns with user needs and requirements.
Professionals must involve end users in this process to ensure that the new system will function adequately and meets their needs and expectations.

Step 3: Architectural Design
After the requirements have been determined, the necessary specifications for the hardware, software, people, and data resources, and the information products that will satisfy the functional requirements of the proposed system can be determined. The design will serve as a blueprint for the system and helps detect problems before these errors or problems are built into the final

system. Professionals create the system design, but must review their work with the users to ensure the design meets users' needs.

Step 4: Coding and Debugging

Coding and debugging is the act of creating the final system. This step is done by software developer.

Step 5: System Testing

The system must be tested to evaluate its actual functionality in relation to expected or intended functionality. Some other issues to consider during this stage would be converting old data into the new system and training employees to use the new system. End users will be key in determining whether the developed system meets the intended requirements, and the extent to which the system is actually used.

Step 6: Maintenance

Inevitably the system will need maintenance. Software will definitely undergo change once it is delivered to the customer. There are many reasons for the change. Change could happen because of some unexpected input values into the system. In addition, the changes in the system could directly affect the software operations. The software should be developed to accommodate changes that could happen during the post implementation period.

There are various software process models like:-

Prototyping Model

RAD Model

The Spiral Model

The Waterfall Model

The Iterative Model

Of all these process models we've used the Iterative model (The Linear Sequential Model) for the development of our project.

The Iterative model

The waterfall model derives its name due to the cascading effect from one phase to the other as is illustrated in Figure 5. In this model each phase well defined starting and ending point, with identifiable deliveries to the next phase. This model is sometimes referred to as the linear sequential model or the software life cycle.

The model consists of six distinct stages, namely:

1. In the requirements analysis phase
   (a) The problem is specified along with the desired service objectives (goals)
   (b) The constraints are identified
2. In the specification phase the system specification is produced from the detailed definitions of (a) and (b) above. This document should clearly define the product function.
3. In the system and software design phase, the system specifications are translated into a software representation. The software engineer at this stage is concerned with:

Data structure

Software architecture

Algorithmic detail

Interface representations

The hardware requirements are also determined at this stage along with a picture of the overall system architecture. By the end of this stage should the software engineer should be able to identify the relationship between the hardware, software and the associated interfaces. Any faults in the specification should ideally not be passed downstream.

4. In the implementation and testing phase stage the designs are translated into the software domain Detailed documentation from the design phase can significantly reduce the coding effort. Testing at this stage focuses on making sure that any errors are identified and that the software meets its required specification.
5. In the integration and system testing phase all the program units are integrated and tested to ensure that the complete system meets the software requirements. After this stage the software is delivered to the customer [Deliverable – The software product is delivered to the client for acceptance testing.]
6. The maintenance phase the usually the longest stage of the software. In this phase the software is updated to:
   Meet the changing customer needs
   Adapted to accommodate changes in the external environment.
   Correct errors and oversights previously undetected in the testing phases Enhancing the efficiency of the software.
   Observe that feedback loops allow for corrections to be incorporated into the model. For example a problem/update in the design phase requires a 'revisit' to the specifications phase. When changes are made at any phase, the relevant documentation should be updated to reflect that change.

VI. INTERATIVE MODEL (ADVANTAGES AND DISADVANTAGES)

Advantages of the Iterative Model:

- Testing is inherent to every phase of the Iterative model
- It is an enforced disciplined approach
- It is documentation driven, that is, documentation is produced at every stage

Disadvantages of the Iterative Model:

- The waterfall model is the oldest and the most widely used paradigm. However, many projects rarely follow its sequential flow. This is due to the inherent problems associated with its rigid format. Namely:
- It only incorporates iteration indirectly, thus changes may cause considerable confusion as the project progresses.
- As The client usually only has a vague idea of exactly what is required from the software product, this IM has difficulty accommodating the natural uncertainty that exists at the beginning of the project.
- The customer only sees a working version of the product after it has been coded. This may result in disaster any undetected problems are precipitated to this stage.

VII. SYSTEM MAINTENANCE AND EVALUATION

Types of Maintenance

- Corrective Maintenance
- Adaptive Maintenance
- Perfective maintenance
- Preventive maintenance

Corrective Maintenance:

Even with the best quality assurance activities, it is likely that the customer will uncover defects in the software. Corrective maintenance changes the software to correct defects.

