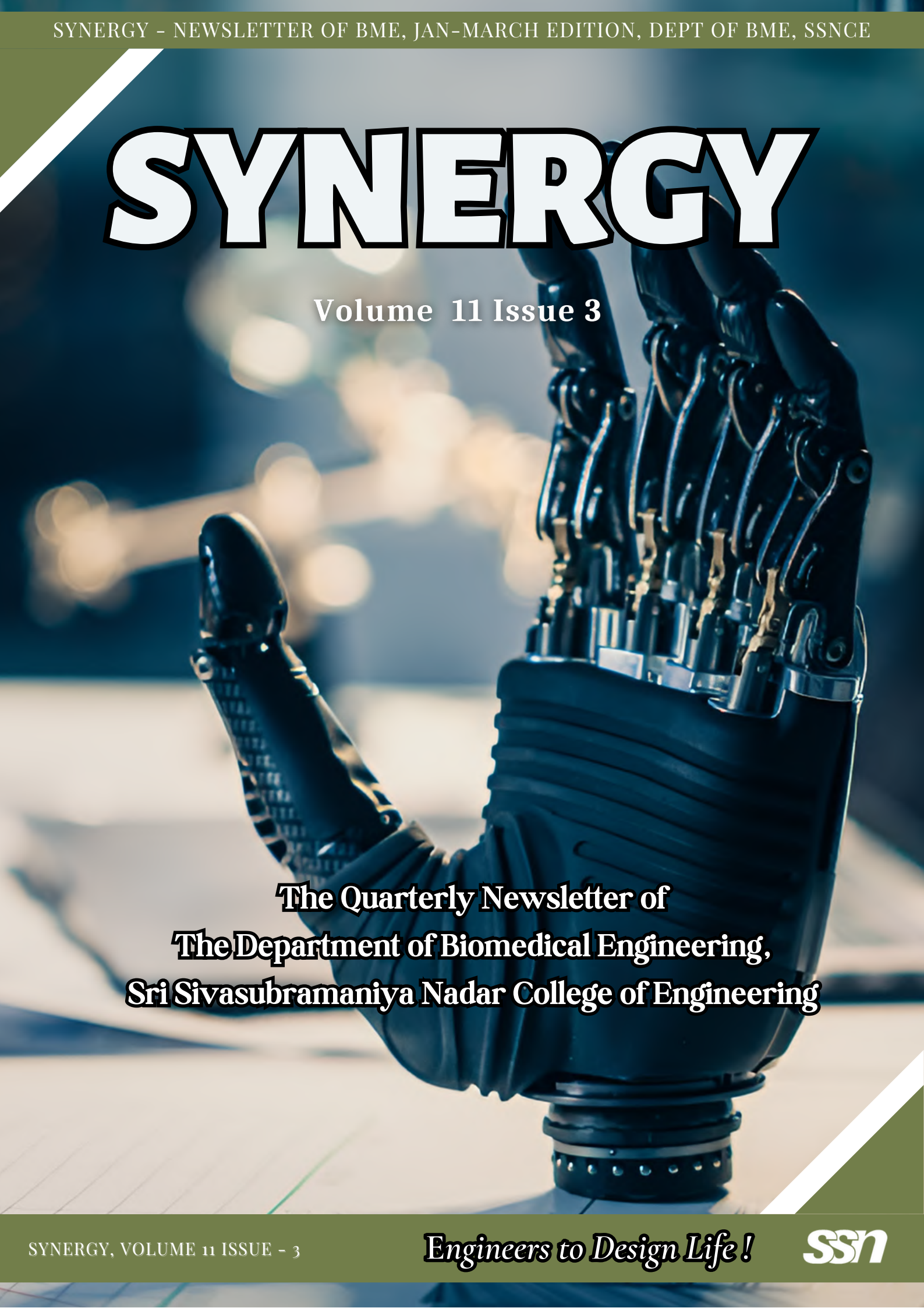
SYNERGY

Volume 11 Issue 3



The Quarterly Newsletter of
The Department of Biomedical Engineering,
Sri Sivasubramaniya Nadar College of Engineering

Engineers to Design Life !

SSN

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EDITOR'S DESK

Warm Greetings to Everyone!!!

Presenting to you the Third Issue of the Eleventh Volume of SYNERGY

In this edition of the department's newsletter, we present to you the exciting activities and achievements of our students and faculty, for the months of January to March 2023. Let us take inspiration from the work of our peers and experience the boundless world of engineering.

It has been my personal experience that the true flavour, the real fun, the continuous excitement of work lie in the process of doing it rather than having it over and done with. To return to the four basic factors that I am convinced are involved in successful outcomes:

Goal-setting

Positive thinking

Visualizing

Believing

- Dr. A. P. J. Abdul kalam

-The Editorial Board

HOD'S DESK

I am pleased to write this foreword for the January to March edition of our department's quarterly newsletter – 'SYNERGY'.

Nowhere else is synergism more relevant than it is in engineering. Collaboration and teamwork are key to growth, and the events covered in this edition reflect that maxim.

Our department's annual conference – ICBSII 2023 – was a resounding success, thanks to the dedicated efforts of the organizing committee. We have seen collaborations with various domain specialists to organize workshops and expert talks on the latest trends in tech like AR/VR and UI/UX.

I was proud to see the innumerable faculty and student ventures this time around, both individual and teamwise. From research papers to conferences, internships to more artistic pursuits, our faculty and students seem to shine in them all.

My sincere thanks to the editorial team for beautifully collating the vast number of activities from the past three months. Hopefully, we have even more to compile in the upcoming days.

And after this truly busy quarter, I am only more energized for the next!

Dr. A. Kavitha
Professor and Head,
Department of Biomedical Engineering

DEPARTMENT VENTURES

EVENTS ORGANIZED

PRECONFERENCE WORKSHOP ON AR / VR

The Pre-Conference Workshop on AR & VR was conducted by The Department of Biomedical Engineering, co-ordinated by **Dr. A. Kavitha, Dr. S. Pravin Kumar** and **Ms. B. Divya** in association with the Centre for Healthcare Technologies, on March 14 and 15, 2023. Mr.Vishnu and Mr. Easwaran, industrial experts from Machenn Innovations, were present to guide the participants through the hands-on experience. They shared their insights on the potential of AR and VR technologies and helped us understand the basic user interface of the software that we intended to use and the enormous potential of the simplest of commands we were going to implement. Almost 70 people, including staff, from different departments and colleges, participated in the event. The goal of the workshop was to give a general overview of the most **recent advancements in AR and VR technology**, as well as their application in several fields. The workshop mainly focused on explaining the basics of AR and VR and assisting us, novices in comprehending the idea.

DEPARTMENT VENTURES

EVENTS ORGANIZED

DAY 1

The instructors introduced the participants to AI, AR, and VR during the first day's opening session. They also gave the students an overview of the workshop's contents and the order in which they would be handled. Following the opening ceremony, the attendees were given instructions to proceed to the medical software lab, where the workshop picked up steam. Unity Hub was required to be installed as a pre-requisite.

So, the participants started off by developing a rudimentary understanding of game objects and game mechanics. Following that, the students got acquainted with the interface of Unity. Unity is a cross-platform game engine, gradually extended to support a variety of desktop, mobile, console and virtual reality platforms. The teachers provided them with information about the many advantages and benefits that were offered, and the participants learned to use several features, some of which includes three-dimensional space, directional light, inspection manager, action input manager, origin, and a camera offset with both left-hand and right-hand controller systems. To make a virtual item behave, more realistically, they learned how to add the collider feature and other mechanical options to a rigid body.

The various advantages of augmented reality and virtual reality were understood by the participants. They were also shown an application developed by the company. The company had developed a game for doctors to understand the most appropriate method of handling NRP or Neonatal Resuscitation Protocol. All of these applications would run on the PC and uses Oculus for display.

Having been familiarized with the application of AR and VR across several domains, the participants were asked to develop a simple solution to any problem statement of our choice. Hence, by the end of the first day, they started working on their own AR and VR projects as teams under the guidance of the instructors.

DEPARTMENT VENTURES

EVENTS ORGANIZED

DAY 2

The second day began with an informative talk on the basics of augmented reality and computer vision delivered by Dr. S. Pravin Kumar, Associate Professor, Department of Biomedical Engineering. Dr. S. Pravin Kumar defined computer vision to be the development of algorithms and mathematical models that can extract meaningful information from visual data. He also gave us insights into how computer vision could be used for object recognition and image segmentation. Several concepts related to augmented reality were discussed and the students understood the various ways by which the overlays and integration of digital information in the real world could be achieved. Primarily, this overlay could be achieved by pose estimation. Pose estimation could be marker-based or markerless. Spatial registration is used in defining the relative position of each element of a scene using a coordinate system. We were also taught about the basics of feature detection, feature matching, homography computation, and perspective transformation.

After the talk, the participants began using Vuforia and Unreal along with Unity. Vuforia is a comprehensive scalable enterprise AR platform. Unreal engine is one of the world's most advanced real-time, 3-D creation tool for photoreal visual and immersive experiences. They placed a figure into the 3-D space and gave it animations to perform.

During the second half of day two, the participants worked on the creation of meta-human using Avaturn. Avaturn is an open platform that can create a realistic 3D Avatar with a Selfie and exports it as a 3-D model. The students had a fun time, customizing the avatars according to their preferences.

DEPARTMENT VENTURES

EVENTS ORGANIZED

The following is a summary of an event report by Abdullah Sheriff, B.Tech.(AI & DS) student, SNU Chennai. To view the complete academic report with instructions to use the Unity software, click the link: AR/VR Report.

The AR/VR workshop, held at the Department of BME, SSNCE, as part of the line-up towards ICBSII 2023, was conducted by Machenn Innovations Pvt. Ltd. and the Centre for Healthcare Technologies, SSNCE. The instructors were Mr. Vishnu TU, CEO & Founder of Machenn Innovations, and Mr. Eswar RM, Product Strategist, Machenn Innovations.

Day 1 began with an introduction to XR by Dr. A. Kavitha, HOD, BME, SSNCE detailing the technologies available at the XR lab in the BME department. Mr. Vishnu introduced Machenn's work in the field while Mr. Eswar gave an in-depth look at VR, its history, and the predominant softwares. Unity was the primary software taught at the workshop due to its ease-of-use and simplicity. Advantages and disadvantages along with XR impact in the Metaverse was discussed. The basics of Unity such as starting a new project, displaying a sphere (GameObject), manipulating it, and asset handling were covered.

Day 2 began with an overview on Computer Vision based AR by Dr. S. Pravin Kumar covering its various features and development pipeline. Creating an AR overlay using Vuforia SDK, and building metahumans using Avaturn was taught hands-on.

- Abdullah Sherif

DEPARTMENT VENTURES

EVENTS ORGANIZED

The Pre-Conference Workshop turned out to be a huge success, enabling the students to hone their skills in the domains of Augmented and Virtual Reality. The treasure trove of knowledge that the professionals had truly inspired us, piquing our interest and deepening our curiosity. We received an immense amount of help from both the student coordinators and the instructors, every time we faced a minor impediment in the process. The hands-on nature of the workshop allowed the participants to genuinely benefit from the experience. Creating a Virtual Environment and developing the ability to view it from the perspective of the user was truly fascinating.

We are incredibly grateful to every single one of the student coordinators, organizers, staff members, and teachers for making this event an extremely informative and memorable experience.

