



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

**School of
Electrical &
Communication**

**Department of
Biomedical
Engineering**

SYMBIOSIS

A BIOMED COLLAB NEWSLETTER

AY: 2021-2022

3rd Edition

Department of Biomedical Engineering

Vel Tech is one of the few Institutes offering Biomedical Engineering in Tamil Nadu, with an immense aim of providing a different learning environment to inculcate out-of-box thinking. The department of Biomedical Engineering was established in 2017 under the school of Electrical and Communication with an aim to connect engineering and biology. True to its mission, the department is propelling itself to become a major educator in biomedical instrumentation and allied engineering by employing diverse workforce. The department has raised to the standards of world class laboratories by setting up Brain Computer Interface (BCI) from open BCI. The department has introduced a major pedagogical shift by incorporating integrated lab courses in curriculum with the motive of giving learn-by-doing experience to the students.

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

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

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Editor's Desk

I would like to open up the 3rd annual newsletter of the Department of Biomedical Engineering - SYMBIOSIS, 3rd Ed, with two major quotes of Dr. A. P. J. Abdul Kalam (Scientist and 11th President of India):

- ❖ “*You have to dream before your dreams can come true.*”
- ❖ “*My message, especially to young people is to have courage to think differently, courage to invent, to travel the unexplored path, courage to discover the impossible and to conquer the problems and succeed. These are great qualities that they must work towards. This is my message to the young people.*”

The COVID pandemic situations have surpassed the global scenario. The education fraternity including faculties and students have re-entered into the physical class rooms and getting ready to “dream”, “think”, “travel”, “discover” and “work” for making a better future. In the SYMBIOSIS, 3rd Ed., the following varieties are included: message from HoD's, Talk-of-The-Town from Faculty's Desk, Cites on the Department of BME and its Faculties and Students, and also Think-Pieces from the Students. In the next edition of SYMBIOSIS, we once again will come up with a whole set of distinct flavours, achievements and creativities.

Faculty Editor - Dr. K. Ganeshlenin, PhD

Assistant Professor (TTS2843)

Student Editors – Abimanyu. J (vtu12390) & A Chitra (vtu15544)

HoD's Desk

I am glad to signify that with the beginning of this academic year 2021, department of Biomedical Engineering at Vel Tech is completing 4 years and one batch has gone out and it is an ecstatic moment for us. It is an amazing fact which shows we are growing. We established our Brain Computer Interface laboratory, Digital Signal Processing laboratory and much more. I am happy to see our second batch students doing their project more vigorously following their senior's footstep. Students and faculty working together as a family, they continuously excel in all the activities whether it is organized or attended events. I wish the best for all our staff and students who restate their mission at delivering the best in academic and extra-curricular fields. Also, I whole heartedly congratulate the editorial team in bringing up this new letter every year as a matter of course.

Dr. N. M. Masoodhu Banu, PhD

Professor & HoD.

Faculty's Desk

“Talk-of-The-Town”

Nanotechnology

Nanotechnology or nanoscience is a field in engineering or science, which usually investigates the objects (particles/structures) or phenomena (physical/chemical) happening at the nanoscale. Usually, nanoscale ranges from 1 to 100 nanometres (nm), where 1 nm is equal to 10^{-9} metres.

Earlier History

“Completely Unknowing” (May be)

- 600 BC in Ancient India - Carbon Nanotubes (CNTs) & Cementite Nanowires in Wootz Steel
- 4 AD in Rome - Lycurgus Cup - Dichroic glass made from nano-colloidal metals (gold and silver)
- 6-15 AD in Europe – Glass windows stained with nanoparticles of gold and other metal oxides
- 9-17 AD in Islamic world - Ceramic glazes coated with nanoparticles of metals - silver & copper
- 13-18 AD in Damascus – Saber blades possessing CNTs and Cementite Nanowires

Modern History

“Slightly Unknowing”

- 1857 – Discovery of colloidal “ruby” gold by Michael Faraday
- 1936 – Invention of field emission microscope by Erwin Müller
- 1947 – Discovery of semiconductor transistor at Bell Labs
- 1950 – Development of theory/process to grow colloids in a monodispersed manner
- 1956 – Coinage of term “molecular engineering” - applied to di-/ferro-/piezo- electrics
- 1958 – Design and construction of *Nobel prize* worthy “Integrated circuits” by Jack Kilby

“Get-to-Knowing”

