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: 2020-2021

2nd Edition

Department of Biomedical Engineering

Vel Tech University 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 of Engineering 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

The editor takes an enormous pleasure in bringing in the 2nd annual newsletter of the Department of BME, SYMBIOSIS, *2nd Ed*.

Though COVID pandemic situations have shaken the rock-bottom of the world, learning and education processes continue to exist and excel, but only through a different mode of communication, "online". Let's start this edition with a famous quote by one of the greatest 21st century intellectuals, *Albert Einstein*

"Education is not the learning of facts, but the training of minds to think"

True to the essence of above words, the Department of BME continues to train the modern minds for better future.

In the SYMBIOSIS, *2nd Ed.*, different varieties are including, which are as follows: solicitous 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 next edition of SYMBIOSIS, we will come back with a different set of flavours, achievements and creativities. We thank the management for their avid support and the enthusiastic readers of the SYMBIOSIS.

Faculty Editor - Dr. K. Ganeshlenin, PhD

Assistant Professor (TTS2843)

Student Editors –Lawanbha Lyngdoh (VTU11962) &

Roiky Suchiang(VTU11958).

HoD's Desk

Every year, SYMBIOSIS cuts through the technical jargon to give you plain-English highlights of the latest technical trends and developments in the field of Biomedical Engineering.

I am so happy and privileged that this happened even amidst covid this academic year. The department always provides a conducive environment for student's holistic development in every way whether it is academic program or extracurricular activities.

This issue carries out the lively articles and/or reviews from faculties and/or students, the events organized in the Biomedical Engineering Department from during the academic year 2020-2021.

I hope that the students and faculties will continue to give their support by contributing creative ideas and current trends in Biomedical Engineering.

I congratulate all the contributors and editorial board for bringing out such an outstanding newsletter. I wish all the best for bringing up more laurels in coming years

Dr. N. M. Masoodhu Banu, PhD

Professor.

Faculty's Desk

"Talk-of-The-Town"

Continuous Health Monitoring Systems

Patient Health Monitoring (PHM) involves in the development of the assisting tool for the hospitals to support; (i) well-organized screening, (ii) disease diagnosis, (iii) treatment scheduling, (iv) pre-surgical and post-surgical monitoring, and (v) recovery observation. PHM systems normally consider the essential information, such as medical images and bio-signals recorded using clinical aids in a controlled or uncontrolled environment, are utilized by the doctor to examine and to take decision regarding the treatment process to be implemented.

In earlier days, the diseases were diagnosed based on the expertise of the doctor and based on his opinion; the possible treatment procedure was implemented to treat the disease. The conventional procedure requires a direct link among the patient and doctor, which occasionally may cause a delay in the treatment process and recovery observation. To overcome this shortcoming, Remote Health Monitoring (RHM) system are developed and implemented considering all the possible modern tools to maintain efficient integration between the patient and doctor. Due to its economical and clinical significance, considerable RHM approaches have been developed and implemented in recent years.

Digestive disorders are common among the aged people irrespective of the gender, and it requires proper screening and treatment procedures. Initial treatment procedure is to be carried in the hospitals under the direction of an experienced doctor and the developed RHM system can be considered to supervise the patient during recovery observation.

Most of the recent RHM devices are constructed with modern communication platform called as the Internet of Things (IoT). IoT helps to establish proficient link between a network of sensors to support communication and exchange of data through the Internet with wired/wireless link. The IoT has also gained importance in various fields such as RHM using biosensors, smart cities, intelligent systems, environmental monitoring, and surveillance security systems. Sometimes, the patients who have undergone surgery may feel healthy and are not able to feel or realize the internal health disorders, resulting in severe consequences. Therefore, it is necessary to monitor patients health continuously even after surgery for a period of time.

With the greater advancements in recent technologies such as IoT and Wireless Sensor Networks (WSN), it is possible to monitor patient's health using RHM systems and to make decision using portable and cheaper health monitoring devices. The IoT overcomes the distance restriction resulting in monitoring the patient's health by the Doctor or Surgeon even at the other end of the world and the only constraint is that the patient should have internet facility in his/her residence.

Dr. A. Paramasivam, PhD

Assistant Professor.

Department Cites

- The Department of BME has organized three webinars by inviting the scientists and industry personnel, whose information is given below
  - Webinar on "Optical Coherence Tomography" by Ms. Shiny Ayubrahiman, Business Development Manager, Najmat Burgan Co., Kuwait - 18.6.2021
  - Webinar on "Career Opportunities for Biomedical Engineers" by Mr. Nitturi Naresh Kumar, Scientist – D, Andhra Pradesh Med Tech Zone, AMTZ Campus, Near Pragati Maidan, Visakhapatnam, Andhra Pradesh - 19.6.2021
  - Webinar on "Marketing Opportunities after Biomedical Engineering" by Mr. Parameswaran Subramanian, Regional Business Director, South Asia, RaySearch Laboratories - 18.7.2021
- The Department of BME has organized a 6-days faculty development program (FDP) on "Recent Trends in Biomedical Engineering" from 07.01.2021-12.01.2021 by using the expertise of its workforce and outside industrial/academic experts, whose details are given below.