-Ishwarya R
2nd year, BME

PRECONFERENCE WORKSHOP ON AR / VR -GALLERY

DEPARTMENT VENTURES

PRECONFERENCE WORKSHOP ON AR / VR -GALLERY

DEPARTMENT VENTURES

PRECONFERENCE WORKSHOP ON AR / VR -GALLERY

DEPARTMENT VENTURES

ICBSII 2023

NINTH INTERNATIONAL CONFERENCE ON BIOSIGNALS, IMAGES, AND INSTRUMENTATION

EVENTS ORGANIZED

The Department of Biomedical Engineering, SSNCE in association with the Centre for Healthcare Technologies had organized the Ninth International Conference on Biosignals, Images, and Instrumentation (ICBSII 2023) on March 16 - 17, 2023. It was a two day conference conducted in hybrid mode with offline and online participants. The Conference commenced with the Inaugural session on the 16th of March. The **Chief guest Prof. Yuichi Kurita**, Biological System Engineering Lab, Hiroshima University, Japan joined us virtually and was accompanied by **Dr V. E. Annamalai, Principal, SSN College of Engineering, Dr. S. Radha, Vice Principal, SSN College of Engineering and Dr. A. Kavitha, Conference Convenor, Head of the Department, BME** on the dais. The program began with the traditional lighting of the lamp by the dignitaries present on the dais. The soft glow of the lamp enlightened our minds with positivity, spirituality, a sense of enthusiasm and the spirit to be erudite, and expand our knowledge through ICBSII, hearing from eminent researchers around the world.

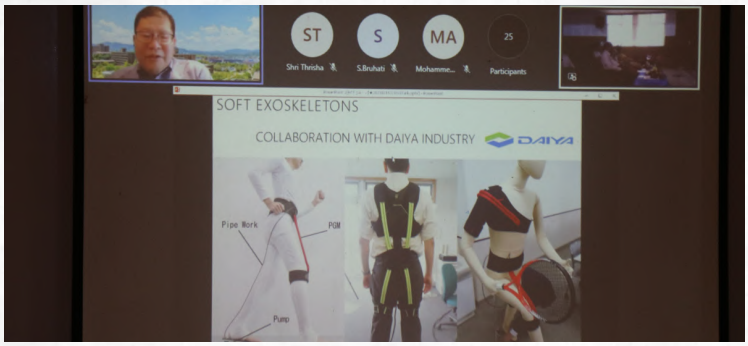
DEPARTMENT VENTURES

ICBSII 2023

NINTH INTERNATIONAL CONFERENCE ON BIOSIGNALS, IMAGES, AND INSTRUMENTATION

EVENTS ORGANIZED

Following which, the Principal, Vice Principal and Head of the Department released the proceedings of the 9th ICBSII, 2023.Then, Professor Kurita began to deliver a lecture on the topic **˝Human augmentation with a soft wearable exoskeleton˝** as part of the session. He emphasized the aspects of developing wearable devices and their importance in rehabilitation through the visuals captured in his research laboratories. It was a very informative session indeed.



The next keynote session as presided by Dr. Rajeswari Aghoram, Associate Professor, Department of Neurology, JIPMER, Pondicherry. She addressed the gathering about **˝Pattern recognition from a clinician's perspective˝.** Dr. Rajeswari made the session very interactive by engaging with the audience. She began the lecture by discussing about a common man's visit to a clinic and his interactions with his physician.

DEPARTMENT VENTURES

ICBSII 2023

NINTH INTERNATIONAL CONFERENCE ON BIOSIGNALS, IMAGES, AND INSTRUMENTATION

EVENTS ORGANIZED

On the same evening, Arthur McClelland, PhD, Principal Scientist, Centre for Nanoscale Systems, Harvard University, virtually delivered a keynote address on the ˝**Applications of Raman spectroscopy and Imaging for Biomedical Applications**˝. The session started with the introduction to spectroscopy and moved on to their applications in biomedical domain. The speaker gave detailed insights on this topic and educated the audience with his speech.

The events for day 1 concluded with a cultural show hosted by the students of the Department of BME. They had showcased their skills by singing, dancing, beat boxing and many such artistic talents. Their programs were thoroughly enjoyed by the audience seated for the event. It was a delight to watch them perform. (Musical Performance)

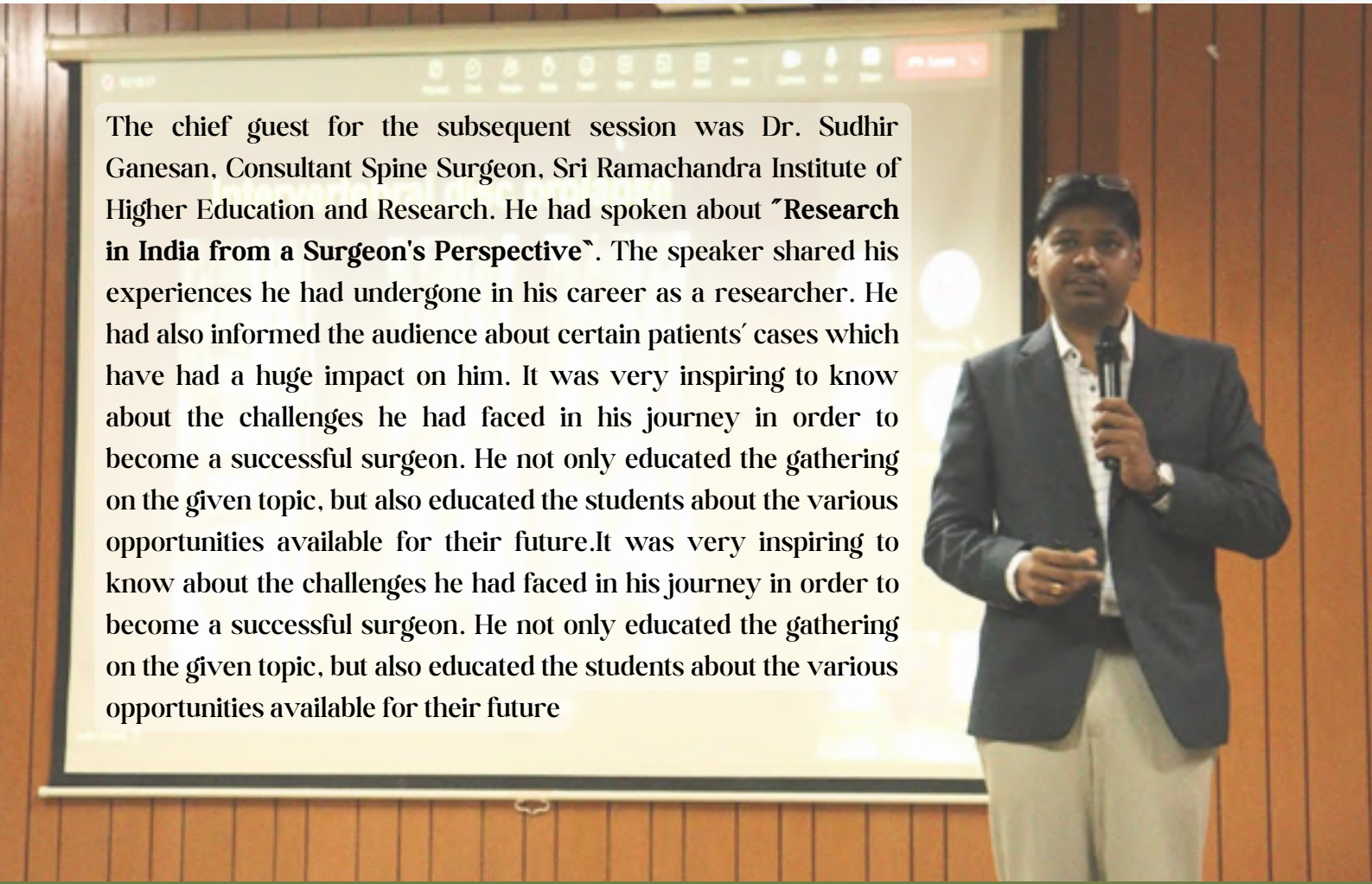
DEPARTMENT VENTURES

ICBSII 2023

NINTH INTERNATIONAL CONFERENCE ON BIOSIGNALS, IMAGES, AND INSTRUMENTATION

EVENTS ORGANIZED

Day 2 events of the Conference started with the virtual session by Dr. Yuvaraj Rajamanickam, Education Research Scientist, NTU, Singapore who elaborated on the topic ˝**Artificial Intelligence in Neurology**˜. He began his session by briefing upon AI and its development in today's world. He had also elucidated on the advancement of AI in the field of diagnosis and treatment of neurological disorders. The audience found the session very interesting to attend.



The chief guest for the subsequent session was Dr. Sudhir Ganesan, Consultant Spine Surgeon, Sri Ramachandra Institute of Higher Education and Research. He had spoken about ˝**Research in India from a Surgeon's Perspective**˜. The speaker shared his experiences he had undergone in his career as a researcher. He had also informed the audience about certain patients' cases which have had a huge impact on him. It was very inspiring to know about the challenges he had faced in his journey in order to become a successful surgeon. He not only educated the gathering on the given topic, but also educated the students about the various opportunities available for their future.It was very inspiring to know about the challenges he had faced in his journey in order to become a successful surgeon. He not only educated the gathering on the given topic, but also educated the students about the various opportunities available for their future

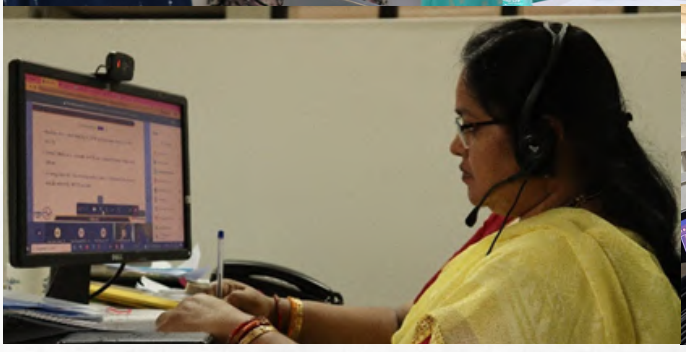
DEPARTMENT VENTURES

ICBSII 2023

NINTH INTERNATIONAL CONFERENCE ON BIOSIGNALS, IMAGES, AND INSTRUMENTATION

EVENTS ORGANIZED

Along with the keynote sessions, set of six paper presentation track sessions were held during the Conference, where participants were allowed to present their research articles. Each track was presided by an internal Session in charge and a Session chair who is an external expertise. A total of 82 papers across the globe were received under three categories: Biosignals, Medical Instrumentation, Medical Images and sensors. The submitted papers underwent a pre-evaluation assessment by conference editors and papers with a similarity index of less than 15% were selected. All the reviewers have an expertise in assessing the novelty, quality, impact, and importance of the research. Reviewers considered the following key points related to technical content, quality, and presentation of the papers. 37 papers were selected post scrutiny, which were presented across the 6 tracks.