- 1958 – “There's Plenty of Room at the Bottom” by Richard Feynman
- 1974 – Coinage of term “Nanotechnology” by Norio Taniguchi
- 1981 – Invention of scanning tunneling microscope by Binnig and Rohrer
- 1981 – Discovery of nanocrystalline, semiconducting quantum dots (QDs) by Alexei Ekimov
- 1985 – Discovery of buckminsterfullerene (i.e., bucky ball) by Smalley et al.
- 1986 – Invention of atomic force microscope by Binnig et al.
- 1989 – Manipulation of 35 individual xenon atoms to write “IBM” logo.
- 1990 – Beginning of operation of some nanotechnology companies
- 1992 – Discovery of nanostructured catalytic materials
- 1993 – Invention of a method to synthesize QDs nanocrystals in a controllable manner
- 1999 – Assembling of a molecule using a scanning tunneling microscope
- 1999 – Invention of “Dip Pen Nanolithography” by Chad Mirkin
- Early 2000's – Development of consumer products based on nanotechnology

Interesting Nanotechnological Developments for Biomedical Applications

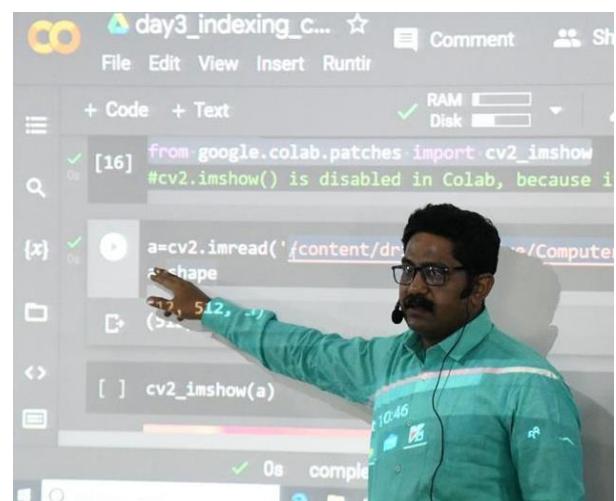
Nanomaterials and nanoparticles, which are particles in the nanometer regime, have gained enormous interests in biomedical applications. For instance, iron oxide nanoparticles exhibit superparamagnetic characteristics at sizes below 20 nm, which is useful in creating contrast effects in magnetic resonance imaging and in creating intrinsic heat to treat deeply seated tumors through magnetic fluid hyperthermia. Similarly, gold nanoparticles are capable of generating heat on exposure to the light via surface plasmon resonance phenomena, which is useful in cancer therapies – i.e., photothermal therapy. Micro/Nanobubbles, on exposure to the ultrasound, tend to deliver the chemotherapeutic drugs to the cancer sites. Apart from cancers, the nanoparticles are also useful in the treatment of brain diseases like Alzheimer's and Parkinson diseases, tissue engineering and regeneration, organ transplant and so on.

Dr. K. Ganeshlenin, PhD

Assistant Professor.

Department Cites

- The Department of BME has organized the following during the academic year 2021-2022:
 - ❖ A webinar on “Health-Care Devices” (28th August 2021) by Dr. Ajitkumar G. Patil, Ph.D, Head, Department of Medical Electronics, SBMP, Mumbai
 - ❖ A 4-days Faculty Development Program (FDP) cum Student Workshop (21st – 24th March, 2022) on “Biomedical Signal Analysis and Artificial Intelligence” by Dr. S. Mahesh Anand, AI & ML Consultant and Corporate Trainer, Founder – Scientific Computing Solutions



- ❖ A 6-days Hospital visit (21st - 26th March, 2022) to Rela Hospital (Dr. Rela Institute & Medical Centre - An International Medical Facility), Chromepet



- ❖ A One-day Intra-University Eye-Camp along with Dr. Agarwal's Eye Hospital on World Health Day (7th April, 2022)





Faculty Cites

Research Activities:

A. Research Articles

- The faculties in the Department of BME have published articles in national/international journals/conferences, whose details are given below.

Authors	Title	Name of the Journal/Conference	Year of Publication
Dr. Masoodhu Banu	Gaming Pedagogy for Effective Learning in Engineering College	Journal of Engineering Education Transformation	2022
	Internet of Things based Fall Predication and Alerting Device	2022 International Conference on Communication, Computing and Internet of Things (IC3IoT)	2022
	Swift and Secure Medical Data Transaction	Advances in Distributed Computing and Machine Learning: Proceedings of ICADCML 2022	2022
Dr. Thiyam Deepa Beta	Signal Processing for hybrid BCI	Journal of Physics: Conference Series	2022
	Automatic control of Blood pressure for rectifying Hyper and Hypertension using music therapy	Proceedings of the 3rd International Conference on Inventive Research in Computing Applications	2021
Dr. K. Ganeshlenin Kandasamy	Rod-shaped ZnO nanoparticles: synthesis, comparison and in vitro evaluation of their apoptotic activity in lung cancer cells	Chemical Papers, Springer	2021
Dr. A.	Internet of Things	2022 International	2022