Day 1: Mr. KNT Karunagaran, R&D Engineer, Kody Medical Electronics Pvt Ltd, Chennai

Day 2: Ms. Marilyn William, Business Development Manager, Echosens, Cochin

Day 3: Dr. K. Ganeshlenin, Assistant Professor, Vel Tech, Chennai

Day 4: Dr. Arun K M, ICMR SRF, Dept. of IS and IR, SCTIMST, Trivandrum

Day 5: Dr. Saranya. G, Assistant Professor, Vel Tech, Chennai

Day 6:Dr. Masoodhu Banu. N.M HOD, Professor, Vel Tech, Chennai

Faculty Cites

Research Activities:

A. Funded Projects

- The faculties in the Department of BME have obtained funded projects, whose details are given below.
    - Dr. A. Gowri under the title "Development of a highly sensitive technique for specific detection of pesticidal residues and heavy metals in crude herbal drugs and herbal products"

B. Research Articles

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

S. No	Author and Title	Name of the Journal/Conference	Year of Publication
1	T.Sujithra, N.M.Masoodhu Banu, A.Merline, PO Assessment and Attainment through POGIL Based Classes.	Journal of Engineering Education Transformation	2020
2	Prasanna Ram, NM Masoodhu Banu, R Rachel Jeeva Light, Multilayer screen printed flexible graphene antenna for ISM band applications and energy harvesting	Materials Today: Proceedings	2021
4	NM Masoodhu Banu, T Sujithra, Sunaina Maryam Cherian, Performance comparison of BCI speller stimuli design	Materials Today: Proceedings	2021

3	C. Jim Elliot, V Gayathry, A Pannertamil, Deepa Beeta Thiyam, Ponmozhi Chezhiyan, M. Benisha, M. Anisha, R Thandaiah Prabu, Customized Knee Brace for Osteoarthritis Patient Using 3D Printing A Customized Knee Brace Using 3D Printing: A Customized Knee Brace Using 3D Printing.	Third International Conference on Intelligent Communication Technologies and Virtual Mobile Networks (ICICV))	2021
4	K. Ponmozhi, M. Anisha, Thiyam Deepa Beeta, J. Palani Meera, Asana posture correction using centre of gravity calculated using skeletal information	Materials Today Proceedings	2021
5	Ganeshlenin Kandasamy, Atul Sudame, Deepak Singh, C.V. Tomy , Dipak Maity, Symbiotic thermo-chemotherapy for enhanced HepG2 cancer treatment via magneto-drugs encapsulated polymeric nanocarriers	Colloids and Surfaces A: Physicochemical and Engineering Aspects	2020
6	Ganeshlenin Kandasamy, Dipak Maity, Multifunctional theranostic nanoparticles for biomedical cancer treatments - A comprehensive review	Materials Science and Engineering: C	2021
7	Shelishiyah Raymond, Edagottu Susmitha, Lasgnewhun Mawblei, Minhajul Ahmed, Automatic Anesthesia Control system	2021 Seventh International Conference on Biosignals, Images and Instrumentation	2021

8	Steeve Shibu Chempolil; Renie Melvinia Basaiawmoit; Sneha Saji; Karthik Raj V, Design of a Medical Prototype Robot for Nurse Assistance	Seventh International conference on Bio Signals, Images and Instrumentation 2021	2021
9	Karthik Raj. V, Tushar Sankaran J, Soumya Samantaray, Sayan Chakraborty, Srishti Saxena, Design of a Wireless Single Arm Electrocardiograph System	Biomedical & Pharmacology Journal	2021
10	Annasamy Gowri ,Themmila Khamrang . Marappan Velusamy .Murugavel Kathiresan .Madhu Deepan Kumar Madhavan Jaccob .Arunkumar Kathiravan,, Pyrene based chemosensor for carbon dioxide gas – Meticulous investigations and digital image based RGB analysis	Sensors And Actuators Report	2020
11	Anantha Christu Raj, J Samson Isaac, Ramesh Kumar, Dhana Sony, S Prabakar, Green Transportation Technology Based on Ergonomic Posture Monitoring for Enhanced Driver safety system	Journal of Green Engineering	2020
12	Ms. Dhana Sony, J Samson Isaac, N. Ezhilarasi and V. Jayanth, IOT Based Infant Healthcare monitoring system	Journal of Physics: Conference Series	2021
13	S Vennila Preethi, Sunaina M Cherian, Two layer model to simulate trans dermal drug delivery for skin psoriasis	International Journal of Pharmaceutical Sciences And Research	2021