DEPARTMENT VENTURES

ICBSII 2023

NINTH INTERNATIONAL CONFERENCE ON BIOSIGNALS, IMAGES, AND INSTRUMENTATION

EVENTS ORGANIZED

The Conference ended with the Valedictory Session on 17th March. The chief guest was Dr. David Belo, Senior Scientist- Machine Learning for Time Series Fraunhofer Portugal AICOS, Portugal. He was accompanied by Dr. A. Kavitha, Head of the Department, BME, Dr. M. Dhanalakshmi, Conference Coordinator, BME and Dr. R. Nithya, Conference Coordinator, ICBSII 23 on the dais. Dr. David Belo delivered a very informative lecture on the topic, **"Challenges and opportunities in handling healthcare data"**. He began his presentation by introducing us to data handling in physiological domain. Following which, he briefed us about the hurdles in data acquisition. Dr. Belo then went on to give insights about the usage of data in various healthcare applications at the end of his speech.

The Conference was organized by **Dr. A. Kavitha, Convenor, HoD, BME, Dr. M. Dhanalakshmi, Conference Coordinator, ICBSII 23 and Dr. R. Nithya, Conference Coordinator, ICBSII 23 and Dr. L. Suganthi, Conference Coordinator, ICBSII 23**. The entire function went on very well and concluded with a formal vote of thanks. This conference was an excellent platform for researchers, academicians, and industry practitioners across the globe to showcase their novel ideas in the field of biomedical engineering.

-Shreya M, III yr BME

DEPARTMENT VENTURES

EVENTS ORGANIZED

Valedictory Function of Association of Biomedical Engineers

On the 17th of March, the Valedictory function of Association of Biomedical Engineers took place presided by the **chief guest Dr. David Belo**, Senior Scientist- Machine Learning for Time Series Fraunhofer Portugal AICOS, Portugal. He was accompanied by **Dr. A. Kavitha, Head of the Department, BME, Dr. M. Dhanalakshmi, Faculty Coordinator, BME and Dr. R. Nithya, Conference Coordinator, ICBSII 23** on the dais.

The function began with the Welcome address by Sneha BS, Secretary of ABE. She was followed by Dharshan AH, President of ABE who delivered the Association report for the year. The next segment was the distribution of certificates and momentos, by Dr. A. Kavitha, Head of the Department, BME and Dr. M. Dhanalakshmi, Faculty Coordinator, for Association members, SYNERGY team members, IEEE & EMBS members, INVENTE coordinators and event heads, INSTINCTS core committee members and for students who excelled in their academic performance.

DEPARTMENT VENTURES

EVENTS ORGANIZED

Valedictory Function of Association of Biomedical Engineers

The function was organized by **Dr. A. Kavitha, HoD, BME, Dr. M. Dhanalakshmi, Faculty Coordinator, BME and Dr. R. Nithya, Conference Coordinator, ICBSII 23**. The entire function went on very well and concluded with a formal vote of thanks by Vahini M, Vice - President of ABE. Dr. M. Dhanalakshmi, Faculty Coordinator delivered a thank you note on behalf of the ICBSII committee.

DEPARTMENT VENTURES

EVENTS ORGANIZED

Faculty Development Program

A Faculty Development Program on **Emerging Trends in Biomedical Engineering Research for Healthcare 4.0** was conducted by the Department of Biomedical Engineering in association with the Centre for Healthcare Technology, SSNCE, and IEEE Signal Processing Society, Madras Chapter, on the dates March 27-29, 2023, in hybrid mode. The event was convened by **Dr. A. Kavitha**, and coordinated by **Dr. J. Vijay**, **Dr. K. Nirmala** and **Dr. N. Venkateswaran**.

The objectives of the program were to provide in-depth knowledge of state-of-the-art technologies through theoretical sessions to participants and to equip faculty members with skills to potentially augment their research. Resource persons from diverse academic and industry backgrounds supported the program through their technical and practical expertise.

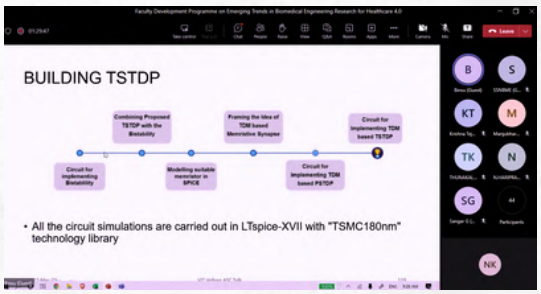
Sessions started at 9:00 a.m. and ended by 3:30 p.m. Day 1 began with an Introduction to Neuromorphic circuits by Dr. Binsu J Kailath, IIITDM, Kanchipuram. This was followed by a talk on Medical Device Design by Dr. De Britto of ICMR-Vector Control Research Centre. Seminars on **'The Role of Computational Physiology in Modern Healthcare'** as well as **'Augmented Reality for Medical Applications'** took place post lunch.

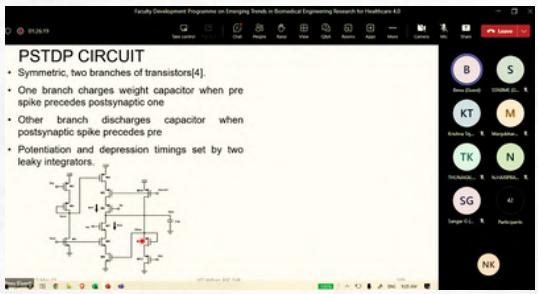
DEPARTMENT VENTURES

EVENTS ORGANIZED

Faculty Development Program

Topics discussed on Day 2 included "**Recent Trends in Biomedical Image analysis**" by Dr. Varun Gopi, NIT Trichy, Biomechanics and 3D Printing, Medical Device Standards, "**Retinal Disease Classification with Thermography**", and "**Aids and assistive devices for mobility enhancement**". The last day saw talks on Medical Robotics, Biomedical Image Processing, Medical Data Analytics, and Medical Image Retrieval.





The program had active participation of faculty members, Ph.D. scholars and PG students from colleges across India as well as industry professionals. All participants were benefited from the new and exciting trends of biomedical innovation discussed.

DEPARTMENT VENTURES

EVENTS ORGANIZED

Workshop on UI / UX Design in Healthcare: Testing and Automation

The One day UI/UX Workshop was conducted on 29th March 2023 by the IEEE EMBS Student Chapter co-ordinated by **Dr. S. Pravin kumar AsP/BME** and **Dr. S. Saranya AP/BME** at the Department of Biomedical Engineering. There were 53 participants, from BME, CSE, EEE and IT departments, and M.E. students had also joined the workshop. The event consisted of two sessions.

In the morning session the basics of design and the importance of UI /UX in the current industry was elaborated. The participants were offered a hands-on session in developing a UI using ˝Figma˜, a booming software for UI design. Students created different webpages based on their interests and had an interesting session all together. The second session of the workshop focused on testing and automation of the UI UX Design. Students were given an insight on automate checking of the working of different websites using JAVA Programming. ˝Eclipse˜, a Java Programming Software was used for this session. Overall, the workshop was an eye opener to this field of development and was informative for the students to later utilise in their projects.

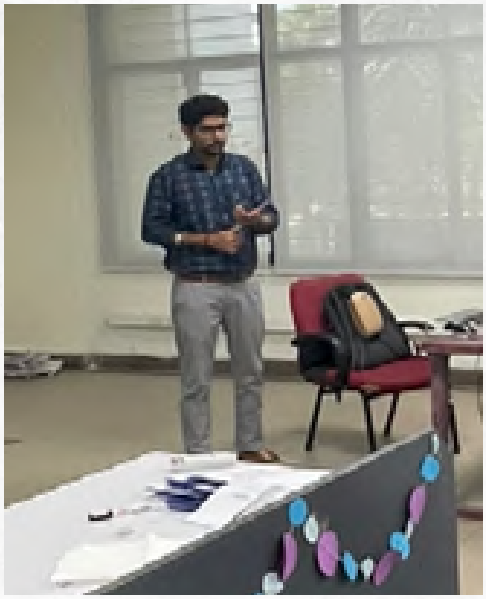
DEPARTMENT VENTURES

EVENTS ORGANIZED

Materialise Innovation suite

Dr.A.Kavitha, **Dr.Pravin Kumar**, **Dr.Saranya** and **Ms.Divya** organized and **Mr.Udayachandran** coordinated a demonstration session on ˝Materialise Innovation Suite - MIMICS Research 25.0˝ conducted by MATERIALISE Trainers Mr.Gagan, Application Engineer and Miss.Ayusi Bhan, Operations Manager on 19 January 2023.

The session briefed about how 3D models of human anatomy can be created using the automated tools available with the MIMICS V.25 suite. The new features that are added in the current version compared to the existing MIMICS V19 version available in the department such as automated tools to identify and remove artifacts. 3D measurement tools to identify and analyse landmarks were also highlighted.



UG, PG students, research scholars and faculty working in the areas of Biomedical 3D modelling were interested and benefitted from this session.

DEPARTMENT VENTURES

EVENTS ORGANIZED

Funding Awareness Programme

Dr.A.Kavitha, Dr.Pravin Kumar,Dr.Nithya and **Ms.Divya** organized and conducted (BIRAC) Funding Awareness Program by HTIC Medtech Incubator (BIRAC's Associate BIG Partner) in association with the Department of BME, SSN College of Engineering & SSN iFound on Jan 25th, 2023 at Central Seminar Hall, SSNCE

Bio-Med- An Overview of Pioneering Innovation cum Modern Technology

Dr L.Suganthi, AsP/BME organized a One day Seminar on ˝Bio-Med- An Overview of Pioneering Innovation cum Modern Technology˝ delivered by Mr. S Kiruba, Technical Architect, Philips Medical Systems, Bangalore on February 03,2023.

DEPARTMENT VENTURES

Healthcare technology: Established and Emerging

EVENTS ORGANIZED

Dr.S.Pravin Kumar AsP/BME, **Dr.S.Saranya AP/BME** coordinated a guest talk organized by SSN IEEE EMBS wing titled ˝Healthcare technology: Established and Emerging˜ delivered by Mr. Stalin Selvamoni, Healthcare Technology solutions Consultant on February 10, 2023.

Padma Bhushan Shri Shiv Nadar is an early Visionary for the Technological revolution of India, who founded Hindustan Computers Limited (HCL) in the mid - 1970's and transformed the IT hardware company inot an IT Enterprise (HCL Tech).

He has focussed his efforts on developing the high quality educational system of India through the Shiva Nadar Foundation which he found. The institutions, with their diverse and dynamic community of students offer a distinctive combination of some of the finest graduate, undergraduate and research programs, accomplished faculty, world class facilities and a residential campus set on a sprawling 230 acres of sylvan surroundings. It was a fulfilling time to conduct a seminar on "Healthcare Technology: Established and Emerging" on February 10th, 2023 for the students of Department of Biomedical Engineering at SSN College of Engineering.

-Stalin Selvamoni, Consultant, Healthcare Technology Solutions

DEPARTMENT VENTURES

EVENTS ORGANIZED

A Visit to National Institute for Empowerment of Persons with Multiple Disabilities (NIEPMD)

The third year Biomedical Engineering students of SSN College of Engineering were taken to visit the National Institute for Empowerment of Persons with Multiple Disabilities (NIEPMD), chennai on the 28th of February, 2023, organized by the department of BME, coordinated by **Dr. M. Dhanalakshmi AP/BME**, **Dr. R. Nithya AP/BME** and **Dr. S. Saranya AP/BME.** People with multiple disabilities from all across India had put up pop-up stalls in the institute, ranging from pencil sketches and oil-on-canvas paintings to rehabilitation devices to help children with clubbed feet. The national level exhibition was titled the ˝abilities hub.˝ The organic and natural artisanal items were purchased with great enthusiasm by the students as mementos to be cherished.