Adaptive Maintenance:

Over time, the original environment (e.g., CPU, operating system, business rules, external product characteristics) for which the software was developed is likely to change. Adaptive maintenance results in modification to the software to accommodate changes to its external environment.

Perfective Maintenance:

As software is used, the customer/user will recognize additional functions that will provide benefit. Perfective maintenance extends the software beyond its original functional requirements.

Preventive Maintenance:

Computer software deteriorates due to change, and because of this, preventive maintenance, often called software reengineering, must be conducted to enable the software to serve the needs of its end users. In essence, preventive maintenance makes changes to computer programs so that they can be more easily corrected, adapted, and enhanced.

Evaluation

System evaluation provides framework for classification scheme to identifying sets of similar systems. The framework integrates previous studies on software evaluation, productivity models, software quality factors, and total quality models. It also classifies information about software systems from the perspective of the project, the system, and the environment.

VIII. ALGORITH AND CODING

```
public partial class User_result : System.Web.UI.Page
{
    string strcon = ConfigurationManager.ConnectionStrings["sqlconnection"].ConnectionString;
    private SqlConnection con;
    SqlDataAdapter adt;
    DataTable dt1;
    0 references
    protected void Page_Load(object sender, EventArgs e)
    {
        con = new SqlConnection(strcon);
        if (Session["id"] == null)
        {
            Response.Redirect("Login.aspx");
        }
        if (!IsPostBack)
```

```
if (!IsPostBack)
{
    int radioid = Convert.ToInt32(Request.QueryString["radioid"]);
    int id =Convert.ToInt32(Session["id"].ToString());
    using (SqlCommand cmd = new SqlCommand("select * from User_master where ID='"+id+"'",
    {
        SqlDataAdapter adt = new SqlDataAdapter(cmd);
        DataTable dt = new DataTable();
        adt.Fill(dt);
         if (dt.Rows.Count > 0)
        {
            lblname.Text = dt.Rows[0]["Name"].ToString();

        }
        if (radioid == 1)
        {
            Label1.Text = "Stage-1";
```

```
        lblname.Text = dt.Rows[0]["Name"].ToString();

    }
    if (radioid == 1)
    {
        Label1.Text = "Stage-1";
        Image1.ImageUrl="/image/stage1.svg";

    }
    else if (radioid == 2)
    {
        Label1.Text = "Stage-2";
        Image1.ImageUrl = "/image/stage22.svg";
    }
    else if (radioid == 3)
    {
        Label1.Text = "Stage-3";
```

```
        Label1.Text = "Stage-3";
        Image1.ImageUrl = "/image/stage3.svg";
    }
    else if (radioid ==4)
    {
        Label1.Text = "Stage-4";
        Image1.ImageUrl = "/image/stage4.svg";
    }
    else if (radioid ==5)
    {
        Label1.Text = "Stage-5";
        Image1.ImageUrl = "/image/stage5.svg";
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    {
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        Image1.ImageUrl = "/image/stage6.svg";
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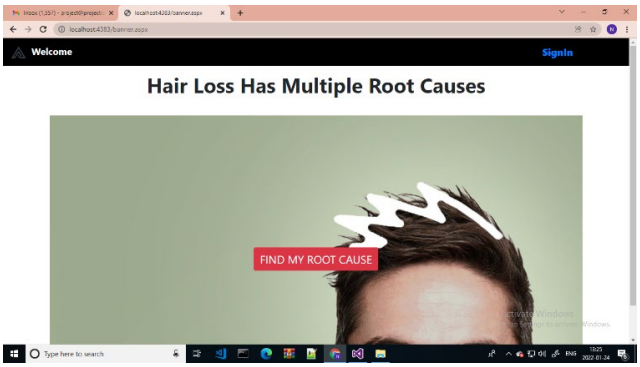
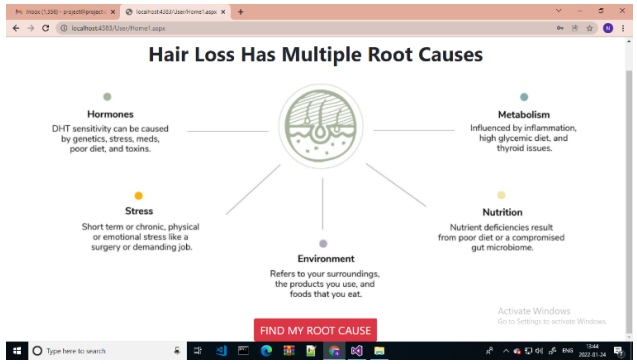
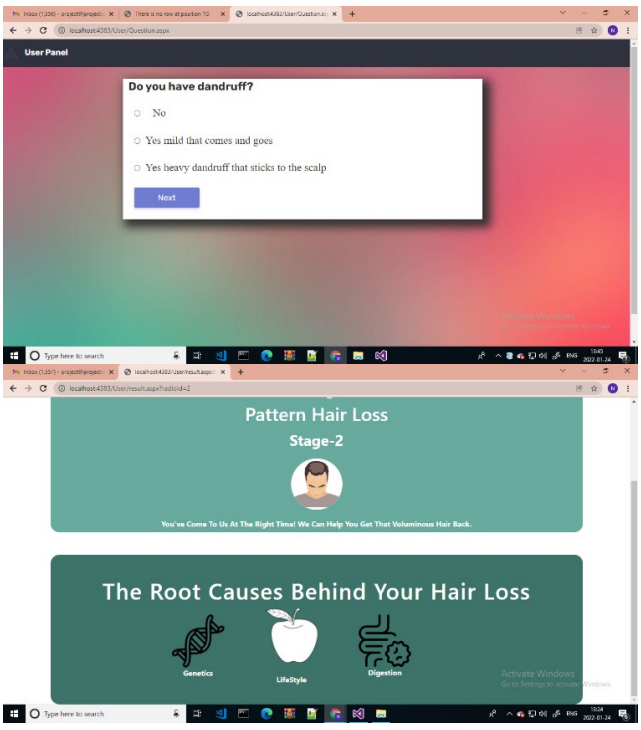
IX. PROJECT WORKING







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AET 048

App For Skin Care

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Abstract- "The key to skin resiliency is knowing your skin and treating it well."
A clean and clear skin is what most of the young adults actually desire. During teenage some people start having acne and breakouts, this problem doesn't do any physical harm but it indeed lowers one's self confidence. Correct skincare routine according to one's particular skin type can really help a lot in reducing as well as avoiding the breakouts and maintaining a healthy clear skin. The primary skin types are dry, oily or combination and while your skin may get drier or oilier based on the season, the majority of the time it should be relatively consistent. Taking good care of your skin is important for more than just your appearance. As the largest organ you have, your skin is essential to your general health. If you take care of it, it can help take care of you. This is why it is so important to have a well-thought-out skin care routine. It is absolutely worth the time and energy to take care of your skin on a daily basis.

I. INTRODUCTION

