



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



JUNE 2021
VOLUME I

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

This magazine emerges as a record of experiences, accomplishments, and lessons learned. Carefully curated with dedication and creativity, this edition captures the essence of our department's journey—one marked by continuous learning, innovation, and resilience. The magazine brings together student achievements, technical explorations, and creative endeavors that highlight the multifaceted nature of our academic environment. May this magazine serve as a source of motivation, pride, and lasting memories.

HAPPY READING !

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DEAN'S Desk



It gives me immense pleasure to present BIOVERSE – Innovating the Future of Life and Medicine, reflecting the growth and achievements of the Department of Biomedical Engineering. It gives me immense pleasure to present BIOVERSE – Innovating the Future of Life and Medicine, reflecting the growth and achievements of the Department of Biomedical Engineering.

The initiatives featured in this magazine, including wearable biosensors for remote health monitoring and low-cost ventilators, demonstrate our dedication to addressing real-world medical challenges. With a strong foundation in core concepts, hands-on laboratory training, multidisciplinary research, and emerging areas such as medical imaging, biomedical signal processing, and artificial intelligence in healthcare, our students are well-prepared to meet global standards.

This edition also highlights alumni experiences and departmental milestones, strengthening collaboration within our academic community. I commend the editorial team, faculty, and students for their efforts and wish BIOVERSE continued success in advancing healthcare technology.

Dean

School of Electrical and Communication

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

Prof. Dr. Jaisankar

Dean- School of Electrical & Communication

HoD'S Reflection



It is with great pride that I present this edition of BIOVERSE, reflecting the achievements, growth, and aspirations of the Department of Biomedical Engineering. Our department is committed to bridging engineering principles with medical and biological sciences to create meaningful healthcare solutions.

Through strong academic foundations, hands-on laboratory training, and research-driven learning, we aim to nurture competent and socially responsible biomedical engineers.

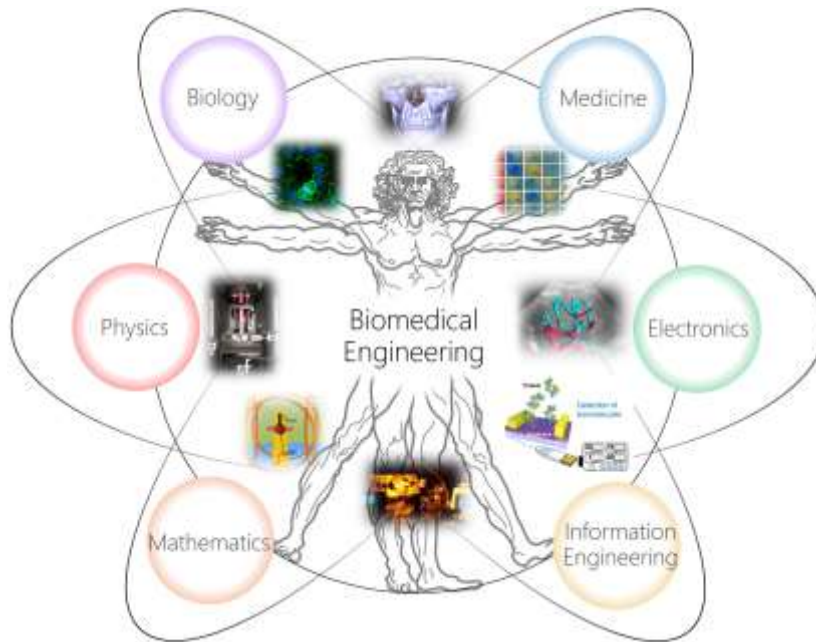
The contributions highlighted in this magazine, including emerging trends in wearable biosensors, low-cost ventilator development, student projects, and alumni achievements, showcase the innovative spirit of our students and faculty. We continuously strive to create an environment that promotes critical thinking, interdisciplinary collaboration, and technological advancement.

I appreciate the dedicated efforts of the editorial team and faculty members in bringing out this publication. May this magazine inspire our students to explore, innovate, and contribute positively to the evolving world of healthcare technology.

Head of the Department
Department of Biomedical Engineering

Prof. Dr. N M Masoodhu Banu

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- Low Cost Ventilator



In response to the urgent demand for life-saving medical equipment during the COVID-19 crisis, Biomedical Engineers worldwide focused on developing low-cost and rapidly deployable ventilators. June 2021 marked significant progress in the design of simplified ventilator systems that could be manufactured quickly while maintaining essential safety standards.

Researchers and engineering teams collaborated with clinicians to ensure that these devices met practical clinical requirements. Emphasis was placed on reliability, ease of use, and affordability, making ventilators accessible to resource-limited regions. Many designs incorporated open-source hardware concepts to accelerate global adoption.

These innovations demonstrated how engineering solutions could directly address critical healthcare shortages. Beyond the pandemic, the development of cost-effective ventilators opened new possibilities for emergency preparedness and rural healthcare systems.

This trend reinforced the role of Biomedical Engineering as a discipline capable of responding swiftly and responsibly to real-world medical challenges.