After an hour of shopping and interacting with the entrepreneurs and stall owners, the students received special permission to view the various departments in NIEPMD. The institute majorly treated patients of various agents suffering from cerebral palsy, in the Neuro developmental therapy room, enabling patients to walk with support within 6 years of treatment. The progress is slow and requires a three-days-a-week physiotherapy and rehabilitation therapy, offered at a subsidised price of Rs.10 per session. The students were amazed by the patience required to aid those affected, and inspired to develop biomedical devices to aid them.

DEPARTMENT VENTURES

EVENTS ORGANIZED

A Visit to National Institute for Empowerment of Persons with Multiple Disabilities (NIEPMD)

The students were then taken to the audio lab and the sensory room, which are used to treat those with ADHD and related developmental disorders. They could see the treatments and exercises being offered by the practitioners, giving them an insight into their world, something far different from the one the ˝general public˜ lives in.

All in all, it was a very inspiring visit, reminding the students and professors alike of the talent and grit of the physically and mentally disabled, to survive and prosper, and inspire.

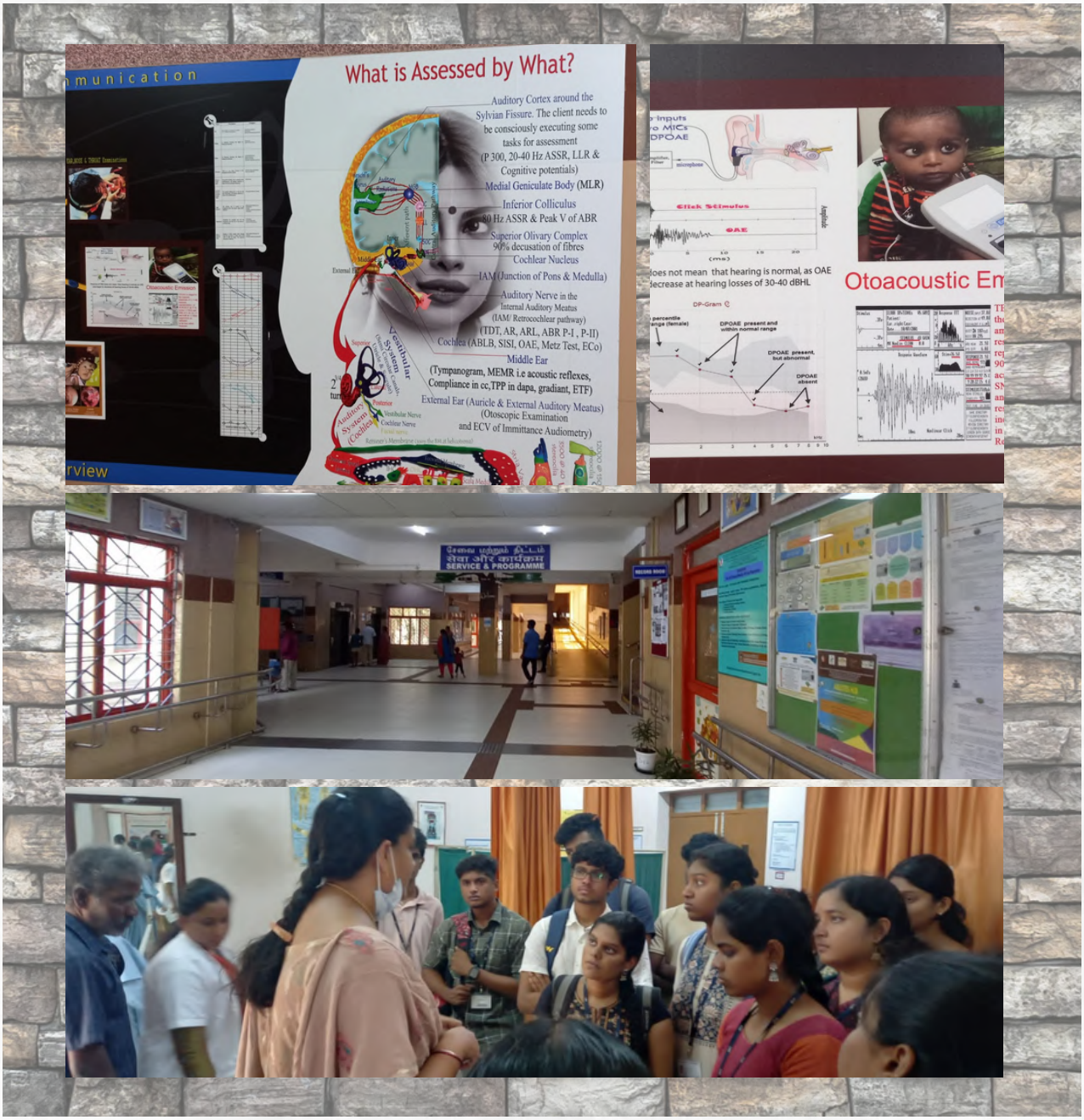
- Supraja Vaidhyanathan, III yr BME

NIEPMD VISIT - GALLERY

DEPARTMENT VENTURES

NIEPMD VISIT - GALLERY

EVENTS ORGANIZED



DEPARTMENT VENTURES

Meeting with President

On March 22, 2023, a meeting with **Dr. Kala Vijayakumar, President, SSN Institutions** was held at the department of BME accompanied by **Dr. V. E. Annamalai, Principal, SSNCE, Dr. S. Radha, Vice Principal, SSNCE, Dr. A. Kavitha, HoD/BME** along with the **Heads of Various Committees** such as transport, food to name a few. Different queries raised by the students were addressed through the respective representatives in this meeting.

DEPARTMENT VENTURES

XTIC VR-AR laboratory, IITM-Research park, Chennai

INDUSTRY COLLABORATIONS

Dr Kavitha, Dr. Pravinkumar, Dr Vijay Jeyakumar and **Ms. Divya B** along with **Dr Kala Vijayakumar, President, SSN Institutions,** and **Dr Radha S, Vice Principal** interacted with Prof. Manivannan about the functioning of **XTIC VR-AR laboratory** established at IITM-Research park, Chennai on Feb 05, 2023.

DEPARTMENT VENTURES

Kauvery Hospital Team visits the Dept. of. BME, SSNCE

INDUSTRY COLLABORATIONS

Kauvery Hospital team visited the Department of Biomedical Engineering on 8th Feb 2023 for exploring collaboration with them. Faculties from BME **Dr. A. Kavitha HoD, Dr. S. Pravinkumar, Dr. J.Vijay, Dr. M. Dhanalakshmi, Dr. R. Nithya & Ms. B. Divya** gave presentations on their project works.

Working models and Software/Hardware projects at the **Centre for Healthcare Technologies** were demonstrated to the team during the visit. **SSNiFound** and **BME department** co-ordinated the visit.

DEPARTMENT VENTURES

Cognizant Technology Solutions (Healthcare Unit) visits the Dept. of. BME, SSNCE

INDUSTRY COLLABORATIONS

Cognizant Technology solutions (Healthcare unit) visited the department of Biomedical Engineering on 10th Feb 2023. **Mr. Raghuraman, Ms. Rophia and Ms. Sujithra** visited **CHT, AR/VR lab and other laboratories in the department.** PG Scholar **Ms. Abiya MJ** demonstrated the use of HTC Vive (VR device) to them during the visit where a game called Inmind VR was played on the Alienware system interfaced with the VR device using Steam AR application. This kindled their interests posing many questions and more on the applications of VR in the healthcare, thus making it even more interactive.

Following this, on March 31, 2023 (2 pm to 3 pm), a discussion between the department of Biomedical Engineering and the Healthcare unit of Cognizant Technology Solutions took place to establish collaborative project works. Mr. Raghuraman, Ms. Rophia and Ms. Sujithra attended the meeting online. They also discussed in the short - guest lecture sessions for BME, ECE and CSE departments (2.30 pm to 3 pm) and represented subject matter experts (SME) for handling the sessions.

DEPARTMENT VENTURES

INDUSTRY COLLABORATIONS

Founder & CEO of Machenn Healthcare Company visits the Dept. of BME

Mr. Vishnu T.U., CEO, Machenn, had discussions with **Dr. A. Kavitha HoD/BME** and **Dr. S. Pravin Kumar, AsP/BME** for potential student internships and collaborative research works on 14.3.23. He also met Mr. Chandran, SSN IFound to discuss the startup formation.

EduTech Startup

Dr. A. Kavitha HoD/BME and **Dr. S. Pravin Kumar AP/BME** arranged a meeting between Mr. Magendran from Study International Academy and Mr. Chandran and SSN IFound Team on 28.03.23 to discuss the EduTech Startup.

Sonic Rehab Health Care Physiotherapy Services, Bangalore visits the Dept. of. BME

Dr. Denzil Fernandes, Physiotherapist and co-founder of Sonic Rehab Health Care Physiotherapy Services, Bangalore was referred by **Dr. Kala Vijayakumar, President, SSN Institutions** to initiate possible collaborations with Dept. of BME. Accordingly, Dr. Denzil visited the department on 9 March, 2023 and interacted with a team of faculty members including **Dr. Kavitha HOD/BME, Dr. Nithya, AP/BME, Dr. Dhanalakshmi AP/BME and Dr. Saranya AP/BME**. The team presented the current prospective projects pertaining to the area of Exoskeletons, Prosthetics and Orthotics. Dr. Denzil was interested in commercializing certain projects that would benefit a larger community of differently abled population. He had also shared his requirements for developing a low cost lower limb robotic exoskeleton for gait assistance and shared his interests to support with the necessary engineering expertise as a part of collaborative development.

FACULTY VENTURES

External Recognitions

Dr. Vijay Jeyakumar, AsP, BME was appointed as the Chairman for Biomedical Board (Central valuation) which was held at Zone - II during January 11 -22, 2023.

Dr. A. Kavitha, HOD, BME delivered a guest lecture on ˝Autism analysis using advanced ML procedures˝, at St. Joseph's College of Engineering in the SERB sponsored Two-Day National Seminar organized by the Department of Electronics and Communication Engineering on 20th January 2023

Dr. Vijay Jeyakumar, AsP, BME delivered a talk on 'Smart Textiles for Healthcare Monitoring, Real Time Eye Tracking using Gaze Maps and Non-Contact Measurement of Vital Parameters" in DRDO sponsored Three Day workshop on "Emerging Trends in Medical Technology and Inventions in Healthcare" (ETMTIH2023), organized by the Department of Biomedical Engineering, Mepco Schlenk Engineering College, Sivakasi on February 04, 2023.

Dr. Vijay Jeyakumar, AsP, BME was invited as a subject expert for the faculty recruitment (online) hosted by Nadimpalli Satyanarayana Raju Institute of Technology (NSRIT), Andhra Pradesh on February 10, 2023.

Dr. N. Venkateswaran, Professor/BME was invited as an Expert member by the department of ECE Hindustan Institute of Technology and Science. Padur, in framing the courses for B.Tech. ECE with specialization in Electronics Manufacturing Technology Program on 21.02.23.

FACULTY VENTURES

External Recognitions

Dr .K .Nirmala, AsP, BME acted as Technical committee member and reviewer for the third international conference on computer vision and robotics (CVR2023) held during February 24-25,2023.

