



Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
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BIOVERSE

INNOVATING THE FUTURE OF LIFE AND MEDICINE

**JUNE 2024 SCHOOL OF ELECTRICAL AND COMMUNICATION
VOLUME VII DEPARTMENT OF BIOMEDICAL ENGINEERING**



Institute Vision

To create, translate and disseminate frontiers of knowledge embedded with creativity and innovation for a positive transformation of emerging society.

Institute Mission

- M1:** To nurture excellence in teaching, learning, creativity and research; translate knowledge into practice
- M2:** To foster multidisciplinary research across science, medicine, engineering, technology and humanities
- M3:** To incubate entrepreneurship; instill integrity and honour
- M4:** To inculcate scholarly leadership towards global competence and growth beyond self in a serene, inclusive and free academic environment

Department Vision

To be recognized as an excellent centre in Biomedical Engineering for imparting quality technical education that leads to transformative advancements in healthcare industries

Department Mission

- M1:** To infuse critical thinking skills by providing a strong foundation that enables the students for continuing education
- M2:** To create an ambience of academic excellence with state-of-the-art laboratories to compete globally
- M3:** To establish a dynamic research environment that integrates advanced healthcare technologies for innovation and progress



Program Education Objectives

- PEO1:** Exhibit proficiency in designing and analyzing healthcare solutions to cater to the needs of the medical industry and societal needs
- PEO2:** Demonstrate professional networking in a diverse team setting and collaborate among peers with ethical practices in the workplace, ensuring integrity
- PEO3:** Reinforce lifelong learning practices for professional advancement not limited to higher studies and research.

Program Special Outcomes

- PSO1:** Apply critical reasoning to analyse, identify and solve solutions for problems related to Brain-Computer Interface (BCI)
- PSO2:** Design an effective interface between biological and electronic systems.
- PSO3:** Apply the knowledge of Artificial intelligence in healthcare engineering to solve real-time problems



Magazine Credits

From the Magazine Team

“We are delighted to present to you all yet another fascinating issue of this magazine, which has been painstakingly, creatively, and inventively made. This year's issue, a result of perseverance and teamwork, captures the spirit of our department's advancements in a variety of areas this academic year. This edition, which was thoughtfully drafted and properly indexed, is adorned with teacher messages, creative corners, academic accomplishments, and much more. We genuinely hope that these observations will pique your interest, encourage you, and highlight the seemingly endless possibilities of electrical engineering. Explore and celebrate our dynamic community's outstanding accomplishments

HAPPY READING!”

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DEAN'S Desk



As we usher in the new year and unveil Volume 7 of our departmental magazine, I am struck by the profound evolution of the Biomedical Engineering department. In the short span of three years, this publication has grown into a vibrant archive of innovation and academic excellence.

The first half of 2024 was a period of significant transition for our institution. We have moved beyond the traditional boundaries of the classroom, fostering an ecosystem where engineering precision meets clinical empathy. In the current landscape of global healthcare, the role of a Biomedical Engineer is more critical than ever.

The integration of Artificial Intelligence in diagnostic imaging to the development of sustainable medical devices, our students and faculty are at the very forefront of these transformative shifts. What makes this specific edition special is its focus on application. We have seen our students take theoretical concepts from their textbooks and translate them into functional prototypes that address real-world patient needs.

This synergy between academic rigor and social responsibility is what defines our vision. I wish to commend the Department of Biomedical Engineering for maintaining its momentum and the editorial team for their meticulous effort in capturing these moments. May this retrospective look at 2023 inspire our community to pursue even bolder innovations in 2024.

Prof. Dr. R S Valarmathi

Dean- School of Electrical & Communication



HoD'S Reflection



I am delighted to welcome you to the June 2024 edition (Volume 7) of our magazine. The first half of 2024 has been a period of intense activity. June is traditionally a month of transition; we see our senior students preparing to take their expertise into the professional world, while our junior batches consolidate their learning through ambitious projects and internships. From successful project completions to the vibrant exchange of ideas in our seminars, our students and faculty have consistently demonstrated that excellence. This volume highlights the technical milestones we have reached.

