

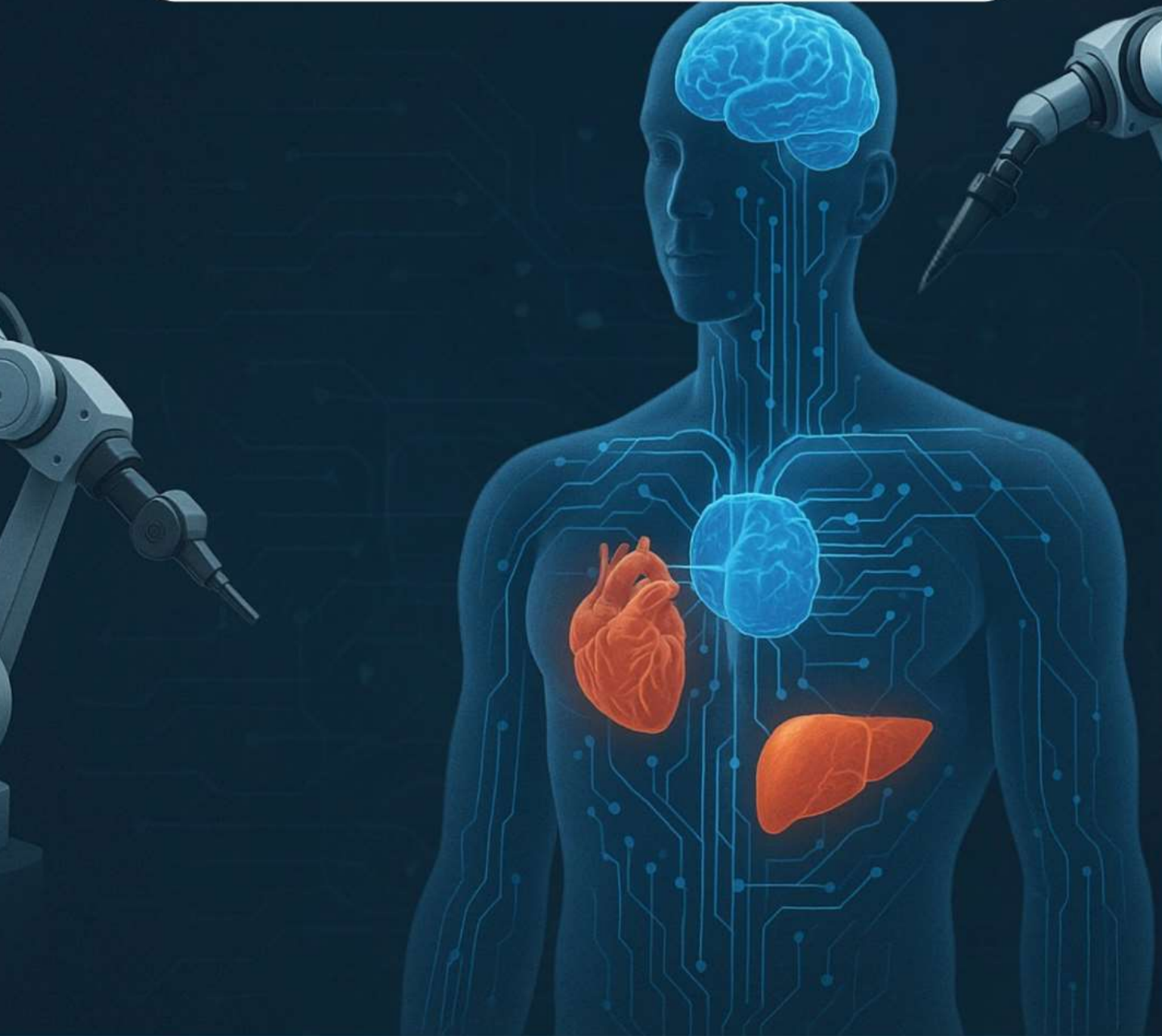


Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)



BIOVERSE

INNOVATING THE FUTURE OF LIFE AND MEDICINE



JAN 2024
VOLUME VI

SCHOOL OF ELECTRICAL AND COMMUNICATION
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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Mr. A. Padmanabha Sarma
(Assistant Professor)



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DEAN'S Desk



As we usher in the new year and unveil Volume 6 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 latter half of 2023 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



As we usher in the new year and unveil Volume 6 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.

"It is with great pride and a sense of accomplishment that I introduce the sixth volume of our biannual departmental magazine. As we step into January 2024, this edition serves as a vital bridge, capturing the vibrant energy, academic rigor, and creative spirit that defined the latter half of 2023.