Paramasivam	based Predication Alerting Device	Fall and	Conference on Communication, Computing and Internet of Things (IC3IoT)	
	Analysis of Deep Learning Algorithms for Intelligent Plant Disease Identification	for	2022 Second International Conference on Artificial Intelligence and Smart Energy (ICAIS)	2022
Dr. G. Saranya	Complex Contourlet Transform Domain Based Image Compression		5th World Conference on Smart Trends in systems, security, and sustainability (worlds4 2021)	2022
Mrs. Shelishiyah R	Signal Processing for hybrid BCI		Journal of Physics: Conference Series	2022
Mrs. Dhana sony	IOT based Infant Healthcare Monitoring System		Journal of Physics: Conference Series	2021
Ms. S. Vennila Preethi	Design of Smart Therapeutic Device for Insomnia			2022

C. Invited Talks

- The faculties in the Department of BME have given invited talks in other institutions, whose details are given below.

Name of the faculty	Name of the Institution in which lecture delivered	Topic & Date
Dhana Sony. J	Loyola Institute of Technology and Science	Li-Fi Technology & 21/11/2021
N. M. Masoodhu Banu	Vel Tech High Tech Engineering College	8051 and ARDUINO Micro controller & 8/12/2021

D. Faculty Development Program

- The faculties in the Department of BME have attended Faculty Development Program (FDP), whose details are given below.

S. No	Name of the Faculty	Name of FDP	Date of FDP	Institution
1	Dr. K. Ganeshlenin	Smart Materials For Medical Technology	17th - 22nd January 2022	SRM Institute of Science and Technology, Kattankulathur
2	Mrs. S. Hema	Fuzzy Logic and Neural Networks	Feb-Apr 2022	NPTEL Online Course, IIT Madras
		Fuzzy Sets Logic, Systems and Applications	Feb-Apr 2022	NPTEL Online Course, IIT Madras
3	Dr. Thiyam Deepa Beeta	Data Science with Python	31st Jan- 4th Feb 2022	Boston Training Academy
		Applications in Medical Imaging and Signal Processing	14th – 16th July 2021	B.V. Raju Institute of Technology, Hyderabad
4	Dr. Saranya G	Emerging Applications in Image Processing	1st - 5th March 2022	Rajalakshmi Institute of Technology, Chennai
		Workshop on Artificial Intelligence and Machine Learning Application in Healthcare	16th - 17th September 2021	SRM Institute of Science and Technology, Kattankulathur
		Applications in Medical Imaging and Signal Processing	14th - 16th July 2021	B.V. Raju Institute of Technology, Hyderabad
5	Mrs. Premalatha P	Emerging Applications in Image Processing	1st - 5th March 2022	Rajalakshmi Institute of Technology, Chennai
6	Mrs. Dhana Sony. J	Applications in Medical Imaging and Signal Processing	14th - 16th July 2021	B.V. Raju Institute of Technology, Hyderabad

Student Cites

- Details of the 2018-2022 batch students who have done their minor and major project works in industries and abroad universities (in collaboration) are given below.

S. No	Name of the Student(s)	Name of the Industry (Project Title)	Minor/Major Date
1	M.J.Ahamed Fathima Firdouse, M. Sabitha Prabha, and Dapheinkiru Dkhar	Medcuore Medical Solutions (Asthma Detection Using Co sensor)	Minor September - December 2021
2	P.Pavithra, Ragavi.M.S , and Priyanka M	Medcuore Medical Solutions (Automatic segmentation of liver tumors using 2D U-Net Architecture)	
3	Praveen Kumar M	Medcuore Medical Solutions (Design and analysis of knee implant)	
4	M.J.Ahamed Fathima Firdouse, M. Sabitha Prabha, and Dapheinkiru Dkhar	Medcuore Medical Solutions (Remote infusion monitoring system)	Major Jan - May 2022
5	P Pavithra, M Priyanka and Vidhyadarshini R	Medcuore Medical Solutions (Diagnosis of pulmonary disease with lung sounds using CNN)	
6	M Praveen Kumar, M S Raghavi and Rajasekar V	Medcuore Medical Solutions (Design and analysis of knee implant)	
7	Sri Reka TM, Poonguzhali E and Rekha R	Rapid Solutions (Non-Invasive Identification of blood glucose)	
8	R Balakrishnah, Sweta Jha and Perumal D	North Carolina A&T State University, USA (Designing and Testing of a Human Lung-on-Chip)	

Details of the 2018-2022 batch students who have attended conferences are given below.