Skin care is the range of practices that support skin integrity, enhance its appearance and relieve skin conditions. Skin care is a routine daily procedure in many settings, such as skin that is either too dry or too moist, and prevention of dermatitis and prevention of skin injuries [1].

Nowadays, because of a shift in lifestyle and a rise in pollution, the number of skin diseases are rising day by day and, overall, it is creating a lot of problems for people as well as degrading the quality of life of the individual. A person suffering from different skin care disease can know even the slightest shift in an individual's condition and should quickly resolve the condition before it worsens or contributes to a life-threatening attack. However, it is more often likely for a person not to understand the signs due to many factors and can certainly lead to a danger to the individual.

Skin disorders vary greatly in symptoms and severity. They can be temporary or permanent, and may be painless or painful. Some have situational causes, while other may be genetic. Certain skin disorders very often occur on face like Acne vulgaris, atopic dermatitis, Hives, Sunburn, Contac Dermatitis, Rosacea.

Natural skin care remedies, they are safe, non-allergic so do not leave a harmful footprint. They are light and do not clog pores of the skin. Easier on the skin.

II. LITERATURE SURVEY

It is 2021, and everything is virtually available at one's fingertips. The need for flawless skin and picture-perfect makeup has spurred the emergence of beauty apps that have turned our smartphones into beauty experts.

It is much easier and quicker to get all glammed up in a matter of a few clicks and taps.

In 1967, the zoologist Desmond Morris1 declared that "Flawless skin is the most universally desired human feature," explaining the primordial human need to "advertise" health, well being, and fertility with an even-toned, clear, and radiant complexion. In the quest to achieve perfect skin, consumers of all ages are constantly searching for the "best" skincare products.

Whether they shop at drug stores, department stores, or online, consumers are faced with a paradox of choice. They look to their friends, physicians, or favorite bloggers for independent recommendations, often purchasing expensive products that fail to live up to their reputed benefits.

Daily skincare routines potentially can have a significant long-term impact on the overall quality of a person's complexion.

* Similar apps

1) Cure skin (available in multiple languages | quiz available in the form of chat | can fix appointment with doctor)
   a) home page - blogs, tips, FAQs
   b) chat tab
   c) explore - allows to search for doctors

2) 1. TroveSkin 2.0 Skincare tracker: Simply take a selfie, and cutting edge skin analysis algorithms will analyze skin for issues like spots, pores, texture. Then get suitable skincare product recommendations. Also take into account factors like your sleep, diet and stress levels, in calculating skin health score. Holistic view of how various factors affect skin health.

According to the research, products for skin care, hair care, and fragrances are the most-sold products online. Skincare has the largest market share currently, while oral cosmetics will be the fastest growing sector during the forecasted period. The research also predicts that companies will increasingly sell products via eCommerce sites, revealing that orders via smartphone rose to $1.53 billion in 2017. We researched the use of AI in the beauty and cosmetics industry to better understand where AI comes into play in the industry and to answer the following questions: What types of AI applications are currently in use in the beauty and cosmetics industry? What tangible results has AI driven in beauty and cosmetics? Are there any common trends among these innovation efforts? How could these trends affect the future of the skincare and makeup sectors? With the help of artificial intelligence and machine learning, beauty and cosmetics companies are exploring the possibilities.

Importance of Skin types

In the early 1900s, cosmetics entrepreneur Helena Rubinstein claimed that dry, oily, combination, or sensitive were the best words to label what could be considered the four fundamental types of skin. For the ensuing century, these categories have been used to characterize skin types with only minor, if any, modifications. During the same time period, the skin care product market has developed into a multibillion-dollar industry featuring numerous innovations and frequent new product introductions. The industry has, in recent years, also witnessed the emergence of ‘‘cosmeceuticals,’’ a new product category that refers to cosmetic products that may impart some biologic function to the skin [3]

1. Dry skin