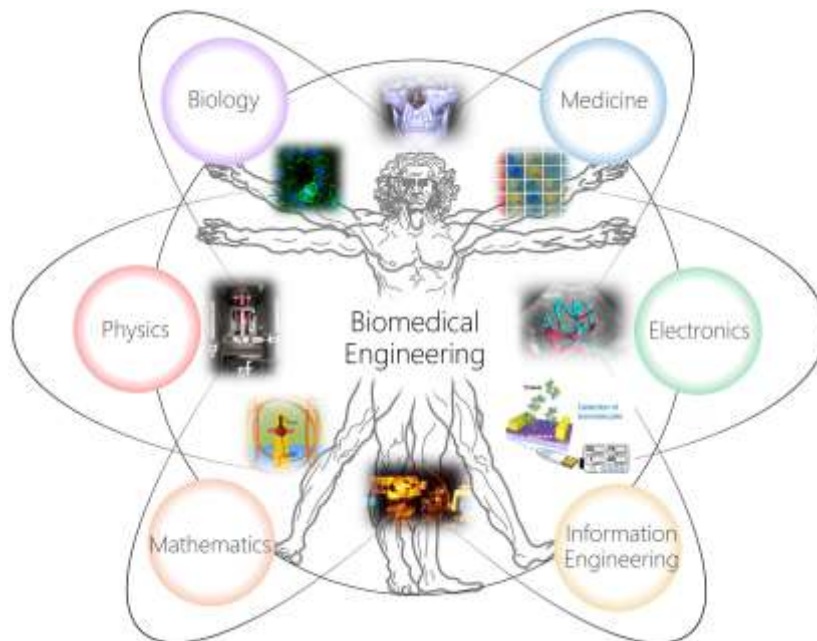
Reaching our sixth edition is a testament to the department's commitment to self-expression and documentation. As you look through these pages, you are not just reading a report—you are witnessing the growth of our students and the dedication of our faculty.

I hope this volume inspires you to reflect on your achievements from the past six months and fuels your ambitions for the year ahead. My sincere congratulations to the editorial team for their meticulous work in compiling this record of our department's legacy."

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.



News in Trend- GraphNoVo

Machine learning is now helping researchers analyze the makeup of unfamiliar cells, which could lead to more personalized medicine in the treatment of cancer and other serious diseases.

Researchers at the University of Waterloo developed GraphNovo, a new program that provides a more accurate understanding of the peptide sequences in cells. Peptides are chains of amino acids within cells and are building blocks as important and unique as DNA or RNA.

In a healthy person, the immune system can correctly identify the peptides of irregular or foreign cells, such as cancer cells or harmful bacteria, and then target those cells for destruction. For people whose immune system is struggling, the promising field of immunotherapy is working to retrain their immune systems to identify these dangerous invaders.

To quickly build a profile of the peptides in an unfamiliar cell, scientists have been using a method called de novo peptide sequencing, which uses mass spectrometry to rapidly analyze a new sample. This process may leave some peptides incomplete or entirely missing from the sequence.

GraphNovo represents a paradigm shift in **immunopeptidomics** by leveraging deep learning to overcome the limitations of traditional mass spectrometry data analysis. It uses a graph-based approach to predict the missing pieces of the biochemical puzzle with high fidelity. This precision allows researchers to identify specific neoantigens in cancer cells that are unique to an individual patient, effectively providing a roadmap for the immune system to target tumors. By bridging the gap between raw data and actionable clinical insights, this AI-driven tool accelerates the design of personalized vaccines and immunotherapy treatments, marking a significant milestone in the convergence of computer science and molecular biology.



News in Trend- Smart Patches



The emergence of multi-biomarker microneedle patches marks a transformative step toward continuous, non-invasive health monitoring. These patches utilize microscopic needles that penetrate only the outermost layer of the skin—reaching the interstitial fluid without triggering the pain receptors located deeper in the dermis. By integrating multiple electrochemical sensors into a single one-centimeter square device, the patch can simultaneously track glucose and ketone levels, providing a comprehensive view of metabolic health that a single-marker test cannot offer. The seamless integration with smartphone technology via Bluetooth allows for real-time data visualization and emergency alerts, empowering patients with conditions like Type 1 diabetes to manage their health with greater precision and far less discomfort than traditional finger-prick methods.

-Dhiya Sabu(VTU16805)



Best Project

In-house Design of Functional Near InfraRed Spectroscopy System (November- 2022)

