

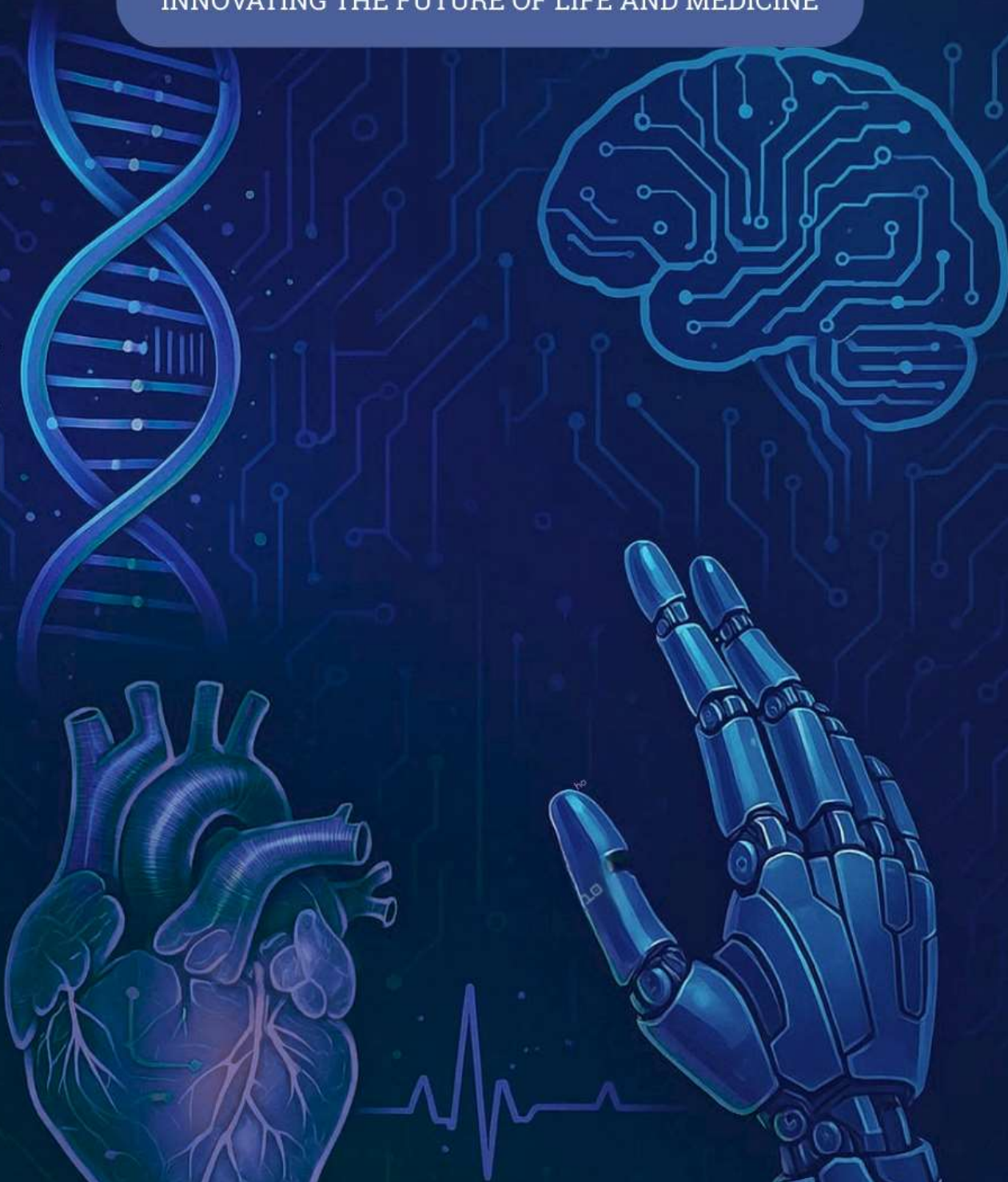


**Vel Tech**  
Rangarajan Dr. Sagunthala  
R&D Institute of Science and Technology  
(Deemed to be University Estd. u/s 3 of UGC Act, 1956)



# BIOVERSE

INNOVATING THE FUTURE OF LIFE AND MEDICINE



JAN 2022  
VOLUME II

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

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# Magazine Credits

## From the Magazine Team

“As another academic chapter unfolds, this edition of the magazine stands as a reflection of the department’s collective efforts, growth, and aspirations. Thoughtfully compiled, it captures the academic rigor, innovative thinking, and collaborative spirit that define our learning environment. Each contribution reflects the enthusiasm and commitment of students and faculty alike, highlighting the department’s journey toward excellence.

Through articles, achievements, and reflections, this issue aims to document meaningful experiences and encourage readers to engage with knowledge beyond the classroom. We hope this edition inspires curiosity, fosters learning, and reinforces the values that shape our department’s academic culture.

HAPPY READING!”

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## DEAN'S Desk



As we release the Volume 2 of the departmental magazine in January 2022, I am pleased to witness the continued academic growth and progressive outlook of the Department of Biomedical Engineering. This edition reflects the department's sustained commitment to quality education, innovation, and the pursuit of excellence in teaching, research, and professional development.