Dr. S. Arun Karthick, AsP, BME was invited by Dr. Gagandeep Singh, Senior Publisher (STEM), CRC Press, India and Sub-Saharan Africa, Taylor & Francis Books India Pvt Ltd. to review the book proposal titled ˝Nanomaterials and Sensors for Healthcare Application˜ dated 23 Jan 2023.

Dr. A. Kavitha Prof & Head, BME attended the 27th BoS meeting of Adhiyamaan College of Engineering on 28th February 2023.

Dr. Vijay Jeyakumar, AsP, BME acted as Program committee member and reviewer for the Third International conference on computer vision and robotics (CVR2023) held at Babu Banarasi Das University, lucknow, India during February 24-25,2023.

Dr. Vijay Jeyakumar, AsP, BME Delivered a talk on "AI enabled Image retrieval systems in PACS environment - An overview" in UGC refresher course in Biomedical organized by the Department of Biomedical Engineering, North Eastern Hill University (NEHU), Shillong on March 13, 2023.

Dr. Vijay Jeyakumar, AsP, BME was invited as a chief guest for a National Conference on ˝Paradigm shift in Embedded Communication, organized by the department of ECE, Jai Shriram Engineering College, Tirupur on March 17, 2023.

FACULTY VENTURES

External Recognitions

Dr. A. Kavitha, Prof & Head, BME was invited as Chief Guest for ˝**Maathare - Women as LeadX**˜ program organized by SSN IEEE Women in Engineering and student branch affinity group on 8th March 2023.

Dr. A. Kavitha, Prof & Head, BME was invited for a talk on ˝**The World Needs Empowered and Resilient Women**˜ on 8th March 2023, for a webinar on ˝Motivating the future engineers˜ organized by Sathyabama Institute of Science and Engineering technology, Chennai.

Dr. L.Suganthi, AsP, BME has attended fourth Research Advisory Committee (RAC) for the Ph.D Research Scholar Ms. T.R.Thamizhvani on 27.03.2023 in the Department of Biomedical Engineering, School of Engineering , VISTAS, Pallavaram, Chennai -117.

Dr Vijay Jeyakumar, AsP, BME was deputed as an external examiner for the Anna University PG project phase I viva voce examination on March 30, 2023.

Dr. N. Venkateswaran, Professor, BME, conducted the Quarterly IQAC meeting on Wednesday, the 22nd March 2022

Dr. M. Dhanalakshmi AP/BME is appointed as the SPoC for Cognizant Technology Solutions - Health Science unit to strengthen the collaboration between SSN & CTS.

FACULTY VENTURES

External Recognitions

Dr. S. Arun Karthick, ASP/BME acted as expert member for the 9th BoS meeting of the Department of Biomedical Engineering, Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology, Chennai during 18 Jan 2023. BME/2022-23/oth/54

Dr. N.Venkateswaran, Professor, BME, attended the 1st DC meeting of Ms.Amuthavalli, Department of Electronics & Communication Engineering, KCG College of Technology registered in Anna University, Chennai on 18.01.2023

Project prototype titled ˝Brain Computer Interface- Controlled Wheelchair Prototype˝ mentored by **Divya. B, AP/BME** got selected for the final round of project exhibition - AVINYA23 organized by KCG College of Technology. Project was presented by Janani T, Nandhini J and Shivangi Pandey of final year BME.

FACULTY VENTURES

Biocompatible and Bioactive PVA/Sericin/Chitosan Nanofibrous Wound Dressing Matrix

Journal Publications

This work focuses on preparation of electrospun matrix for wound dressing application by utilizing sericin, chitosan and silver nanoparticles in PVA nanofibers. Sericin (SS) is extracted from silk cocoon (Bombyx Mori) by alkali degumming method. The extracted sericin is characterised by UV-visible Spectroscopy and FT-IR. Then, individual stock solutions of 2% (w/v) Chitosan (CH) in acetic acid, 10% (w/v) of PVA in deionised water were prepared. To enhance the antimicrobial property to the wound dressing, silver nanoparticles (Ag NP) was prepared using Cynodan dactylon (Bermuda grass) leaves extract and characterised using UV-visible Spectroscopy. The prepared Ag NP was incorporated in the nanofibers at constant proportion. Furthermore, three blended PVA/SS/CH solutions were prepared in the following ratios 8:1:1, 5:2.5:2.5, and 2:4:4 and electrospun to create nanofibrous dressing material. The structural and physical characteristics of the prepared nanofibrous dressing material were studied using SEM and Universal Testing Machine. Based upon mechanical strength and SEM analysis PVA/SS/CH in the ratio 8:1:1 was chosen for In-vitro studies. From the studies it concludes that the prepared PVA/SS/CH electrospun nanofiber will be a promising material for wound dressing.

S. Arun Karthick, K. Manjari, M. Gundhavi Devi, "Biocompatible and Bioactive PVA/Sericin/Chitosan Nanofibrous Wound Dressing Matrix", Applied Surface Science Advances, Vol. 13, 100362. 2023 (Scopus/TR) https://doi.org/10.1016/j.apsadv.2022.100362

FACULTY VENTURES

Artificial Intelligence-Based Predictive Tools for Life-Threatening Diseases

Journal Publications

The large-scale outbreaks of infectious pandemic diseases emerged regularly throughout history and created notable economic, social, and political disruptions. Major pandemics affect a wide geographic area significantly increasing morbidity and mortality. The world has come across numerous remarkable pandemics such as the Black Death, measles, smallpox, influenza, plague, cholera, Spanish flu, severe acute respiratory syndrome coronavirus (SARS-CoV), Middle East respiratory syndrome coronavirus (MERS-CoV), human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) and Ebola virus and is now combating the new coronavirus disease 2019 (COVID-19) pandemic affecting humanity greatly. Studies suggest that the likelihood of pandemic threats is due to the diversity of pathogens, changes in the dynamics of disease transmission and severity, human-pathogen interaction, increased globalization, urbanization, huge exploitation of land and natural resources, and global warming.

The pandemic risk burden poses serious challenges to humanity and these trends will prolong and intensify over time. For the well-being of humanity, administration of public health measures, techniques to intercept and control infection, pharmaceutical intervention, global surveillance programs, novel technologies to identify disease biomarkers, and vaccine production prove to be effective beneficiary responses to identify and limit emerging outbreaks and to escalate preparedness and health capacity. The extensive amount of data produced during the pandemic has given a lot of chances to the researchers and healthcare providers to evaluate new trends, detect vulnerable groups, and solve long-standing issues in the healthcare industry.

FACULTY VENTURES

Artificial Intelligence-Based Predictive Tools for Life-Threatening Diseases

Journal Publications

The healthcare industry has sought to use the most comprehensive data and predictive analytics software tools employing intelligent data technology, artificial intelligence (AI), machine learning (ML), and deep learning (DL) and has leveraged to gain insight, establish innovative ways to ease sustainable demand and supply, and pitch straight into the prospective benefits to foster the fight against the pandemic.

Hence, these predictive models can support hospitals, healthcare settings, state health organizations, and government establishments to speculate the influence of COVID-19 and prepare for the future. In this chapter, a comprehensive investigation of various data analytic tools that are used in expert systems, proposed for pandemic and epidemic diseases, is discussed. The key issues, challenges, and opportunities of the existing and current methods are also discussed.

Jeyakumar, V., Sundaram, P., Ramapathiran, N. (2023). Artificial Intelligence-Based Predictive Tools for Life-Threatening Diseases. In: Kanagachidambaresan, G.R., Bhatia, D., Kumar, D., Mishra, A. (eds) System Design for Epidemics Using Machine Learning and Deep Learning. Signals and Communication Technology. Springer, Cham. https://doi.org/10.1007/978-3-031-19752-9_8

FACULTY VENTURES

Journal Publications

Pulse Rate Estimation with a Smartphone Camera Using Image Processing Algorithm

Cardiovascular system plays a vital role in maintaining human health, and therefore, it is important to continuously monitor the cardiac activity. Electrocardiogram is the widely used technique to monitor the functioning of heart but it cannot be used at any place or at any time and it requires a clinical person for assistance. On the other hand, since cardiac activity is proportional to blood flow, determination of blood volume and its flow rate can be determined prior to ECG to know the cardiac function. One such method to determine this parameter is photoplethysmogram (PPG). It determines the volume of blood based on the absorption of light by oxy and de-oxy hemoglobin. Pulse oximeter is a device that works based on the principle of PPG. Even though it has many advantages, it also requires assistance and person feel discomfort on wearing this device during recording. Hence, image processing-based methodology has been presented with which a person can monitor his own cardiac activity at any place or at any time without any secondary assistance. Every common person possess a smartphone, therefore, integration of a technique to determine cardiac activity into smartphone will be advantageous to all persons. In this research, a methodology is presented that allows a person to monitor his own heart activity using only his smartphone and without any additional gadgets.

Sowmiya, E.C., Nirmala, K., Suganthi, L. (2023). Pulse Rate Estimation with a Smartphone Camera Using Image Processing Algorithm. In: Kumar, A., Senatore, S., Gunjan, V.K. (eds) ICDSMLA 2021. Lecture Notes in Electrical Engineering, vol 947. Springer, Singapore. https://doi.org/10.1007/978-981-19-5936-3_28

FACULTY VENTURES

Journal Publications

EEG-based classification of children with learning disabilities using shallow and deep neural networks

Learning disability (LD), a neurodevelopmental disorder has severely impacted the lives of many children all over the world. LD refers to significant deficiency in children's reading, writing, spelling, and ability to solve mathematical task despite having normal intelligence. This paper proposes a framework for early detection and classification of LD with non-LD children from rest electroencephalogram (EEG) signals using shallow and deep neural network. Twenty children with LD and twenty non-LD children (aged 8–16 years) participated in this study. Preprocessing the raw EEG signal, segmentation and extraction of various features from the alpha, beta, delta, and theta bands obtained using digital wavelet transform (DWT). Filter based feature selection method were employed for the selection of most relevant features that reduces the computation burden on models. Afterwards, these ranked accumulated features were evaluated separately by machine learning (ML) classifiers and neural network (shallow and deep) models to investigate the performance. The performance of the ML classifiers and one-hidden layer shallow neural network and 3-hidden layer deep neural network were compared. Experimental results showed that the most relevant features computed by ReliefF algorithm along with the shallow neural network based classifier attained the highest average and maximum classification accuracy of 95.8 % and 97.5 % respectively, which is greatest among the existing literatures. The efficient and automatic LD classification from EEG signal could aid in the development of computer-aided diagnosis systems for early detection.

Seshadri, N. G., Agrawal, S., Singh, B. K., **Geethanjali, B.**, Mahesh, V., & Pachori, R. B. (2023). EEG-based classification of children with learning disabilities using shallow and deep neural networks. Biomedical Signal Processing and Control, 82, 104553.(Scopus/TR) Impact factor : 5.076 https://doi.org/10.1016/j.bspc.2022.104553

FACULTY VENTURES

Optimization of preprocessing routines in speech imagery based eeg signals

Journal Publications

Speech imagery is one type of mental imagery specific to processing verbal sequences and plays a vital role in human thought processes. Speech imagery has become an interesting paradigm for researchers as speech imagery has a high similarity to real voice communication. Electroencephalography is a non-invasive electrophysiological technique that measures the mental state of the brain directly from the scalp. The nature of the acquired EEG signals is nonlinear and non-stationary. As EEG signals have a low signal-to-noise ratio (SNR), artifacts occur during acquisition. Hence, an efficient framework of pre-processing is required to obtain artifact-free EEG for further applications. Selection of the optimal pre-processing techniques for EEG still remain a challenging task. This work focuses on employing and comparing the different pre-processing techniques and lists out the optimal solutions for pre-processing Speech imagery-based EEG signals. The techniques are compared based on the Mean Square Error and Peak Signal Noise Ratio values.

