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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. JITENDRA TORAVI

HEAD OF DEPARTMENT, BIOMEDICAL ENGINEERING

Dear Readers,

As I retire from my position as Head of the Biomedical Engineering Department at VIT, I am reflecting on the journey of our Biomedical Engineering Department since its establishment in 2006. Our vision is to become a centre of excellence in Biomedical Engineering, and I am proud to say that all our faculty members have been working tirelessly towards achieving this goal.

Our department has been fortunate to have enthusiastic and hardworking students who have excelled in both industry and academics, including higher studies. It has been a great pleasure working with you all for the past seven years, and I wish you all the best in your professional careers. I am confident that the students of our Biomedical Engineering Department will continue to showcase a high level of professional competence in their respective domains and uphold the credibility of our department.

Thank you all for an amazing journey!

> Success is not final, failure is not fatal, it is the courage to continue that counts
> -Winston Churchill

Guest Lecture Series Conducted by the Department of Biomedical Engineering

Guest lectures are an essential part of an engineering student's education. They provide an opportunity to learn from industry experts and gain insights into the real-world applications of engineering principles. Guest lectures also offer networking opportunities and can inspire students to pursue their career goals. Department conducted several lectures during this semester. The gist of lectures is given as below.

A guest session on "Medical Image Processing" was conducted on March 14, 2023, online via MS Teams, with live telecast in B105 (BIOM), M101 (EXTC, EXCS). The objective was to make students aware of the different applications of image processing in the medical field. The session was organized by Dr. Varsha Turkar and Prof. Geetha Narayanan, and the speaker was Dr. Amoli Belsare from YMCC Nagpur. The lecture covered various modalities of medical imaging, different fields where students can do research, and various datasets available for projects and research. Attendees gave positive feedback, and students can be given internships or projects on medical image processing.

Mr. Akshat Karambe, a Data Scientist at CommonSpirit Health, delivered a guest lecture on March 15, 2023, on the topic Data Analytics in Healthcare for S.E. Sem IV & T.E. Sem VI students of Biomedical Engineering at VIT. He explained the basics of Data Analytics, structured and unstructured data, data cleaning, and analysis. He also shared his experience as a researcher in Bioinformatics and presented his model for analyzing the crown of Coronavirus during COVID-19. Additionally, he covered machine learning and deep learning concepts for Data Analytics applications. The session concluded with a question-answer round and a vote of thanks to the guest speaker. A total of 87 students attended the session.

Ms. Trupti Wadkar, Deputy General Manager at Jupiter Lifeline Hospitals Pvt. Ltd., gave a guest lecture titled "Visionary Role of Biomedical Engineers in Healthcare Industry." on March 21, 2023. The session aimed to enlighten students about the changing roles and responsibilities of biomedical engineers in a clinical environment, along with the opportunities in the healthcare industry. Ms. Trupti showcased several case studies of good projects handled by the biomedical team at Jupiter Hospital, followed by a Q&A session with students. Feedback from students was overwhelmingly positive. 48 people, including 46 students and two faculty members, attended the session.




Department Staff

PROF. SUVARNA UDGIRE
ASSISTANT PROFESSOR

EDUCATION QUALIFICATION:
ME-ELECTRONICS ENGINEERING

TEACHING EXPERIENCE:
14 YEARS

INDUSTRIAL EXPERIENCE:
13 YEARS

AREA OF SPECIALIZATION:
BIOLOGICAL MODELING,
NETWORKING IN MEDICAL
SYSTEMS & MEDICAL DEVICES

PROF. NEELAM PUNJABI
ASSISTANT PROFESSOR

EDUCATION QUALIFICATION:
M.E. INSTRUMENTATION ENGINEERING

TEACHING EXPERIENCE:
13 YEARS

AREA OF SPECIALIZATION:
HOSPITAL MANAGEMENT
INSTRUMENTATION
MEDICAL IMAGING

Impulse-2020: Joint Event of BMESI-VIT Chapter and BMSA

Department conducted its Technical Festival "Impulse-2023" from March 10, 2023, to March 14, 2023. This was jointly organized by BMESI-VIT Chapter and BMSA. Eminent speakers from the Industry and Academia addressed the participants.
The "Squabble" game-based event was the first event conducted on day-1 of Impulse. The event involved seven teams competing in four rounds. The winner, FE Biomed, was declared after answering trivia questions in the final round. On day-2, seminar called "Med-Tech: A collaborative display with Philips & CRRT was organized. The event featured guest speakers from Criticam Medical System LLP and CLINICAL Quality Care Dialysis pvt. ltd. The seminar covered understanding various medical instruments and their working principle, including dialysis machines, patient monitoring systems, nebulizers, and syringe pumps followed by a hands-on workshop for students and teachers.

Day-3 saw a game-based event "Codenames". The event involved eight teams participating in a word-guessing board game, with one player from each team acting as a spymaster and the others guessing the correct word. The game had three rounds, with two teams competing against each other in the final round. The event concluded with the hosts announcing the winners based on points secured. Followed by this "Ideathon" event was conducted. The intercollegiate event saw 17 groups present their innovative project ideas, with the top three winning cash prizes. Project ideas included smart CPR, a programmable mirror dodecahedron, a cost-effective flight controller, and more. The event helped participants and audiences increase their knowledge about technical things and innovative ideas.