It gives me immense pleasure to welcome you all to the second edition of our Biomedical Engineering departmental magazine. Every edition of this magazine is a testament to the talent, creativity, and dedication of our students and faculty, and I am truly proud of the work that has gone into bringing this issue to life.

Our department has continued to grow in both excellence and spirit. The field of Biomedical Engineering is ever-evolving, and our department has shown a unique ability to stay at the forefront of this dynamic landscape, nurturing students who are not only technically proficient but also compassionate problem-solvers.

I would like to take a moment to appreciate the editorial team for their exceptional effort in curating this magazine. Their dedication in compiling insights, achievements, and stories ensures that the magazine not only informs but also inspires. By highlighting the department's milestones, student initiatives, and ongoing research, they have created a platform that truly reflects the spirit and vision of our community.

As we move forward into 2022, I encourage every member of our department to continue embracing curiosity, innovation, and collaboration. Let this magazine serve as a reminder of what we can achieve together, and as a source of motivation to reach even greater heights in the coming year.

**Prof. Dr. R S Valarmathi**

**Dean- School of Electrical & Communication**

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# HoD's Reflection



As we step into the new year, I am delighted to share my reflections on the journey of our Biomedical Engineering department. Looking back, it has been a period of growth, learning, and remarkable accomplishments, all made possible by the dedication of our faculty, the enthusiasm of our students, and the collaborative spirit that defines our department.

Over the past year, our students have continued to shine in academics, research, and innovative projects. From developing novel biomedical devices to contributing to impactful research, their work reflects not only technical excellence but also creativity and a strong commitment to improving healthcare outcomes. These achievements are a true testament to the hard work and guidance provided by our faculty members, who continually mentor, inspire, and push the boundaries of learning.

I would also like to acknowledge the editorial team for their effort in bringing out this magazine. Their work in highlighting departmental milestones, student initiatives, and faculty contributions ensures that the magazine becomes a vibrant showcase of our collective efforts. It captures the essence of our department—dynamic, innovative, and forward-looking.

As we embrace the opportunities of 2022, I encourage everyone in our community to continue exploring, learning, and innovating. Let us build on our successes, embrace new challenges, and continue striving to make meaningful contributions to the field of Biomedical Engineering.

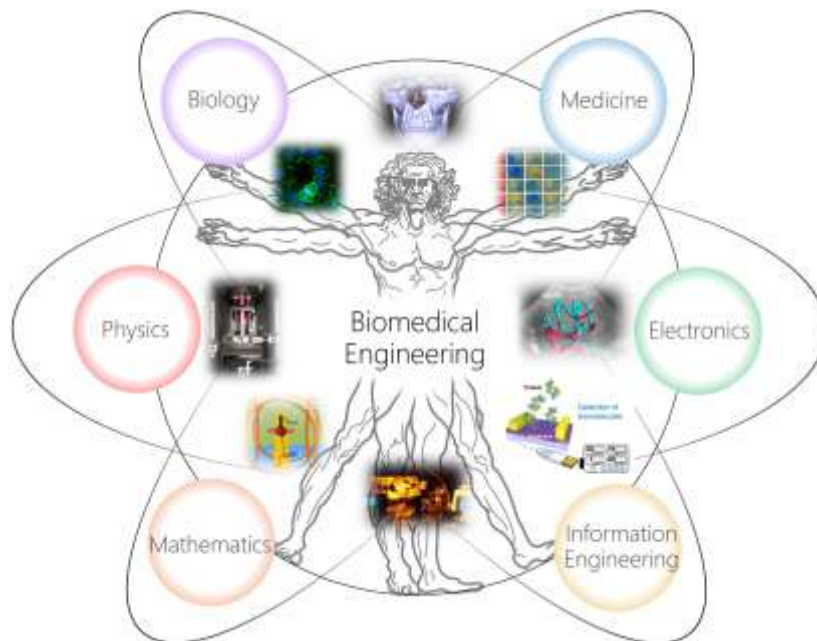
I am proud to lead such a talented and motivated team, and I look forward to witnessing yet another year of excellence and innovation.

**Dr. Masoodhu Banu**

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# 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.

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# News in Trend

## **1. Explosion of Research Breakthroughs in Fall 2021**

In late 2021, several major research advancements were reported by academic biomedical engineering departments worldwide, including novel polymer vaccine delivery systems, new approaches to understanding cell movement, improvements in auditory nerve implants, innovative cryopreservation methods, and potential therapeutic targets for sickle cell disease. These advances reflect a *rapid uptick in interdisciplinary research and creative problem-solving approaches* as students and faculty collaborated across labs.

## **2. Tissue Engineering and Regenerative Medicine Growth**

Tissue engineering continued to be a major trend in biomedical engineering in 2021 as researchers pushed boundaries in regenerating organs, tissues, and biological constructs. Three-dimensional bioprinting became especially prominent, enabling layer-by-layer construction of tissues for potential therapeutic use — from skin and bone to organ-like structures — and demonstrating new possibilities for drug testing, disease modelling, and future organ replacement therapies.