C. Invited Talks

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

S. No.	Name of the faculty	Name of the Institution in which lecture delivered	Topic & Date
1	Dr. N.M. Masoodhu Banu	Sethu institute of technology	Smart sustainable farming an IoT perspective , six days short term training program under AICTE & 21/05/2021
2	Dr. N.M. Masoodhu Banu	K.L.N college of Engineering Sivagangai	DSP programming and applications Anna University sponsored FDP & 03/06/2021
3	Dr. Thiyam Deepa Beeta	Women's Christian College, Chennai	Brain Waves: origin and its Application in Brain Computer Interfacing & 25/7/2020
4	Dr. Thiyam Deepa Beeta	Kalasalingam Academy of Research and Education	Challenges in Signal Processing Approaches for MI based BCI & 13/01/2021

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. Thiyam Deepabeeta	Health Care And Clinical Research	4/6/2020 - 10/6/2020	Sathyabama Institute Of Science And Technology
		Get Ready For Ai With Matlab And Simulink	18/6/2020 - 20/6/2020	Sai Ram Engineering College

		Emerging Techniques In Biomedical Instrumentation-Etbi-2021	28/6/ 2021 - 3/7/ 2021	Koneru Lakshmaiah Education Foundation
		Applications In Medical Image And Signal Processing	14/07/2021 - 16/7/2021	B. V. Raju Institute Of Technology
2	Dr. G Saranya	Health Care And Clinical Research	4/6/2020 - 10/6/2020	Sathyabama Institute Of Science And Technology
		Get Ready For Ai With Matlab And Simulink	18/6/2020 - 20/6/2020	Sai Ram Engineering College
		Machine Learning Techniques For Brain Computer Interface Applications	30.07.2020 - 01.08.2020	Karunya Institute Of Technology And Science
3	Dr. K. Ganeshlenin	Advancements In Biomedical Engineering	16/7/2020 - 18/7/2020	Karpaga Vinayaga College Of Engineering And Technology
		Emerging Trends In Biomedical Engineering	10/6/2020 - 16/6/2020	Kalasalingam Academy Of Research And Education
		Advancements In Biomedical Engineering	16/7/2020 - 18/7/2020	Karpaga Vinayaga College Of Engineering And Technology
4	Ms.Shelishiyah Raymond	International Conference On Biosignals Images And Instrumentation	25/3/21 - 27/3/21	SSN College Of Engineering
	Padmanabha Sarma A	Artificial Intelligence	14/9/2020 - 18/9/2020	North Eastern Regional Institute Of Science & Technology

		Medical Image Processing And Deep Learning Technologies	21/9/2020 - 25/9/2020	Panimalar Institute Of Technology
5	V. Karthick Raj	Ai In Healthcare Sector	08/07/2020-10/07/2020	Karpaga Vinayaga College Of Engineering And Technology
		Internet Of Things For Healthcare	07/09/2020 - 12/09/2020	Dr. Mahalingam College Of Engineering And Technology
		Mems Based Sensors And Actuators For Biomedical Applications	2/11/2020 - 7/11/2020	Koneru Lakshmaiah Education Foundation
		Lab On Chip	14/12/2020 - 18/12/2020	Defence Institute Of Advanced Technology
		Wearable Devices	4/1/2021 - 8/1/2021	Vignan Institute Of Technology And Science
		Gamification	18/1/2021 - 22/1/2021	Vishawakarma Institute Of Technology
		Sensors Technology	22/2/2021 - 26/2/2021	Maharaja Ranjit Singh Punjab Technical University Bathinda
		Emerging Techniques In Biomedical Instrumentation-Etbi-2021	28/6/ 2021 - 3/7/ 2021	Koneru Lakshmaiah Education Foundation
6	Ms. Vennila Preethi. S	Advancements In Biomedical Engineering	16.07.2020-18.07.2020	Karpaga Vinayaga College Of Engineering And Technology

		Atal Fdp On Wearable Devices,	15.02.2021-19.02.2021	Cme, Anna University
		Emerging Techniques In Biomedical Instrumentation	28.06.2021-03.07.2021	Koneru Lakshmaiah Education Foundation
		Applications In Medical Image And Signal Processing	14.07.2021-16.07.2021	B.V.Raju Institute Of Technology
7	Mrs. Dhana Sony C	Recent Trends In Biomedical Application	13.07.2020 - 17.07.2020	Karunya Institute Of Technology And Sciences
		Emerging Techniques In Biomedical Instrumentation-Etbi-2021	28/6/2021 - 3/7/ 2021	Koneru Lakshmaiah Education Foundation
		Applications In Medical Image And Signal Processing	14/07/2021 - 16/7/2021	B. V. Raju Institute Of Technology

Student Cites

- One of the 2018-2022 batch students, Shrinidhi have been selected for the international project entitled "Cognitive Load and Upper Limb Prosthesis Use" in the field of kinesiology under the guidance of Prof. Usha Kuruganti, from University of New Brunswick, Canada through MITACS program

- One of the 2017-2021 Batch students, Azaharuddin Ansari, have received his international remote internship in Yuan Ze University, Taiwan under the guidance of Prof. Jonathan David White (as the external guide) and Dr. Thiyam Deepa Beeta (as the internal guide).