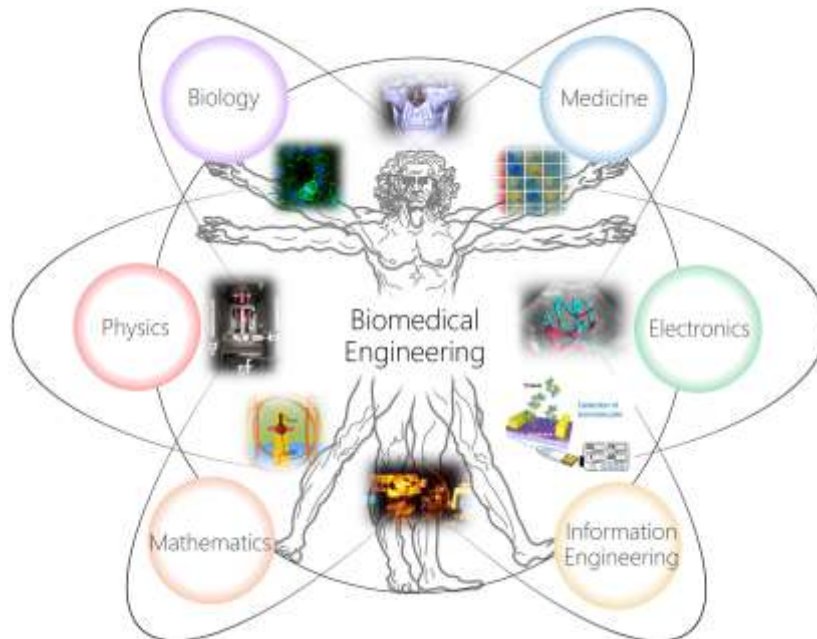
As we look at the contributions in this issue, I am reminded of the dedication it takes to stay at the forefront of our field. I want to extend my sincere gratitude to the editorial team and every contributor who took the time to share their insights. It is through this collaborative spirit that we continue to build a community of lifelong learners.

Let this edition be a celebration of how far we have come this semester and a spark for the innovations we will tackle next.

Dr. Balasubramaniam. D



About the Department



The Department of Biomedical Engineering was established in the year 2017 with the objective of bridging engineering principles with medical and biological sciences to address challenges in healthcare. The department offers B.Tech. and Ph.D. programs, aimed at developing skilled professionals and researchers capable of contributing to healthcare technology, medical device development, and biomedical research. Emphasis is placed on outcome-based education, hands-on learning, and research-oriented training. With a focus on emerging areas such as medical imaging, biomechanics, biomedical signal processing, and artificial intelligence in healthcare, the department strives to produce graduates who are industry-ready, research-driven, and socially responsible.



Guest lecture - Career Guidance

The Department of Biomedical Engineering, through its association VIBE (Biomedical Department Association), organized a one-day guest lecture titled “Biomedical Engineers’ Career Opportunities in the Advanced World.” The session was delivered by Mr. M. Kannan, B.E., M.Tech, who shared his valuable insights and professional experiences with the students.

The lecture aimed to create awareness among students about the wide range of career opportunities available for biomedical engineers in the rapidly advancing global healthcare sector. During the session, Mr. Kannan discussed emerging areas such as medical device development, healthcare technology management, clinical engineering, research and development, and opportunities in multinational healthcare industries. He also highlighted the importance of interdisciplinary skills, innovation, and continuous learning for biomedical engineers to succeed in the modern technological world.

The speaker encouraged students to explore higher education, research opportunities, and global career prospects in biomedical engineering. He also emphasized the growing demand for biomedical professionals in hospitals, medical equipment industries, research laboratories, and healthcare startups.

The interactive session motivated students to understand the scope of their field and inspired them to prepare for future challenges in the healthcare technology sector. The event concluded with a vote of thanks, expressing gratitude to Mr. M. Kannan for sharing his knowledge and guiding students toward building successful careers in biomedical engineering.



Guest lecture-Career Guidance

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Department of Biomedical Engineering
Organized by
Guest Lecture on **GME**

"Biomedical Engineers Career OPPORTUNITIES in Advanced World"

22nd January 2024
@10:00 a.m. | ECE Gallery Hall

Speaker
Mr. M. Kannan B.E, M.Tech
Head - Biomedical Engineering
Shri Devi Institute of Medical Science,
Tumkur, Karnataka.

