VIT Vidyalankar Institute of Technology
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An Autonomous Institute Affiliated to University of Mumbai

MEDITRONICS

DEPARTMENT OF BIOMEDICAL ENGINEERING

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Vision of the Department

To be a globally recognized centre of excellence in the field of biomedical engineering where learners are nurtured in a scholarly environment to evolve into competent professionals to benefit society

Mission of the Department

- Evolve a curriculum which emphasizes on strong engineering fundamentals with the flexibility to choose advanced courses of interest and gain exposure to tools and techniques in Biomedical Engineering.
- Encourage a teaching-learning process in which highly competent faculty share a symbiotic association with the institutes of repute.
- Facilitate creation and dissemination of biomedical engineering knowledge through a digitally-enabled learning environment.
- Develop academic and infrastructural facilities with modern equipment and other learning resources and encourage reciprocal sharing with other institutes through networking.
- Establish a centre of excellence to enhance academia – biomedical industry partnership and work on collaborative projects.

Programme Educational Objectives (PEO)

- To enable the pursuit of knowledge in the field of Biomedical Engineering and contribute to the profession and employability of the students.
- To engage in research, generate the employment through entrepreneurship and work effectively in multidisciplinary environment.
- To understand the human, social, ethical and environmental context of their profession and contribute positively to the needs of individuals and society.

WHAT'S INSIDE

PROF. DR. GAJANAN NAGARE

HEAD OF DEPARTMENT, BIOMEDICAL ENGINEERING

II am extremely happy to let you know that this semester department conducted its first offline AICTE Sponsored ATAL Faculty Development Program (FDP) on "Wearable Devices and Point of Care Technology". This FDP was completely sponsored by AICTE-ATAL and organized by the Department of Biomedical Engineering at VIT, Mumbai. The FDP had renowned speakers from Industry, Research Organizations and Hospitals. It was attended by participants from different places in India. I am thankful to AICTE for providing grant and my strong organizing committee members for successfully completing this FDP.

Under guidance of our faculty members, many students from the department have submitted research grant proposals to TIH Foundation for IoT & IoE (TIH-IoT) at IIT Bombay and Creative Ideas & Innovations In Action (CiiA-3). These proposals are under review, and we are positive that some of these proposals shall be accepted.

For upcoming semester, we have three visiting faculty from reputed industry who will be teaching courses-Medical Imaging Equipment, Data Analysis in Healthcare & Medical Device Regulations. This will certainly give a different learning experience to our students. Also, I would like to welcome our new faculty Prof. Chaitali Deshmukh who will be joining our department as an Assistant Professor.

I wish all the best for the upcoming semester.

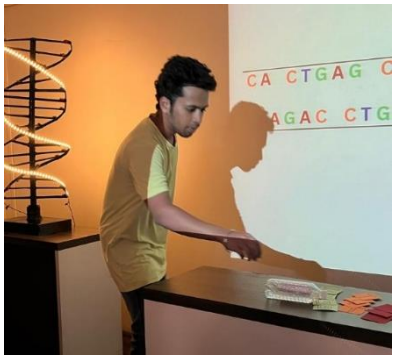
"Your time is limited, don't waste it living someone else's life."
-Steve Jobs

Three days workshop on Bioinformatics organized by BMESI-VIT Chapter

A three days workshop on Bioinformatics was organized by the BMESI-VIT chapter from 12th October 2023 to 14th October 2023. The workshop commenced with an introductory session led by Ms. Krusha Shah and Ms. Isha Popat, both of them working as a research interns, followed by a team-based bottle flipping and DNA puzzle game to foster camaraderie and teamwork among the 30 attendees, including students and faculty. The event included challenging bioinformatics-related activities and quizzes, emphasizing problem-solving and cognitive skills.

Day-2 of the workshop featured Mrs. Mrunal Ghokhale, faculty at D.Y. Patil Institute, Ms. Krusha Shah and Ms. Isha Popat. Mrs. Ghokhale emphasized the importance of biological databases in bioinformatics, covering their types, contents, and roles in research. She detailed primary and secondary databases, focusing on sequence databases like INSDC and NCBI, and discussed sequence analysis and alignment, including the Needleman-Wunsch algorithm. The event, attended by 40 people, including students and faculty, concluded with plans for future initiatives to deepen bioinformatics understanding and application.