The final event of Impulse 2023, the Techno-Cultural Eve, was a successful blend of technical speeches and artist performances. Attendees enjoyed a speech on machine learning and artificial intelligence in healthcare, a singing performance, a discussion on bioinformatics, and a performance by a musician and a band. The event also featured a fun question-answer session with a humanoid robot, Indro. The host concluded the event with gratitude to the faculty members and congratulated all the members of BMESI and BMSA who contributed to the success of Impulse 2023.




Know an Alumna

Ms. Shrutika Nipane (2018 Batch)

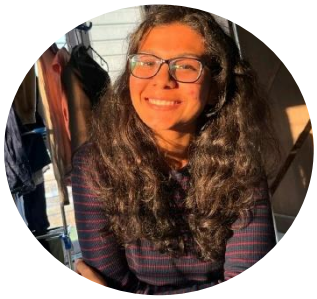
Shrutika Nipane is an alumna of VIT , passed out in the year 2018 from the Biomedical Engineering Department.

I am currently working as a SDET at IBM India Systems Development Labs for a storage domain project which requires knowledge of python programming language and Kubernetes.

VIT has helped me kick start my career by giving me an opportunity to work at Capgemini. The electrophysiology concepts taught in the curriculum helped me correlate with the product and to understand it better.

I would like to advise my juniors to keep learning new concepts and technologies. Try to resolve the issues you get while working on the curriculum projects by yourself. These learnings will definitely help you in the future. Trust the process and believe in yourself.

STUDENT ARTICLE



"Advancements in Nanotechnology"

Ms. Khushi Shah(T.E. Biomedical)

Nanorobotics is a rapidly growing field within nanotechnology that focuses on the design, manufacturing, and regulation of robots at the nanoscale. With the ability to work at the molecular level, scientists can create large structures with fundamentally new molecular organization that hold tremendous potential in various areas, including medicine. Medical nanorobotics has the potential to revolutionize healthcare by offering powerful new tools for treating human diseases and improving biological systems.

One area of research in medical nanorobotics is focused on developing applications for the field of hematology. Scientists are working on creating nanobots that can transport oxygen in the body following major trauma and can formulate improved clotting capabilities in case of a dangerous hemorrhage. Respirocytes are one example of such nanobots. They are designed to act as artificial red blood cells that can be injected into the bloodstream to transport respiratory gases until the patient is stabilized in emergencies where a patient stops breathing and blood circulation stops. According to current proposals, respirocytes could supply 200 times more respiratory gas molecules than natural red blood cells of the same volume. Another type of nanobot, clottocytes, act as artificial platelets to stop bleeding. Clottocytes mimic the natural platelet ability to accumulate at the bleed site to form a barrier by unfurling a fiber mesh that would trap blood cells when the nanobot arrives at the injury. One injection of clottocytes would be 10,000 times more effective than an equal volume of natural platelets at clotting.

Nanorobots also hold great potential in the detection and treatment of cancer. Early detection is critical for improving cancer prognosis, and nanobots with enhanced detection abilities can accelerate cancer diagnosis. Nanobots with chemical sensors embedded in them can be programmed to detect tumor cells in the body. Proposed designs currently include the use of integrated communication technology, which produces two-way signaling. This means that nanobots will respond to acoustic signals and receive programming instructions via external sound waves, in addition to transmitting data. A simple reporting interface could be created using strategically placed nanobots in the body that can log data supplied by active nanobots traveling through the bloodstream. In vivo, instructions could be changed to supply active targeting for monitoring or healing.

Nanobots equipped with chemical sensors can also be used in therapy. Therapy can be provided in both the primary and metastatic phases of cancer by using specific programming to detect different levels of cancer biomarkers such as e-cadherins and beta-catenin. Nanobots have the advantage of delivering precise treatment. Current cancer treatments cause severe side effects by destroying healthy cells. Designing nanorobots with chemotactic sensors on their surfaces that correspond to specific antigens on cancer cells can result in targeted treatment.

In conclusion, nanorobotics is a promising field with potential applications in various areas of medicine. Its benefits can help revolutionize the healthcare industry by offering powerful new tools for treating human diseases and improving biological systems. As the field continues to grow, there will be a great demand for skilled biomedical engineers who can design and program nanobots for medical applications. Thus, the importance of nanorobotics in the job sector is expected to grow in the coming years.

Faculty and Student Publications

1. R. Bhurke, A. Khan, D. Chamaria, S. Mali, G. Nagare, "Systematic Analysis of Increase in Health Deterioration Due to Lifestyle Changes," 2023 DST Sponsored Second International Conference on Signal Processing and Communication Systems (ICSPC), M. Kumarasamy College of Engineering, Karur, Tamil Nadu, India,2023.
2. R. Jangam, C. Hase, S. Tapare, S. Mali, G. Nagare, "A review on Diabetes and Cardiovascular Diseases: Growth rate & Causes," in DST Sponsored Second International Conference on Signal Processing and Communication Systems (ICSPC 2023), M. Kumarasamy College of Engineering, Karur, Tamil Nadu, India, 2023.
3. H. Shetty, H. Surlekar, G. Nagare, "Alzheimer's Diseases Detection by using Convolution Neural Network," in International Conference on Information Systems and Computer Networks (ISCON 2023), IEEE Conference, Dept. of Computer Engineering and Applications, GLA University, Mathura, India, 2023.

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EDITORIAL TEAM

PROF. ARUNKUMAR RAM
Chief Editor