In the presence of
Col. Prof. Vel. Dr. R. Rangarajan
Founder President & Chancellor
Dr. Sagunthala Rangarajan
Foundress President
Prof. S. Salivahanan
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News in Trend

The trend for 2024 moved toward "Clinical Grade" wearables. Devices like the Assert-IQ ICM (an insertable cardiac monitor) were refined to provide higher-fidelity electrogram details, allowing doctors to monitor arrhythmias with hospital-level precision from the patient's home. Additionally, the rise of Continuous Glucose Monitors (CGMs) for non-diabetic athletes and wellness enthusiasts has become a mainstream BME trend this year.

In a historic moment for neurotechnology, Elon Musk's **Neuralink** successfully implanted its first brain-computer interface (BCI) in a human patient in January 2024. The patient, who is paralyzed from the shoulders down, was able to control a computer cursor and play video games using only his thoughts. This marks a turning point for BME, moving from experimental research to a clinical reality that could restore autonomy to millions with neurological conditions.

Significant strides were made in "Organ-on-a-Chip" technology and vascularized 3D printing. New bio-inks were developed that allow for the printing of delicate capillary networks, bringing us closer to the goal of printing functional human tissue for drug testing and, eventually, organ transplantation.

The integration of Artificial Intelligence into medical imaging reached new heights. Researchers at UCSF debuted CathEF, an AI model that can estimate heart pumping function directly from standard angiogram videos. This eliminates the need for additional invasive procedures, showcasing how "Software as a Medical Device" (SaMD) is becoming as critical as physical hardware in BME.

A Chithra (VTU15544)



Best Project

Early detection of Alzheimer's disease based on CNN

Alzheimer's disease is a progressive neurological disorder that affects memory, thinking ability, and behavior. Early detection of Alzheimer's disease is very important because it helps doctors provide timely treatment and slow the progression of the disease. This project focuses on the early detection of Alzheimer's disease using medical brain images and machine learning techniques, particularly Convolutional Neural Networks (CNN).

In this project, brain MRI images are used as the primary dataset to identify different stages of Alzheimer's disease. The dataset contains several categories such as Cognitively Normal (CN), Mild Cognitive Impairment (MCI), and Alzheimer's Disease (AD). These images are first collected and then preprocessed to improve their quality and remove unwanted noise. Image preprocessing includes resizing, normalization, and enhancement so that the neural network can effectively analyze the features present in the brain scans.

After preprocessing, the images are fed into a Convolutional Neural Network model. CNN is a deep learning algorithm specifically designed for image analysis. It automatically extracts important features from the MRI images using convolutional layers, pooling layers, and fully connected layers. These layers help the system learn patterns and structural changes in the brain that are associated with Alzheimer's disease.

The model is trained using multiple epochs so that it can gradually improve its prediction accuracy. During the training process, parameters such as loss, accuracy, precision, recall, and F1-score are calculated to evaluate the model's performance. The results are visualized using graphs such as accuracy graphs, loss graphs, and AUC curves. From the accuracy graph shown in the results, the model achieves an accuracy of approximately 74–75%, indicating that the system can reasonably classify brain images based on Alzheimer's stages.



Alumni Spotlight

Alumnus : Bharanidharan

I am truly honored to share my thoughts as an alumnus of the Biomedical Engineering Department. My journey in this department has been a transformative experience that laid a strong foundation for both my academic and professional growth. The curriculum was well-structured, combining core engineering principles with emerging biomedical technologies, which helped me understand the real-world applications of what we studied.

The faculty members played a vital role in shaping my career. Their constant guidance, encouragement, and willingness to support students beyond classroom learning made a significant difference. They not only focused on academic excellence but also motivated us to think critically, innovate, and stay updated with the latest advancements in the biomedical field.

One of the most valuable aspects of my time in the department was the hands-on learning experience. Laboratory sessions, mini-projects, workshops, and seminars provided practical exposure and enhanced my technical skills. These experiences helped me gain confidence and prepared me to face real-world challenges in the healthcare and medical technology sectors.

I am deeply grateful to the department for nurturing my potential and guiding me toward a successful career path. The knowledge, discipline, and values I gained here continue to support me in my professional journey. I extend my best wishes to the department for its continued growth, excellence, and contribution to the field of biomedical engineering



Gallery