News in Trend-Wearable Biosensors for Remote Health Monitoring

The year 2021 saw a surge in the development of wearable biosensors designed for continuous health monitoring. With hospitals under immense pressure, remote patient monitoring became essential, and Biomedical Engineering played a key role in enabling this transition. Wearable devices capable of tracking vital signs such as heart rate, oxygen saturation, body temperature, and respiratory rate gained widespread attention.

Researchers focused on improving sensor accuracy, comfort, and real-time data transmission. These devices allowed clinicians to remotely monitor patients recovering at home, reducing hospital admissions while ensuring timely medical intervention. Wearable biosensors also empowered individuals to actively participate in managing their own health.

Such systems proved especially useful during the pandemic, where early detection of symptoms like oxygen level drops could prevent severe complications. Data collected from wearables was often integrated with mobile applications and cloud platforms, enabling continuous analysis and alerts.

The rapid advancement of wearable health technology in 2021 highlighted the growing importance of Biomedical Engineering in personalized and preventive healthcare.

E Susmitha(VTU9290)

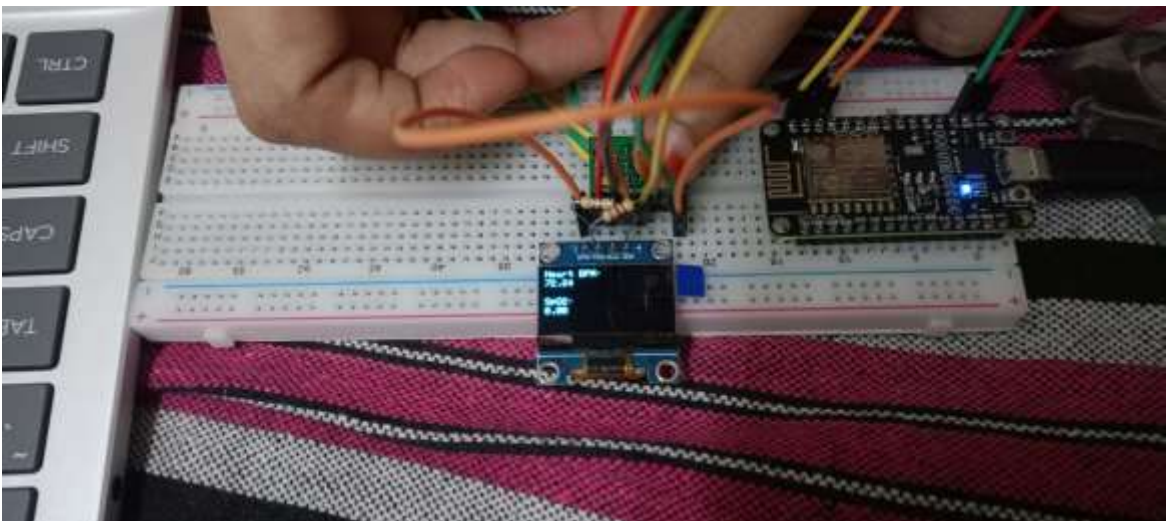
Best Project

Real -Time Oxygen Saturation Monitoring VIA IOT

The Real-Time Oxygen Saturation Monitoring via IoT system is designed to continuously measure and monitor a patient's oxygen saturation (SpO_2) and heart rate, and transmit the collected data to a cloud platform for remote access and analysis. Oxygen saturation is a vital physiological parameter that indicates the percentage of oxygen-bound hemoglobin present in the blood. Maintaining normal oxygen levels is essential for proper functioning of body organs, and a sudden decrease in SpO_2 can lead to a serious medical condition called hypoxemia. Patients suffering from respiratory disorders such as asthma, chronic obstructive pulmonary disease (COPD), pneumonia, and post-COVID complications require continuous monitoring of oxygen levels. Conventional pulse oximeters provide accurate readings but are limited to short-term measurements and do not support remote monitoring or long-term data storage. To overcome these limitations, the proposed system integrates a MAX30100 or MAX30102 pulse oximeter sensor with an ESP8266 NodeMCU microcontroller and IoT cloud technology. The sensor operates on the principle of photoplethysmography (PPG), where red and infrared light are passed through the fingertip to measure variations in blood volume. Based on the difference in light absorption between oxygenated and deoxygenated hemoglobin, the sensor calculates SpO_2 and pulse rate. The raw data is processed by the ESP8266, which computes accurate values using embedded algorithms. The microcontroller's built-in Wi-Fi module enables real-time wireless transmission of the processed data to cloud platforms such as Blynk or ThingSpeak.

Best Project

The measured values are displayed locally on a 0.96-inch OLED screen and simultaneously uploaded to the cloud for remote visualization through mobile or web dashboards. The system also generates automatic alerts when oxygen levels fall below a predefined threshold, ensuring timely medical attention. Experimental results show that the device provides reliable readings with minimal deviation compared to standard clinical pulse oximeters. The system is low-cost, portable, energy-efficient, and suitable for home-based monitoring and telemedicine applications, improving accessibility and quality of healthcare services.



B Bhargavi (VTU9336)

Gallery