On Day-3 Dr. Naveen Padmadas initiated the event with an interactive session on the Needleman-Wunsch algorithm. Dr. Padmadas delivered a comprehensive talk, enhancing understanding of bioinformatics principles, followed by a doubt-clearing session. The workshop covered DNA sequencing, protein structure prediction, functional genomics, personalized medicine, metagenomics, and ethical considerations. This was followed by practical sessions, case studies, and collaborative learning to provide a thorough and practical bioinformatics education. The overall event was coordinated by Prof. Priyanka Shrivastava, Convener-BMESI-VIT chapter and student members of the chapter



Department Staff

DR. GAJANAN NAGARE
PROFESSOR & HEAD

EDUCATION QUALIFICATION:
PHD-BIOMEDICAL ENGINEERING

TEACHING EXPERIENCE:
12 YEARS

AREA OF SPECIALIZATION:
BIOMEDICAL INSTRUMENTATION
BIOSENSORS
BIOMEMS

PROF. GEETHA NARAYANAN
ASSOCIATE PROFESSOR

EDUCATION QUALIFICATION:
MTECH-POWER ELECTRONICS

TEACHING EXPERIENCE:
29 YEARS

AREA OF SPECIALIZATION:
VLSI
DIGITAL IMAGE PROCESSING
ROBOTICS IN MEDICIN

AICTE Sponsored ATAL FDP on "Wearable Devices and Point of Care Technology"

AICTE Sponsored ATAL Faculty Development Program on "Wearable Devices and Point of Care Technology was conducted from 18th -23rd December 2023 at Vidyalankar Institute of Technology. 30 participants from all across India and few participants from Vidyalankar participated in this offline FDP.

About AICTE Training and Learning (ATAL) Academy

AICTE Training & Learning Academy (ATAL Academy) facilitates through trainings and workshops to up-grade the knowledge and skills of faculty members of AICTE approved Institutions, Research Scholars, PG Scholars, Participants from Govt, Industry and staff of host institution. ATAL plans and helps in imparting quality technical education in the country and to support technical institutions in fostering research, innovation and entrepreneurship through training in various emerging areas.

FDP Objectives	FDP Outcomes
▪ This FDP will provide participants an exposure to the Medical Device Development phases and new trends like Point of Care Technologies and Wearable Devices. ▪ This will be a platform for the participants to interact with experts from Industry and Research Organizations having a focus on the Medical Device Industry.	▪ Discuss about sensor development for Point of Care Technology and wearable devices. ▪ Explain the technology behind various wearable and point of care devices. ▪ Describe the stages of product development. ▪ Describe the procedure for making a proposal for INUP program

Eminent Speakers of the FDP

Session Title-Affordable Healthcare Technologies in Sensing Drug Delivery and Therapy
Dr. Rohit Srivastava, Professor, BSBE, IIT Bombay.

Session Title-Nanotechnology and MEMS based Sensors for Chemical and Biochemical Sensing Applications
Dr. Nitin Kale, Co-founder and CTO, Nanosniff, Mumbai.

Session Title-Wearable devices for early detection of cancer and a review of bioelectrical devices
Dr. Nagraj Huilgol Chief – Radiation Oncology, Nanavati Max Super Speciality Hospital, Mumbai.

Session Title-Wearable IoT Challenges and opportunities
Dr. Saurabh Mehta
Chief Academic Officer VIT Mumbai.

Session Title-Impact of Emerging Technologies on Point of Care Treatments
Dr. Guruprasad Kuppu Rao, Professor & Dean, School of Design, NMIMS, Mumbai.

Session Title-Research Methodology-Biosensors and Point of Care Devices
Mr. Vijay Mathur, CTO, DiaSys India, Mumbai

Session Title- An Overview of Indian Nanoelectronics Users' Programme – Idea to Innovation
Dr. K Nageswari, Sr. INUP Program Manager, IIT Bombay.

Session Title- Propelling Entrepreneurial Success through Sensor Development
Dr. Rajul Patkar, Co-founder and CEO, Proximal Soilsens Technologies Pvt. Ltd, Mumbai.

Session Title-Product and Project Management in Point of Care Domain
Ms. Shreekala Koli R&D Team Lead, Prisms India Pvt. Ltd, Mumbai.

Session Title-Designing Wearable Devices for Health Monitoring: Key Components and Considerations
Dr. Nirmal Punjabi Adjunct Faculty, Koita Centre for Digital Health, IIT Bombay.