Having skin that is sufficiently hydrated, which would fall in the middle of the oily–dry spectrum, is most often ideal regarding this parameter. The dry end of this dichotomy is considered more troublesome than the oily end, however. Dry skin, also known as xerosis, is the result of a convoluted, multifactorial cause, but its description is relatively straightforward. Dry skin is characterized by dull color (typically gray white), rough texture, and an elevated number of ridges. 2 Levels of stratum corneum lipids, sebum, natural moisturizing factor, and aquaporin are considered to be the most important factors that regulate the degree of, or contribute to, dry skin.

2. Sensitive skin

Sensitive skin is a more complex phenomenon and more difficult to characterize. It is also becoming increasingly common.65 Most patients who present to a dermatologist complaining of sensitive skin are healthy women of childbearing age. Fortunately, with age, the incidence of sensitive skin seems to decrease. As the prevalence of sensitive skin has increased, so too has the number of products marketed as suitable for the treatment of sensitive skin.

3. Combination Skin

According to board certified dermatologist and aesthetic expert Kavita Mariwalla, MD, FAAD, combination skin is normal, just like other skin types. The difference is that combination skin is oily in some places and dry in others. For example, “It’s common to have an oily T-zone and dry cheeks.”

What causes it?

Nothing causes combination skin per se (it’s genetically pre-determined), but it can change with hormonal and seasonal shifts, Mariwalla explains. Occasionally, as we age, skin becomes drier and less oily as it reacts to hormonal changes. Other hormone-driven factors that can cause changes in skin are periods and contraceptives [4].

4. Oily skin

Notice that your skin emits a little extra shine? Fact is, everyone has oil in their skin. Under each of your pores is a sebaceous gland that produces natural oils called sebum. This helps keep your skin hydrated and healthy. In some people, though, the sebaceous glands can produce too much oil. This creates oily skin. You know you have oily skin if your skin constantly looks shiny, and you go through several blotting sheets a day. Oily skin can even feel greasy within hours of cleansing.

Breakouts are also more likely because the sebum mixes with dead skin cells and gets stuck in your pores [5].

Skin Disorders

1. Acne

Although incidence and prevalence rates vary, acne is by far the most common skin disease, typically affecting adolescents and young adults, equally by gender, between the ages of 11 and 25 years. The second-largest demographic group that suffers from acne in appreciable numbers is adult women, who exhibit a hormonal component to their acne. The pathogenesis of this conspicuous and, therefore, stressful condition originates from the intersection of four main factors: increased sebum production; clogged pores due to dead keratinocytes inside the hair follicles adhering more strongly than in those without acne (higher sebum production may also promote such cellular clinging), the presence of the bacteria Propionibacterium acnes, and inflammation. Although acne can occur in various idiopathic presentations, the quintessential feature is the

adherence of dead keratinocytes in the hair follicles as a result of increased sebum production, yielding clogged follicles and the emergence of a papule or pustule. Subsequently, P acnes migrates into the hair follicle, intersecting with the collected sebum and dead keratinocytes. This interaction spurs the release of cytokines and other inflammatory factors that engender the inflammatory response leading to the formation of the characteristic redness and pus. High levels of primary cytokines, chemokines, and other inflammatory markers are usually present in chronic inflammatory skin conditions such as acne.3 The treatment of acne targets the four primary etiologic factors: reducing sebum production (with retinoids, oral contraceptives, or stress reduction), unclogging pores (with retinoids, AHAs, or BHA), eradicating bacteria (with benzoyl peroxide, sulfur, antibiotics, or azelaic acid), and decreasing inflammation.

2. Rosacea