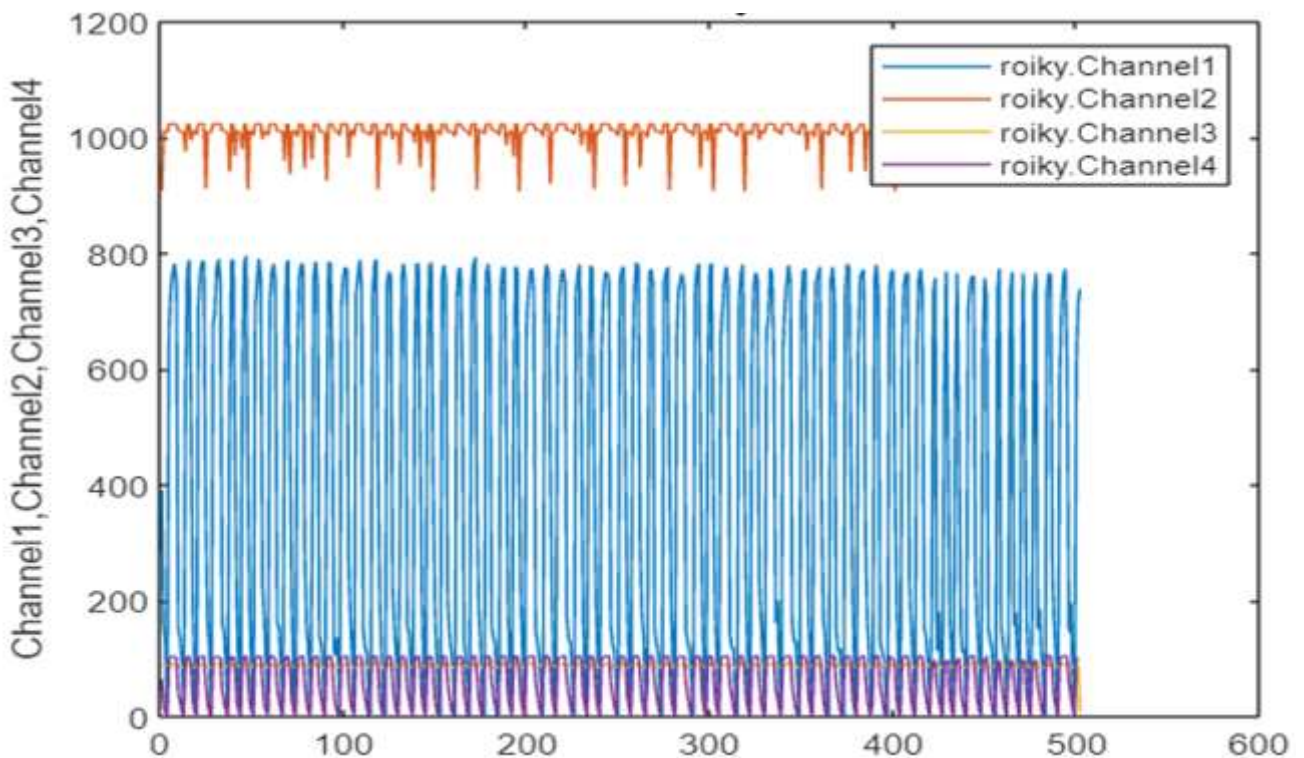
The brain is one of the most important and complex organs in the human body. To understand the structure and functionality of the brain, it must be monitored in natural or nonclinical settings such as during daily activities. This monitoring should assist in the detection of these natural circumstances. There are several techniques to monitor the brain's structure and function including functional magnetic resonance imaging (fMRI), electroencephalography (EEG), magnetoencephalography (MEG), positron emission tomography (PET), and single positron emission tomography (SPECT).

Functional near-infrared spectroscopy (fNIRS) is a non invasive brain monitoring method which emits NIR light into the brain tissue and detects the transmitted or reflected light from the brain. fNIRS has many advantages over its counterparts in terms of its relatively high temporal/spatial resolution, mobility, portability and safety. It has a higher temporal resolution than fMRI and a greater spatial resolution than EEG.

In our project we used 4 LEDs and 4 detectors and an Arduino Uno board for acquiring the fNIRS signals. The microcontroller will send the signal to the LED for turning ON and the photodetector will detect the reflected light and sends electrical output to the ADC embedded in the Arduino. The microcontroller will digitized the signal and the data will be saved using the Putty tool in “.csv” format.

Best Project

Project Setup and Results



Lawanbha Lyngdoh (VTU11962)



Alumni Spotlight

Name: Roiky Suchiang

Batch: B.Tech Biomedical Engineering – 2021

Current Position: Biomedical Engineer, Philips Healthcare, Bangalore

Looking back at my time in the Department of Biomedical Engineering, we are filled with appreciation for the experiences that shaped both our knowledge and our perspective. Campus life was more than just lectures and labs—it was a place where I learned to think critically, innovate, and embrace challenges as opportunities for growth.

Throughout my studies, I discovered the importance of integrating multiple disciplines. Projects, hands-on experiments, and collaborative assignments helped me to develop a practical understanding of engineering concepts while honing creativity and problem-solving skills. Our professors were always encouraging us to push boundaries, experiment with new ideas, and translate theoretical knowledge into meaningful solutions.

As I stepped into the professional roles, my ability to collaborate with diverse teams, communicate effectively, and tackle complex problems became my strongest assets. Challenges were an essential part of my journey. Navigating tight deadlines, unfamiliar technologies, and ambitious projects taught me resilience and the importance of a growth mindset.

To the students currently walking the halls of the department, I leave this advice: engage fully with the opportunities around you. Participate in research, attend workshops, and embrace internships with curiosity and enthusiasm. Seek guidance from mentors, collaborate openly, and never shy away from exploring new areas within biomedical engineering.

Gallery