Inauguration and Keynote Speaker
Dr. Jayesh Bellare
Professor, Chemical Engineering, IIT Bombay.

Faculty Participants of the FDP

STUDENT ARTICLE

"Natural Solutions"
-Ms. Pushpanjali Jha (T.E. Biomedical)

Theodore von Kármán believed that science is the study of what is, but engineering builds what will be. The scientist merely explores that which exists, while the engineer creates what has never existed before. Ordinarily, we engineer by minimising abstract concepts and ideal conditions to solve a problem. Encircled by apparent complexities, we try to visualise and build the theoretical. But, let's take a step back and observe that which exists and composes of compound engineered systems of approximately 8 million plants and animals, home to 8 billion human beings and about a trillion microbes; nature.

Nature borne concepts of self-healing abilities, environmental exposure tolerance and resistance, hydrophobicity, self-assembly, and harnessing solar energy can be solutions to a vast range of engineering problems. The idea of looking up to nature for inspiration, technically coined as biomimicry is an approach to innovation that seeks sustainable solutions to human challenges by emulating nature's time-tested patterns and strategies. As stated by the Biomimicry Institute, "The core idea is that nature has already solved many of the problems we are grappling with. Animals, plants, and microbes are the consummate engineers. After billions of years of research and development, failures are fossils, and what surrounds us is the secret to survival."

For eons, nature has solved its problems with well-adapted designs, biochemistry, and smart material and energy use. A bridge between nature and technology compels us to reimagine various engineering notions, especially breaking frontiers in biomedical engineering. Presently we speculate an interesting new wave of potential medical devices tapping into nature. Engineers at Massachusetts Institute of Technology have designed an ingestible pill that can inflate to the size of a ping-pong ball and stay in the stomach for up to a month. The design, inspired by the puffer fish, can help doctors study tumours and ulcers. Carnegie Mellon University's Chris Bettinger and Jay Whitacre have found that ink from cuttlefish may be able to power edible medical devices. Researchers at University of Illinois at Urbana-Champaign, developed an ultra-sensitive camera capable of sensing both colour and polarization by mimicking the eye of the mantis shrimp. The bioinspired imager can potentially improve early cancer detection and help provide a new understanding of underwater phenomena.

Naturalist Charles Darwin's theory of natural selection is a generally accepted concept that explains how genetic traits of a species varies over time as a simple mechanism with five basic steps: Variation, Inheritance, Selection, Time and Adaptation. Consequently, this mechanism over successive generations is believed to have caused evolution. Parallelly, the ultimate evolution in engineering can be positively attained turning to natural solutions, revolutionising engineering powered by nature.

Faculty and Student Publications

1. A. Karnale, S. Deshmukh, Y. Rane, B. Nayak, G. Narayanan, P. Shrivastava "GaitSynergy: Redefining Gait Analysis with Vision-EMG Convergence for Precise Neuro-Muscular Evaluation," 6th IEEE International Conference of Advances in Science and Technology (ICAST-2023), K.J Somaiya Institute of Technology, Mumbai, India, 2023.
2. K. Adsule, E. Gade, R. Bhurke, A. Ram, G. Nagare, "Classification Of Respiratory Disorders Using Deep Learning" in IEEE 1st DMIHER (DU) International Conference in "Artificial Intelligence in Education and Industry 4.0" (IDICAIEI 2023), Datta Meghe Institute of Higher Education & Research, Maharashtra, India, 2023.
3. K. Adsule, A. Maluskar, A. Ram, G. Nagare, "A Simplified Procedure Development of Asynchronous Pacemaker Circuit" in IEEE 1st DMIHER (DU) International Conference in "Artificial Intelligence in Education and Industry 4.0" (IDICAIEI 2023), Datta Meghe Institute of Higher Education & Research, Maharashtra, India, 2023.
4. J.Sawant, N. Chikhale, P. Shrivastava, "Automated Papilledema Detection: Harnessing Machine Learning" in International Journal for Research in Engineering Application & Management (IJREAM), 2023.
5. S. Shete, S.Udgire, S. Desai, R.Murpani, A. Joshi , "Machine learning Algorithms for predicting cardiac arrythmias" in 5th International Conference on Artificial Intelligence and Speech Technology, AIST 2023, Indira Gandhi Technical University for women (IGDTUW), Delhi, India, 2023.

THE
EDITORIAL TEAM

PROF. ARUNKUMAR RAM
Chief Editor