According to the National Rosacea Society, 14 million Americans,66 usually adults between 25 and 60 years of age, are affected by rosacea. This acneiform condition, the pathophysiology of which has yet to be completely elucidated, shares some symptoms with acne, specifically facial redness, flushing, and papules; however, rosacea is also characterized by the formation of prominent telangiectases, the primary manifestation of the condition. Topical rosacea treatments target the use of anti-inflammatory ingredients to decrease the dilation of the blood vessels and the avoidance of exposure to factors that trigger or aggravate symptoms. The goal of rosacea therapy is to reduce vascular reactivity, attack free radicals or reactive oxygen species (ROS), inhibit immune function, and interfere with eosinophilic activity, degranulation of mast cells (which often colocalize to areas of eosinophil-mediated disease), and the arachidonic acid pathway. Eosinophils are pleiotropic multifunctional leukocytes involved in initiating and promoting numerous inflammatory responses.67,68 The most effective anti-inflammatory ingredients (many of which are derived from botanical origins) in the myriad topical rosacea therapies include aloe vera, arnica, chamomile, colloidal oatmeal, cucumber extract, feverfew, licochalcone, niacinamide, Quadrinone, salicylic acid, sulfacetamide, sulfur, witch hazel, and zinc.69 Various prescription anti-inflammatory products, including antibiotics, immune modulators, and steroids, are also available to treat rosacea.

3. Dark spots

Dark spots, also known as hyperpigmentation or age spots, is a common skin problem that can increasingly grow as age progresses. Dark spots can appear overnight, and can be seen as an indicator of age. In this medical condition, Melanin, which is the chemical that gives the human skin its color, is excessively produced in one area, leading to freckles, liver spots and other patches of darker skin [6].

4. Hives

Hives, also known as urticaria, are itchy, raised welts that are found on the skin. They are usually red, pink, or flesh-coloured, and sometimes they sting or hurt. In most cases, hives are caused by an allergic reaction to a medication or food or a reaction to an irritant in the environment.

In many cases, hives are an acute (temporary) problem that may be alleviated with allergy medications. Most rashes go away on their own. However, chronic (ongoing) cases, as well as hives accompanied by a severe allergic reaction, are larger medical concerns [7].

5. Contact Dermatitis

Contact dermatitis is a red, itchy rash caused by direct contact with a substance or an allergic reaction to it. The rash isn't contagious or life-threatening, but it can be very uncomfortable.

Many substances can cause such reactions, including soaps, cosmetics, fragrances, jewellery and plants [8].

Natural Remedies

1. Using natural and organic skincare products can reduce skin irritation unlike non-organic and non-natural products.

   People with sensitive skin will know how easily irritated it is, and products with chemicals and other strange ingredients in them such as Benzoyl Peroxide (used to treat acne) often leave skin feeling dry, red and sore.

   It is easy to find natural alternatives to all skin products, whether you are targeting spots, wrinkles or just want your skin to feel clean and healthy. Natural products are kinder to your skin, and will work just as effectively.

   Naturally sourced ingredients such as zinc oxide, tea tree oil and lavender extract are all wonderfully healing, natural ingredients that will leave your skin feeling smooth and nourished instead of sore and irritated like other products that contain harmful chemicals.
2. Natural and organic skincare products have stood the test of time.

   What do you think people were using before all these supposed ‘skin enhancing’ chemicals were Natural ingredients of course!

   Many ingredients that are included in modern organic skincare products have been used for centuries, developed from ancient remedies that have been known for their incredible benefits for the skin.

   There is no better test than the test of time, and these ingredients have proven their worth and shown not to have any adverse side effects, guaranteeing healthy and beautiful looking skin.
3. If you wouldn’t eat it, don’t put it on your skin!

   Our skin is very absorbent, and when you use products such as moisturizers, cleansers and toners, the ingredients within these are getting absorbed into our bodies.

It's great to be health conscious and think about what we are putting into our bodies, and it doesn't stop at what we eat and drink. Next time you are buying a new moisturizer take a look at the ingredients on the label and think, "Would I eat this?" If the answer is no perhaps it's time to start turning your skincare routine into a more natural one!

Chemical toxins are very destructive whereas natural products, which are made from flower and plant extracts, are designed to nourish our bodies and do nothing but good.

4. Buying better quality, organic and natural products actually mean you end up saving a lot in the long run!