Anandha, S. R., **Kavitha, A.**, & **Divya, B.** (2023). Optimization of preprocessing routines in speech imagery based eeg signals. Journal of Mechanics in Medicine and Biology. Indexing : Scopus : Web of Science (SCIE), impact factor:0.883 :https://doi.org/10.1142/S0219519423400328

FACULTY VENTURES

Journal Publications

Brain connectivity dynamics during listening to music and potential impact on task performance

To analyze brain connectivity dynamics during listening to music and estimate the potential impact on task performance. Fifteen participants (13 males and 2 females) participated in this study based on their interest in Indian classical music. Measurements of the influence of Indian music on task performance were obtained by assessing brain activation using EEG signals. Brain connectivity analysis was performed to visualize the connections between brain regions under various experimental conditions. Visual Go/No Go Stimuli was used to evaluate visual spatial attention during operation by evaluating misses, committed errors, and reaction times. In Task 1 (listening to music only), it was reported that there was a change in the positions of the electrodes (F_3, F_7) located in the left frontal lobe. The energy of the relative beta component was significantly higher only at F_7 during task 1 ($p = 0.005$). Event-related desynchronization alpha and theta synchronization were significant ($p = 0.005$) at all electrode sites in the bilateral frontal lobes (F_3, F_4, F_7 and F_8) while listening to music and performing tasks (task 2). When the task without music (task 3) was performed, the energy of the relative alpha component was significantly higher at the Fp_2 electrode position ($p = 0.005$). It is noteworthy that the energy of the theta component was significantly lower at the location of the Fp_2 electrode ($p = 0.005$). The frontal asymmetry index score measures were significantly high at F_4/F_3 and F_8/F_7 during task 1. The connectivity map of theta synchronization showed a robust association between Fp_2 and F_8 which was in turn connected to P_4 and O_2 during Task 2. Results indicated an increased omission and commission errors during Task 3.

Balasubramanian, **Geethanjali**, Adalarasu Kanagasabai, Mahesh Veezhinathan, and Jagannath Mohan. "Brain connectivity dynamics during listening to music and potential impact on task performance." Cognitive Neurodynamics (2023): 1-17. Impact factor : 3.473 Indexing : Scopus ; Web of Science (SCIE); PubMed ; https://doi.org/10.1007/s11571-023-09948-w

FACULTY VENTURES

In vitro biological assessment of green synthesized iron oxide nanoparticles using Anastatica hierochuntica (Rose of Jericho).

Journal Publications

Nanoparticle production can be done easily, safely and without using any harmful chemicals. Due to the multiple biomedical applications of iron oxide nanoparticles, the current study uses plant extracts of Anastatica hierochuntica (A. hierochuntica) for the environmental friendly production of iron oxide nanoparticles (IONPs). UV–visible spectroscopy, Fourier transform infrared (FT-IR) spectroscopy, X-ray diffraction (XRD), energy-dispersive X-ray analysis (EDAX) and scanning electron microscopy (SEM) were the methods utilized to investigate the formation of the iron oxide nanoparticles. In UV–visible analysis, absorption peaks of plant extracts of A. hierochuntica and biosynthesized IONPs were observed at 310 nm and 390 nm respectively. Functional groups such as alkenes, phosphate, carboxylic acid and hydroxyl groups were observed by the FT-IR study.

The produced IONPs crystallinity was further confirmed by the XRD examination, and their average size was found to be 52 nm. SEM analysis revealed most of the formed nanoparticles were in spherical shape with 30–70-nm size. The presence of iron, oxygen, carbon and other elements was further confirmed in the EDAX spectrum. Five different bacteria Staphylococcus aureus, Pseudomonas aeruginosa, Enterococcus faecalis, Bacillus subtilis and Escherichia coli were tested for the biosynthesized IONP antibacterial efficacy. With an inhibitory zone measuring 28.32 ± 1.5 in diameter, the generated IONPs exhibited considerable antibacterial activity against the Gram-positive bacteria Bacillus subtilis.

FACULTY VENTURES

In vitro biological assessment of green synthesized iron oxide nanoparticles using Anastatica hierochuntica (Rose of Jericho).

Journal Publications

The percentage antioxidant activity of biosynthesized IONPs rises with an increasing concentration, and the highest activity of 36.79% was observed at the concentration of 100 µg/mL. In addition, the in vitro cytotoxicity studies against human breast cancer cell line MCF-7 showed that the cell viability of biosynthesized IONPs was hazardous to the MCF-7 cell line, with concentrations ranging between 7.8 and 1000 µg/mL, displaying the strongest and lowest anti-cancer activity, with IC50 value of 52.17%. The haemolytic activity of biosynthesized IONPs demonstrates that the rate of lysis steadily increased with increasing concentrations. At a high concentration of 1000 µg/mL, 24% of lysis and at a lower concentration of 31.25 µg/ mL, 2.2% lysis was observed. The iron oxide nanoparticles produced by this biogenic method will therefore have more varied uses in the biomedical industry with further clinical evaluation.

Vahini M, Rakesh SS, **Subashini R**, Loganathan S, Prakash DG. In vitro biological assessment of green synthesized iron oxide nanoparticles using Anastatica hierochuntica (Rose of Jericho). Biomass Conversion and Biorefinery. 2023, 1-11,Scopus/web of Science, IF:4.103, https://doi.org/10.1007/s13399-023-04018-x

FACULTY VENTURES

Secure medical image storage and retrieval for Internet of medical imaging things using blockchain-enabled edge computing

Journal Publications

Due to the advancements in information, communication, and technology (ICT), the number of healthcare data is increasing day by day enormously. Handling all such electronic health records (EHR) like patient data, laboratory records, surgical reports, and Imaging objects information are becoming complex in terms of storage, transmission, and retrieval. All such data require a high level of security and privacy; also the users have the right to access and edit the data by following certain health standards HIPAA, and DISHA. Among this EHR, storage and maintenance of image objects are much more complicated than others.

The current practice of storing different kinds of medical images by the hospital administration is in their medical server which is vulnerable to various attacks, tampering, and forgery. For emergencies like case-based examination, patient/physician's interest, and post-surgical procedures, the images need to be retrieved along with their information. The traditional kind of medical image retrieval system relies on two kinds of approaches, one is text-based (keyword-based search) and another one is Content-based (the features like texture, shape, and colour based search). However, both these approaches fail to preserve the privacy and security of patient data, which are sensitive in nature.

FACULTY VENTURES

Secure medical image storage and retrieval for Internet of medical imaging things using blockchain-enabled edge computing

Journal Publications

Edge computing is one of the buzzwords of the fourth industrial revolution, which provides decentralized data log entry rather than centralized authority control. The primary characteristics of edge computing are storage across multiple nodes, distributed ledger, immutability, and provenance. Using this technique, medical images can be stored in decentralized blocks with limited/restricted access to the Internet of medical imaging modalities. Such integration will also enhance network scalability for portable medical imaging devices. Patients' information can also be encoded via secured transactions to address privacy concerns. In this chapter, a conceptual framework for blockchain-enabled edge computing implications along with the Internet of medical things (IoMIT) to ensure the privacy policies of medical images will be discussed. We believe such a framework would provide a secure integrated healthcare environment for imaging modalities. The open issues and challenges of the framework over IoMIT will be specified.

Vijay Jeyakumar, Rama abirami K, Saraswathi S, Senthilkumaran R, Gurucharan M. (2023). Secure medical image storage and retrieval for Internet of medical imaging things using blockchain-enabled edge computing. In: D. Jude Hemanth, Brij B. Gupta, Mohamed Elhoseny, Swati Vijay Shinde. (eds) Intelligent Edge Computing for Cyber Physical Applications. P-85.Elsevier. https://doi.org/10.1016/B978-0-323-99412-5.00005-8. ISBN-9780323994330

FACULTY VENTURES

Conference Publications

S. Manivannan and **N. Venkateswaran, Professor, Department of BME** presented a paper titled, ″Dog Breed Classification using Inception-ResNet-V2″ at 2023 International Conference for Advancement in Technology (ICONAT)during 24th - 26th Jan held at RIT, Sangli, Maharashtra, India.

Raghupathy Jothibalaji, S Siva Adithya, Saravanan N V, and **Dhanalakshmi M**, Silent Speech Interface using Lip-Reading Methods, In proceedings of 2nd International Conference on Biomedical Engineering Science and Technology: Roadway from Laboratory to Market (ICBEST 2023) organized by Department of Biomedical Engineering, NIT Raipur, Chhattisgarh, India during 10-11 Feb 2023.

Gowri Vidhya N, **Vijay Jeyakumar**, and Arulselvi R, Evaluation of Deep learning methods and face detection framework with Convolutional Neural Network, In proceedings of 8th IEEE International Conference on Electrical Electronics and Computer Science (SCEECS ´23) (flagship conference of IEEE-MSB) organized by Maulana Azad National Institute of Technology (MANIT), Bhopal, India on Feb 18, 2023.

Sneha Agrawal, N.P. Guhan Seshadri, Bikesh Kumar Singh, **B Geethanjali**, V.Mahesh, EEG Based Classification of Learning Disability in Children using Pre-trained Network and Support Vector Machine, In proceedings of 2nd International Conference on Biomedical Engineering Science and Technology: Roadway from Laboratory to Market (ICBEST 2023) organized by Department of Biomedical Engineering, NIT Raipur, Chhattisgarh, India during 10-11 Feb 2023.
(Won best paper award)

FACULTY VENTURES

Conference Publications

Chandramouli K, Rakshitha S, Nisha S, Jai Kishore R, **Vijay Jeyakumar**, ″Detection of Heart Rate from facial videos using Eulerian Video Magnification captured with commercially available smartphones‟, in the proceedings of International Conference on Intelligent Systems in Smart Healthcare (ICISSH-2023) organized by Department of Biomedical Engineering, Bannari Amman Institute of Technology, Coimbatore, March 10, 2023.

Aishwarya Ponni M C, Anbuselvi M, **Dhanalakshmi M**, **Sachin GS**, Meghna G, Rebecca MG, presented a paper titled ″CHOICE OF WIRELESS CHARGING CIRCUITRY FOR MEDICAL IMPLANTS‟ at the International Conference on Renewable and Sustainable Energy Technologies (RESET - 2023) organized by the Department of Electrical and Electronics Engineering, during 22 -23 March 2023.

Dharshan A H, Shakti Varsha S, **Subashini R**. Synthesis and characterization of collagen-based hydrogel with allicin and silver nanoparticles, in the proceedings (Scopus with ISBN) of 7th International Conference on Nanoscience and Nanotechnology (ICONN-2023) at SRMIST, Chennai, on March 27 -29, 2023.

RaamaNarayanan AnanthaNarayanan, **B Geethanjali**, Sona Mariya, Mahesh Veezhinathan , Implementing a Calibration System for Demand Pacemaker using a Web-based approach, In proceedings of 2nd International Conference on Biomedical Engineering Science and Technology: Roadway from Laboratory to Market (ICBEST 2023) organized by Department of Biomedical Engineering, NIT Raipur, Chhattisgarh, India during 10-11 Feb 2023.