- Another student from 2017-2021 Batch, Sneha Saji have received her admission for Masters from University of Florida, Tampa, USA

Student's Think-Piece

BIOMEDICAL ENGINEERING QUOTES

- The benefits of biomedical progress are obvious and clear. The hazards are must less well appreciated.
- If someone asks what is the strength of a biomedical engineering?
    - I say's it's a profession that saves lives.
    - If they asks what is the weakness of biomedical engineering?
    - I say's like a profession that kills ancient
- Engineering like to solve problems. If there are no problems handily available, they will create their own problem.
- Doctor are brain of the hospital
    - Nurses are the heart of the hospital
    - Biomedical engineering are the nerves of the hospital

LAWANBHA LYNGDOH,
VTU11962

ANYTHING IS POSSIBLE

"If it aim's broke, do not fin it," a familiar expression we use to prevent others from changing the status quo. But, what if something actually breaks. Beyond repair, like a kidney or heart? An alumna of the name Sabrina, have been doing a research on various ways to repair or replace "broken" tissue or organs. Liu (Sabrina) worked with a tiny heart tissues to determine if scientists could use them as actuators, or components to power and mobilize, soft robotic devices which can mimic or imitate a person or how a person behaves mostly on living organisms. She engineered micro tissues by mixing and combining cardiac muscle cells and support cells, also known as fibre blasts, with a solution called collagen that gelled when placed in a miniature mold and heart it at body temp. After further observation, lice found that the tissues organised into functional muscle tissues that could contract and generate force. In this modern world, anything is possible if one pats into the work and may be who

knows, might be a start of another way to actually use tissues to function robots instead of simply using a CPU or a software coded with thousands of lines.

ROIKY SUCHIANG,
VTU11958

LATEST TRENDS IN BIOMEDICAL

- Wearable devices & implantable technologies range from fit bit, & direct to consumer fitness wearable, Insert able cardiac monitor, long term implant under the skin. Wearable sector in health care is estimated to be worth $ 60 billion by 2023
- Nan robotics involves creating tiny surgical robots whose components are the size of manometer. This will help to manipulate biological matter is atomic or molecular. With ability to effectively fight diseases.
- BCIs (Brain computer interfaces) are devices that enable signals from the brain to direct external activity such as moving artificial part or artificial machines.
- 3D reprinting describes use of 3D printing technology to combine cells, growth factors like protons/ hormones & bio meters is to create biomedical parts & implants which implant natural tissue characteristics.
- Artificial intelligence algorithms can offer good results in biomedical imaging methods, helping to minimise impact of imaging while maiming potent benefits. As also helps in signal and analysis.

RIDDHI KHANAL,
VTU16219

My Journey – A Student Talk

I appreciate this special opportunity to introduce myself. My name is Md. Azaharuddin Ansari. I, currently, am a graduate student in Yuan Ze University, Taiwan. I would like to share my experience gained during my bachelor degree at Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology.

As a part of my undergraduate studies, I learnt the fundamentals of biomedical engineering and developed a keen interest in Biomedical Instrumentation, Biomechanics and Medical Robotics. The undergraduate programme pursued at Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology not only gave me a certain skill set but also made me capable to further explore my field of interest and hone my academic strengths by myself. During the course, I learned more about embedded systems, artificial intelligence, bio-signal processing, rehabilitation engineering, Robotics in medicines and Engineering Mechanics. Besides building my theoretical concepts, I always enjoyed long hours in laboratories to correlate theory to practical observation. Also, working on projects throughout the academics provided a sound technical base.

Apart from academic curriculum, several field/ hospital visits were arranged during my undergrad career which helped me to enhance and explore my knowledge and understanding about real time application. Some seminars/webinars/workshops were also organized by the department of biomedical engineering where we learnt some new concepts along with real time application as well as improving our communication skills and got opportunity to made many contacts outside of the organization.

And the best part of my under-graduation career was that I found excellent faculty panel that were very kind and helpful towards students. They guided me at my highs and lows and shaped me into the student that I am now from being failure student in my intermediate to achieving scholarship for my master degree in one of the top private engineering university of Taiwan.

Azaharuddin Ansari

VTU10493.