## **3. Microgravity Bioprinting Takes Off**

Innovators explored 3D bioprinting in microgravity conditions as a cutting-edge approach to overcome Earth-bound limitations like gravitational distortion of printed tissues. This idea has implications not just for healthcare on Earth, but for *future biomedical fabrication in space*, opening doors to the next frontier of regenerative medicine.

## **4. AI and Robotics Reshaping Biomedical Applications**

Artificial intelligence and machine learning steadily gained prominence in diagnostics and biomedical device development during 2021. AI tools began to enhance medical imaging, predictive analytics, and biosensor accuracy — transformations that would set the stage for even broader adoption in 2022. Robotics — especially surgical robotics — continued to advance, offering unprecedented precision and new capabilities across clinical subspecialties.

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# News in Trend

## 5. Stretchable and Flexible Bioelectronics

Biomedical engineers advanced **stretchable microelectrode arrays**, enabling more flexible and biocompatible electrical interfacing with tissues such as nerves and muscles. These developments improve chronic monitoring and neuroprosthetic control, contributing to future neural interface technologies.

## 6. Growth in Wearable and Remote Health Tech

Wearable technology and remote patient monitoring continued to expand between 2021 and early 2022. Devices capable of tracking vital signs — such as smart biosensors and connected health devices — have reshaped how healthcare data is collected and used, supporting early diagnosis, continuous monitoring, and telehealth services.

## 7. Organ-on-Chip and Biofabrication Advances

In 2021, **organ-on-chip systems** began to show increased impact as platforms for pharmaceutical testing and disease modelling, enabling researchers to mimic organ functions on microfluidic devices. These technologies reduce reliance on animal testing and accelerate insights into organ-level biology.

## 8. Regenerative Scaffold Development

Bioengineers also made strides designing **bioactive scaffolds** that support tissue regrowth by guiding stem cell activity and delivering growth factors at injury sites. These scaffolds are increasingly important in bone repair, nerve regeneration, and vascular healing.

Jeffery Jalwin J (VTU11282)

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# Best Project

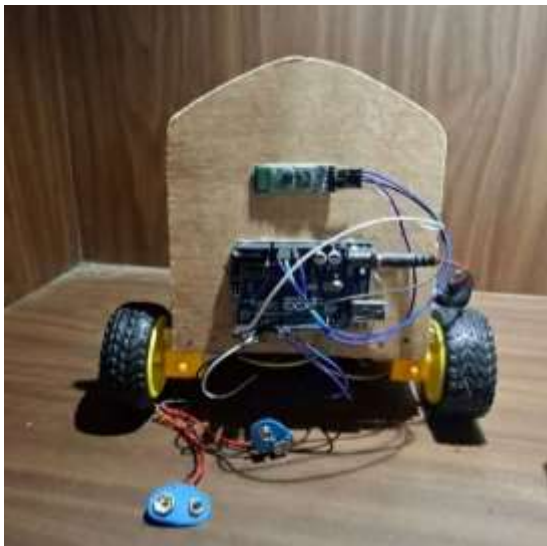
## Voice Control Wheelchair Model for Physically Challenged

Mobility is essential for independence and quality of life. Many physically challenged individuals face difficulties using traditional manual or joystick-controlled wheelchairs due to limited upper body strength or lack of fine motor control. To address this issue, our project proposes a Voice Control Wheelchair Model that allows users to control movement through simple voice commands. This system is designed to provide a safe, affordable, and user-friendly mobility solution. The wheelchair operates using Automatic Speech Recognition (ASR) technology. The main components of the system include an Arduino Uno microcontroller, a voice recognition module, an L293D motor driver, DC motors, and an ultrasonic sensor (HC-SR04) for obstacle detection. When the user speaks commands such as “Forward,” “Backward,” “Left,” “Right,” or “Stop,” the voice recognition module captures and processes the input. The recognized command is sent to the Arduino, which controls the motor driver to move the wheelchair in the desired direction. Safety is an important feature of this system. The ultrasonic sensor continuously monitors the surroundings to detect obstacles. If an object is detected within a safe distance (15–20 cm), the system automatically stops the wheelchair to prevent collisions. An emergency stop mechanism is also included to immediately halt movement in case of unexpected situations. These safety measures improve reliability and user confidence.

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# Best Project

The system works in a continuous loop: it listens for voice input, processes the command, checks for obstacles, and then executes movement. During testing, the prototype achieved around 94% accuracy in recognizing voice commands under indoor conditions. The response time was less than one second, ensuring smooth and real-time operation. The wheelchair operates using a 12V power supply and supports approximately two hours of continuous usage. Overall, this project demonstrates a cost-effective and practical assistive technology solution. By integrating voice control and obstacle detection, the system enhances independence, safety, and accessibility for physically challenged individuals, contributing to inclusive and smart healthcare solutions.



**Bharanidharan M(VTU12348)**

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# Alumni Spotlight

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.

-Bhargavi B

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# Gallery