Chandana H, Archana TC, Pauline John and Srijith K presented a paper titled 'Fiber Bragg Grating based Wearable Device for Monitoring Respiratory Activity' at the IEEE 3rd International Conference on TEMSNET organized by Vidya Vikas Institute of Engineering and Technology, Mysore during 10-11 Feb 2023.

FACULTY VENTURES

Conference Publications

Dr Vijay Jeyakumar, AsP, BME presented (physical) a paper titled, "A study on Impacts of ambient lights and Skin tone for contactless blood oxygen measurement using visible spectrum facial videos" authored by Arulselvi, Gowrividya, and Yuvaraj in 2nd IEEE Delhi section owned Conference DELCON 2023 hosted by Chitkara University, Punjab on February 24, 2023 (Won best paper award).

Divya S (Research Scholar) and Venkateswaran N, Professor/BME, presented a paper titled, ˝Analysis with 1D Defect Layer Photonic Crystal for Detection of Abnormalities in Blood Samples˜ at the National Photonics Symposium 2023, Cochin, India on 28.02.2023.

Patent Info

Dr. S. Pravin Kumar, ASP/BME attended the hearing session for the patent application 6299/CHE/2015 titled Multistance smartphone support for microscopes on 23.02.23.

Research Scholar Activity

Dr Vijay Jeyakumar, ASP/BME convened the first Doctoral Committee meeting for the research scholar Ms Nithiya R (Reg. No. 23254991341) on February 21, 2023

FACULTY VENTURES

PROJECT NEWS

A proposal for Regional Meeting on Signal Processing for Healthcare 4.0 has been reviewed by IEEE SPS, USA and sanctioned an amount of USD 1800 (Rs.147000/- approx.). The proposal was submitted by **Dr. Vijay Jeyakumar** and **Dr. Venkateswaran N.**

A Project titled "A powered EMG-based embedded system controlled transfemoral prosthesis", with Personal Investigator (PI) as Dr. G. Satheesh Kumar, Associate Professor, Co-PIs as **Dr. M. Dhanalakshmi, AP/BME**, Dr. P. Vijayalakshmi, Prof & Head/ECE, Dr. P. Rajini kumar, Tamilnadu Sports University have been sanctioned a total budget of Rs. 34,81,808. under SERB- CRG scheme.

Dr. K.Nirmala, AsP/BME and **Dr. R.Nithya, AP/BME** submitted a project proposal titled ˝Development of a decision support system for ocular disorders using thermal image to SERB CRG, 23.49Lakh.

FACULTY VENTURES

Faculty Development Programmes Attended (FDP)

Dr. M. Dhanalakshmi AP/BME and **Dr. J. Vijay AsP/BME** attended ″Course design workshop‶ organized by SSN School of Advanced Career Education during 19-20 Jan 2023.

Dr. M. Dhanalakshmi AP/BME and Mr. Viswanath. S presented their Business model of ″Composite blade‶ in the ″Lean Canvas Business model competition‶ held on 18 Jan 2023. The programme was organized by SSN incubation foundation and SSN IIC. External jury members evaluated the projects and the project won Second place.

Ms. Divya B, AP/BME attended the Brain, Computation, and Learning (BCL,2023) International Workshop at the Indian Institute of Science, Bengaluru from January 9-13, 2023. sponsored by the Indian Institute of Science and the Pratiksha Trust.

Dr. S. Saranya, AP/BME attended ″Web of Science Training & Certification Program 2023-Effective scientific discovery and writing leveraging‶ on January 30, 2023.

Dr. S. Saranya, AP/BME attended a 3-day webinar on ″Web of Science Training & Certification Series 2023‶ conducted by Clarivate from 1-3rd February 2023.

Dr. A. Kavitha HoD/BME, Dr. S. Pravin kumar AsP/BME, Dr. S. Arun Karthick, AsP/BME, Dr. M. Dhanalakshmi AP/BME, Dr. R. Nithya AP/BME, Ms. B. Divya AP/BME, Ms. Thangam Regi Research Scholar/BME and Mr. Viswanath. S (alumni 2019 Batch) has attended a four day workshop on ″I-NITIATE Program conducted by GDC, IIT-Madras" organized by SSN I-Found during 21.02.2023 to 24.02.2023.

Dr. R. Subashini AP/BME and **Dr. Sachin AP/BME** attended two days discovery workshop to develop technology enabled course material on 17th and 18th March 2023 at SACE block, SSN College of Engineering.

FACULTY VENTURES

"Towards the Foundations of Perception Engineering" organized by IIT Madras

FDP

Dr. A. Kavitha HoD/BME, Dr. S. Pravin kumar AsP/BME and **Ms. B. Divya AP/BME,** attended a talk on "Towards the Foundations of Perception Engineering" organized by IIT Madras on February 2, 2023.

Perception Engineering is an emerging discipline that involves designing, creating, and maintaining perceptual illusions (visual, auditory, haptic etc...). This uses engineering and mathematics principles but borrows heavily from the sciences of psychology and neurosciences. Dr. Steven M. Lavalle, the speaker from University of Oulu, Finland discussed about the progress towards developing mathematical foundations that attempts to bring the human-centered science of perceptual psychology, neuroscience, and physiology closer to core engineering principles by viewing the design and delivery of illusions as a coupled dynamical system. He also shared about his work on developing a unified "Brain Theory", which covers both robotics and VR by applying Von Neumann-Morganstern game-theoretic principles of information spaces.

FACULTY VENTURES

"Innovation and Entrepreneurship" (I-NITIATE program) by the Gopalakrishnan Deshpande Centre for Innovation & Entrepreneurship (GDC).

FDP

Dr. A. Kavitha HoD/BME, Dr. S. Pravin kumar AsP/BME, Dr. S. Arun Karthick, AsP/BME, Dr. M. Dhanalakshmi AP/BME, Dr. R. Nithya AP/BME, Ms. B. Divya AP/BME, Ms. Thangam Regi Research Scholar/BME and Mr. Viswanath. S (alumni 2019 Batch) attended a four-day workshop on ″I-NITIATE Program conducted by GDC, IIT-Madras" organized by SSN I-Found during 21.02.2023 to 24.02.2023. Shreya M, Srilalitha R, Aswin J, Prathibha P and Shri Thrisha A, third year students, BME also participated in the same along with the faculty. The program was conducted at the campuses of IITM and SSN College of Engineering.

The objective of this program was to enhance the entrepreneurial capabilities of the participants so that they can better appreciate the process of commercialization of research through startups. The workshop introduced key ideas such as what is meant by developing an entrepreneurial mindset, appreciating the main risks at different stages of development of a startup, and gaining a nuanced understanding of key business concepts such as problem identification, customer segmentation, value proposition, unit economics, and business models.

The workshop included lectures, discussions, talks by experts, class exercises, and provided feedback to teams on their presentations/assignments. It also served as a preparatory launchpad for participant teams to rapidly develop their entrepreneurial thinking and qualify for their advanced programs such as I-NCUBATE or I-NSPIRE.

FACULTY VENTURES

"Innovation and Entrepreneurship" (I-NITIATE program) by the Gopalakrishnan Deshpande Centre for Innovation & Entrepreneurship (GDC).

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On the 1st Day of the Workshop, the participants were taken on an IITM Research Park campus tour to the Healthcare Technologies Innovation Center (HTIC). There were many projects displayed including ArtSans, Mobile Eye Surgery Unit, Neonatal Transport Unit and iQuant. HTIC developed the iQuant, lateral flow immunofluorescence assay test kit reader, that utilizes a specially designed optics module (that houses a laser, optical elements, and photosensor) to capture the fluorescence created by the chemical reaction occurring on the test kit and apply necessary calibration information to convert the electrical signal to the final result value.

The initiative of Mobile Eye Surgical Unit (MESU) was displayed as a model and was explained to the team. It is a self-contained, safe and sterile surgical facility that can travel to remote locations and perform cataract surgery on-site, reaching to resource deprived patients and providing faster, safer and reliable remedies. The MESU, developed by HTIC in 2011, was handed over to Sankara Nethralaya in 2012. After the pilot stage was successfully completed with no post-operative complications, the MESU has been extensively used by Sankara Nethralaya, and a total of 840 cataract surgeries were performed till March 2014. From April 2014 to March 2015 the MESU was used to conduct 7 surgical camps, in which nearly 3700 subjects were screened, and 541 surgeries were performed. By March 2020, over 16000+ surgeries have been performed with more than 122+ surgical camps.

FACULTY VENTURES

"Innovation and Entrepreneurship" (I-NITIATE program) by the Gopalakrishnan Deshpande Centre for Innovation & Entrepreneurship (GDC).

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Shreya M and Srilalitha R presented a prototype of a prosthetic arm, on behalf of Team Protesis, under the guidance of **Dr. A. Kavitha HoD/BME, Dr. S. Pravin kumar AsP/BME, Dr. R. Nithya AP/BME, Ms. B. Divya AP/BME** and Mr. Omar Saleh, Founder & CEO, RECYCL3D.

DR.A. KAVITHA
PROFESSOR & HEAD, BME
FACULTY LEAD

DR.R.NITHYA
ASSISTANT PROFESSOR, BME
ENTREPRENEURIAL LEAD

DR.S.PRAVIN KUMAR
ASSOCIATE PROFESSOR, BME
ENTREPRENEURIAL

MS.B.DIVYA
ASSISTANT PROFESSOR, BME
ENTREPRENEURIAL LEAD

MR.OMAR SALEH
Founder & CEO - RECYCL3D,
A Canadian Start-up

SHREYA M
3rd year, BME
STUDENT MEMBER

SRILALITHA R
3rd year, BME
STUDENT MEMBER

Mr. Viswanath. S presented his project on Composite blades for lower extremity amputees representing Impact Biomedical Solutions along with **Dr. M. Dhanalakshmi AP/BME.** Ms. Thangam Regi Research Scholar/BME explained her idea of Green 3D which includes upcycling of plastic wastes into 3D printing filaments.

FACULTY VENTURES

Experiencing the Brain Up Close -The Brain, Computation and Learning Workshop (BCL 2023)

FDP

The Brain, Computation and Learning Workshop was held at the Indian Institute of Sciences, Bangalore from the 9th to the 13th of January, 2023. **Ms. Divya B, AP/BME** and **Poorvica R, III Yr/BME** had the opportunity to be selected as two of the 90 participants out of the 948 applicants from all over India, which happened through a competitive and rigorous selection process. The workshop was funded by a generous endowment from the Pratiksha Trust, which has been significantly promoting fundamental and translational neuroscience research within the country through the establishment of research centres and chair professorships at the Indian Institutes of Science (Bengaluru) and Indian Institute of Technology Madras (Chennai).

The purpose of the workshop was to promote synergistic interactions among neurobiologists and computer scientists. The workshop also allowed young researchers to understand the diverse themes of research and appreciate the close relationships between these apparently distinct themes. The days went by with talks by a total of 25 eminent speakers such as Professor Rajesh P.N. Rao, Professor Arindam Basu, Professor Veeky Baths, Professor Anand Raghunathan and many more. The participants were able to get an insight into the different topics of Neuroscience including Bayesian Theories of Brain Function, Neuromorphic Technologies for BCI, Non-Invasive Brain Sensory Stimulation, Assistive Technologies for Rehabilitation and Motor Cortical circuits, among many others.