- One of the 2018-2022 batch students, Mr. S. Boopathi has presented a project entitled “Wearable Pregnancy Monitoring Kit” under the theme Life-On-Land, which has won 3rd Prize in 12th International Project Competition (VISAI 2022) - held on 24th February, 2022 – organized by Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology
- Three of the 2018-2022 batch students, R Balakrishnah, Sweta Jha and Perumal D have received their international project internship entitled “Designing and Testing of a Human Lung-on-Chip” under the guidance of Prof. Arvind Chandrasekaran (external guide), from North Carolina A&T State University, USA and Prof. Dr. Thiyyam Deepa Beeta (as internal guide)

- One of the 2018-2022 Batch students, Swetha Jha has received her international admission for Masters in Yuan Ze University, Taiwan for Fall Semester under the Department of Electrical Engineering with monthly stipend of NT\$6000.



- Details of the 2018-2022 batch students who have received placements are given below, where the highest package of above 4.5 LPA is obtained.

S.No	VTU Number	Name of the Student	Name of Company Placed/Accepted
1	VTU 11159	Pavithra P	Cognizant Technology Solutions
2	VTU 11439	Karthick.K	Ava Software Pvt Ltd
3	VTU 11282	Jeffery Calwin J	Cognizant Technology Solutions
4	VTU 12881	Priyadharshini. R	Cognizant Technology Solutions
5	VTU 12891	Subhiksha masilamani	Accenture
6	VTU 13131	Robert Aravindh R	Keyence India Pvt Ltd
7	VTU 11643	Bargavi S	DXC TECHNOLOGY
8	VTU 11762	M.J.Ahamed Fathima Firdouse	DXC TECHNOLOGY
9	VTU 12277	M.Sabitha Prabha	DXC TECHNOLOGY
10	VTU 11351	Priyanka M	Flatirons Solutions
11	VTU11791	Perumal D	ZELFSTUDIE
12	VTU11230	Sarathraj R	CSS Corp
13	VTU13136	Ragavi.M.S	Shree Imaging Technology Pvt ltd
14	VTU11195	R.Balakrishnah	Shree Imaging Technology Pvt ltd
15	VTU11358	S.Boopathi	AKAS Medical Equipment
16	VTU11688	Sri Rekha T M	AKAS Medical Equipment
17	VTU12264	Rajasekar .V	Biometric Cables
18	VTU12348	Bharanidharan. M	Phoenix Medical Systems
19	VTU13142	M Praveen Kumar	Regional Medical Research Centre, ICMR

Student's Think-Piece

BIOMED-POEM

The eyes that seek to see the sick,
The ears that seek to hear the lub-dub rhythm,
The hands that seek to feel a fragile pulse,
The shoulder that seek to lean for the patients,
The lungs that seek to gust the breath of the life,
The mind that shares equal amount of medicine and engineering,
The parts that come together to form a Biomedical Engineer.

Abimanyu. J (vtu12390)
Peta Sandhya (vtu15542)

BIOMED-FACTS

Do you know?

➤ Father of Bio Medical Engineering in India?

SUJOY KUMAR GUHA. He is an Indian bio medical engineer, who was born in Patna India in 20 June 1940

➤ The first equipment invented?

STETHOSCOPE. Rene Laennec, a French surgeon is credited with creating the first stethoscope in 1816.

BIOMED LATEST INVENTIONS

- A biomaterial infused into the blood stream repairs the inflamed tissues (2023 Jan)
- prostate-specific membrane antigen positron (PSMA)-targeted therapy
- mRNA based vaccines
- Rapid prototyping for high-pressure microfluidics

A Chitra (vtu15544)
P Bhuvaneshwari (vtu15586)

My Journey – A Student Talk

I'm grateful for this unique opportunity to introduce myself. I'm Sweta Jha from Nepal. Currently, Now, I'm a graduate student at Yuan Ze University, Taiwan. I would like to share my undergraduate experiences at Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology. It was a privilege to study Biomedical Engineering (BME) at Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, where I was able to grow and develop. Studying Biomedical Engineering was a wonderful experience and a memory that will be cherished for a lifetime. I had opportunities to learn through extensive exposure to the field, and the faculty and the department made every effort to shape my future. The curriculum issued by the department includes the necessary goals, methods, materials, and assessments in order to enhance student learning and facilitate instruction. BME is an interdisciplinary course that relates medicine with engineering to help in inventing, manufacturing, and maintaining medical devices and I study key courses like human anatomy and physiology, image processing, microprocessor and microcontroller, control system, and brain-computer interface, etc. that made me skillful in the required field. In addition to the academic curriculum, I had the chance to participate in various field and hospital visits during my undergraduate studies. These visits helped me to deepen my knowledge and understanding of real-world applications. As we know, practical knowledge is more important than theoretical knowledge. I was more curious to perform experiments in the laboratory because of the specially designed, equipped laboratory and staff to initiate and guide. I want to express my sincere gratitude, love and devotion to the entire faculty members and department. It's their efforts that make me count myself into a better destination.

Sweta Jha.

Alumni (2022 Batch Passed Out) - Biomedical Engineering.