   How nice it would be to know we are doing something great for our health, while also saving money at the same time? Well, if you switch to natural and organic skincare products you can do just that.

   Organic and natural skincare products are actually very cost effective when compared to their non-natural alternatives, especially as the quality of the ingredients means you can use less, which in turn means the product will last longer over time.

   While some chemical based products may be cheaper, you end up needing to use a lot of them - putting layer after layer of moisturizer on as your skin still feels dry, therefore having to buy more of it, and actually costing you more in the long run.

5. Buying naturally and sustainably sourced products can be much kinder to the environment.

   Using natural and organic products in much better for the environment. Skincare products that contain chemicals can have a very damaging impact on the environment, sprays and perfumes that are released into the atmosphere can be very harmful, as well as the manufacturing process that takes place to create them.

   If you use natural and organic skincare products not only will you reap the benefits of beautiful skin, but also can enjoy them guilt-free without harming the environment [9].

III. DESIGN AND DEVELOPMENT

For making our "Skin Care App" we finalized Adalo software.

"Adalo allows users to build apps on an intuitive drag-and-drop interface, either by using pre-made design elements or by creating our own. It allows users to easily publish the apps without any subscription plan[10].

It offers both more basic app features like lists, buttons, forms, and signups as well as more advanced features such as messaging, search, and payments (via a Stripe integration).

We can publish on iOS, Android, or the web with Adalo.

It has been used by dozens of startups, small businesses, and enterprises to create custom-built apps. From a personal trainer looking to send personalized plans to his clients to a mobile food-ordering service to a small business trying to streamline internal communication, Adalo has been used by a diverse set of clients.

SIGN UP / LOG IN

The user will first login using an email-id and password.

HOME PAGE

On home page there are two buttons and five tabs in bottom the first button is take quiz.

Our quiz has valid questions and we have verified with an expert doctor as well.

At the end of quiz user will get result about the skin type they have.

Second button is skin disorders button. It includes 6 specific skin disorders. by clicking particular button user can get information about that disorder and one natural remedy. In search tab user can find dermatologist near him

Water alarm tab gives benefits of drinking water and information about how much water one should drink. After downloading this app user can get notification to drink water.

Profile tab- other details like birth date, city, skin type and more information.

User can mention his allergies as well

By clicking save button user can save his information in application. By clicking edit button user can change his user name email ID and also can change his password

TIPS TAB

This tab gives 10 tips to users which are common for all skin type.

IV. CONCLUSION

Skincare is very underrated. People who have faced any skin condition once in their lifetime know the importance of skincare. Treating any skin requires knowing the skin properly. Thus, skin type quiz is a must take for all. Hydration tips, home remedies, an easy app to use, no chemical recommendations thus reducing chances of reactions are actually very helpful. Our app will be like a friendly skincare coach which you can install in your very own mobile anytime anywhere.

V. FUTURE SCOPE

The following features are expected for the future development of the proposed app.

1. **Water alarm –**

   This will give notifications to "Drink water". The user can set timer of 1 hour/ 2 hour etc.

   The app will send notification so that the user is well hydrated.

2. **Dermatologist near you –**

   "Find Dermatologist near you" feature will give information about dermatologist near the user's

location. Indeed, home remedies are effective but an expert advice is very important thus this feature will help user to get the proper guidance.
Making app available for installation on different platforms.

3. **Diet –**
A proper diet is very important for maintaining a clean skin thus we will suggest diet to the users on the basis of his/ her skin type and requirements.

VI. AKNOWLEDGEMENT

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