FACULTY VENTURES

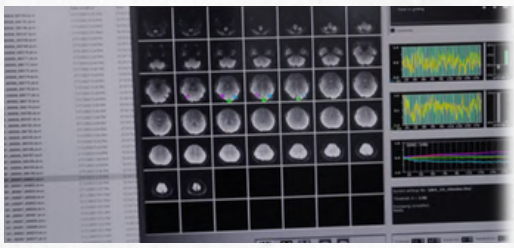
Experiencing the Brain Up Close -The Brain, Computation and Learning Workshop (BCL 2023)

FDP

"They were interspersed with short breaks which could be utilised to munch on the various delicacies offered and strike up conversations with other participants and the speakers themselves. Walking around the lush green campus with fellow participants, interacting with them on the various topics they work on and getting their perspectives on different subjects, was an added bonus", says Poorvica.

Demonstrations of the different equipment used with the latest technology were extremely helpful in giving a better understanding of the working methodologies to them. They were also fortunate enough to be able to see some of the labs up close- such as the fMRI facility with Real Time fMRI imaging modality. The team at the Centre for Neuroscience of IISc guided them through real-time working of Functional Magnetic Resonance Imaging and one of the PhD students was sent into the MRI Scanner for her brain to be imaged. The BOLD response of the person was retrieved using the Turbo BrainVoyager System and visualised. Several Slices of the brain were made and the desired points of visualisation were marked using three different colours.

The aim of the experiment was to analyse the activation of the lower and higher regions of the brain with respect to two activities performed. The participant was made to look at 2 images- a grating and a picture of a person. The scan was started and the functional responses for the two activities were separately retrieved and displayed. The green colour refers to the response to the face of the person while the grey refers to the response when the patient observed the grating.



FACULTY VENTURES

Experiencing the Brain Up Close -The Brain, Computation and Learning Workshop (BCL 2023)

FDP

Turbo BrainVoyager took care of filtration, smoothing and registration and gave us final slice images with ease. The display screen of the Turbo Voyager software is seen. The graph on top depicted that the green bar was more significant than the grey. This was because the person involved had a higher BOLD response in the higher regions because visualising the face was a more complex reaction.

The second graph depicted the lower region activation and here the grey bar was more significant. This was because the lower region was activated for the less complex task of seeing the grating. This showed the different activation patterns of the brain while performing tasks and confirms the specificity of activation.

They also visited the MEMS Biomedical Lab which gave them an insight into the manufacturing process of the electrodes for various acquisitions and their uses. It was explained methodically by one of the PhD students and sample electrodes made in the same lab were shown to them. They also had the opportunity to understand the different applications of these electrodes, ranging from monitoring the pediatric airway of infants to implantation of the chips in mice and subsequent study and even the usage to acquire other bio signals of the body.

FACULTY VENTURES

Experiencing the Brain Up Close -The Brain, Computation and Learning Workshop (BCL 2023)

FDP

There was a panel discussion at the conclusion of each day where participants could ask speakers and organizers questions on a lot of topics, including how to enhance research methodologies, opportunities for cognitive neuro researchers in India, what professors consider when evaluating a candidate's proposal, etc.

Another important aspect of the workshops series was the demo session. Various tables were setup with projectors and the working of different technologies were understood including cameras for movement detection. Overall, the five days of discussions were quite fruitful.

FACULTY VENTURES

Experiencing the Brain Up Close -The Brain, Computation and Learning Workshop (BCL 2023)

FDP

Being the youngest undergraduate student at the conference, I was ecstatic to have been able to get this opportunity to expand my knowledge and understand the different research areas in the neuroscience-computational domain.

-Poorvica. R, IIIyr Student/BME

BCL 2023 was an excellent start to the forthcoming research emphasis in this discipline for me as a cognitive neuroscience researcher and faculty member teaching courses in brain-computer interface. It was a useful forum for academics, physicians, scientists, and aspiring cognitive neuro researchers to exchange ideas. We are very grateful to the Biomedical Department, SSN College of Engineering, and the Indian Institute of Sciences, Bangalore for having given us the opportunity to be a part of something bigger, which reminds us of our purpose to better the systems of healthcare through novel technologies and research in the field of Neuroscience. This was indeed an exciting and memorable scientific program for the brain and AI community of India.

-Ms. Divya B, AP/BME

FACULTY VENTURES

Farewell to Dr. Mahesh Veezhinathan, AsP/BME

After 14 years of inspiring and guiding students as Associate Professor in the Department of Biomedical Engineering, SSNCE, Dr. Mahesh Veezhinathan resigned from his academic position to fully embrace his passion for product development in the industry.

Having joined the department in 2009, he was one of longest serving professors, specializing in Medical Device Design, Medical Imaging, Biosignal Processing, Brain Cognition, Music Perception, Virtual Reality and Machine Learning. Highly skilled in technical tools like MATLAB, Python and LabVIEW, he has published more than 60 papers in international and national journals, conferences, and books.

He has also worked on a SERB-supported project as co-principal investigator on Design and development of Biofeedback for Learning Disability for Indian school children.

Dr. Mahesh has guided three students towards their Ph.D. degree successfully. During his time here, he exhibited an uncanny grasp of student psychology, and was known for the frankness and care with which he addressed students. Over the years, he has led multiple teams to victory in the annual Smart India Hackathon and other innovation challenges.

FACULTY VENTURES

Farewell to Dr. Mahesh Veezhinathan, AsP/BME

With experience in leading several project development engagements in healthcare and pursuing medical device development through his entrepreneurial venture, GEM Design Innovation, he has now taken up the position of Principal at the Innovation wing of Forge Innovation & Ventures.

A formal farewell was organized by the department on February 10th, 2023. We wish him all the best in his pursuit of biomedical innovation.

It was a great pleasure working with you. Thank you for being a great colleague and good luck for your future endeavors.
- Dept of BME/SSN.

STUDENT PURSUITS

Co-curricular Activities

The following students have completed an internship at Cardiac Design Labs from 6.2.23 - 17.2.23 in offline mode in the Cardiac Design Labs office in Bangalore,

- Abishek P S
- Harish Narayanan
- Jeni Christina
- Praveenkumar K R
- Sharmila G

Meera Kumar, Devadharshini and Poorvica of 3rd year BME and Kritik Varshi of 4th year BME successfully completed the 10-day Unleash program (2-11 Dec, 2022) conducted by UNLEASH Global Innovation Lab 2022 at Mysore.

Giridharani R and Supriya R S of 3rd year BME successfully completed a one week internship program in Big data for data engineering from Marcello tech on 19 December 2022

Srivibha Parthasarathy of 3rd year BME successfully completed Supervised Machine Learning: Regression and Classification an online non-credit course authorized by DeepLearning AI and Stanford University and offered through Coursera on 19 January 2023.

STUDENT PURSUITS

Co-curricular Activities

Sanctioned Internally Funded Projects

Harshini Ramachandran, S.Harihara Sudhan and S.Aravinthan of II year BME was sanctioned an Internal funded student project titled "Assistive walker with guidance for posture correction" guided by Dr. S. Saranya, Assistant Professor, BME. Budget: 28000

Pradiep Kumar G.D and Praveen Kumar K.R of III year BME was sanctioned an Internal funded student project titled "Drowsiness detection an prevention using EOG and Binaural rhythms' ' guided by Dr. S. Saranya, Assistant Professor, BME. Budget: 30000

Internal funded student project by **Aarya Raghavan and Dhanya R** titled ˝Assistive training device with biofeedback for amputees˝ guided by Ms.B.Divya and Dr.S.Saranya was selected to be pursued under build club initiative by SSN ifound and IITM Incubation cell.

Anusha A,Giridharani R,Shivapriya S and Supriya R S of III year BME was sanctioned an Internal funded student project titled "Development of Game based Virtual Environment for Post Stroke Treatment" guided by Dr. J. Vijay, Associate Professor, BME. Budget: 26000

R Srilalitha and A Swetha of III year BME , **S A Lingeswar and R Buvan Sankar** from III Year CSE was sanctioned an Internal funded student project titled "Brain computer interface using P300 audiovisual spellers - Tamil language" guided by Ms.B.Divya , Assistant Professor ,BME and Dr.S.Kavitha , Associate Professor ,CSE Budget: 17000

T.V. Santhoshiya IV Year,BME , **T. R. Mahitha ,A.L. Raajameenakshi** of III year BME was sanctioned an Internal funded student project titled " Fabrication of flexible werable sensor using Au nanomesh/PVA nanofibers" guided by Dr.S.Arun Karthick ,Associate Professor , BME and Dr.L.Suganthi , Associate Professor , BME . Budget : 24000

STUDENT PURSUITS

Co-curricular Activities

Sanctioned Internally Funded Projects

J. Jeevan, R. Loshigha , C Manimaran , S Shreenidhi of II year BME was sanctioned an Internal funded student project titled " Miniaturized sensor for continuous physiological Monitoring in the neonatal intensive care unit(NICU)" guided by Dr.S.Arun Karthick ,Associate Professor , BME and Dr.L.Suganthi , Associate Professor , BME . Budget : 24000

K. B. Krithiukha, R. Karthick Siva , M. Renukka Shanmuga Sundari ,II Year BME **B. Rajalakshmi** ,II Year Civil was sanctioned an Internal funded student project titled " Wearable bowling action analyser" guided by Dr. Sachin Gaurishankar Sarate ,Assistant Professor , BME . Budget : 23000

G.Jeni Christina , K.Santhoshi , G.Sharmila , III Year BME was sanctioned an Internal funded student project titled "Albumin as a carrier to deliver Ruthenium based anticancer drug " guided by Dr. R. Subashini ,Assistant Professor , BME . Budget : 24000

STUDENT PURSUITS

Let's Hear it from Supraja, III yr BME

Internship Experience

INTERNSHIP AS AN ANALOG ENGINEERING INTERN AT NEUROSTELLAR, A STARTUP AT IIT MADRAS RESEARCH PARK

How did it Begin?

Post the tech talk by Mr. Karthik, the co-founder of Neurostellar, I had the opportunity to talk to him in person to clear my doubts regarding BCIs and Neurotech as a field, and proceeded to ask if they take any interns. I requested my class incharge Dr. Saranya to follow up on the same. Luckily, they were hiring, and Dr. Saranya soon sent an email linking their website, asking for applications, where I submitted my resume and relevant academic details, and waited for a reply.

The Interview process:

The HR team from Neurostellar called me within 20 days of my application, informing me that I was selected for the Round 1 Interview. Round 1 was a short g-meet with Dr. Fayaz Pathan, Chief Technology Officer, Neurostellar, and he questioned me over the basic concepts of analog electronics, filters and embedded systems. Since I expressed an interest in Neuroscience, he also questioned me on neuroplasticity, EEG bands and analysis of state of mind. I was able to answer most of his questions, and at the end of the call, Dr. Fayaz informed me that he was satisfied with my sound knowledge of base concepts. The Round 2 selection email came within the next 3 days, and it was a technical round. The task was already provided to me with the email, and in the forthcoming meeting, I had to make a presentation on the topics mentioned.

STUDENT PURSUITS

Internship Experience

I was requested to explain the working of BJT, FET and CMOS, Op-Amps, Microcontroller architecture and basic modules of embedded C language. Since the last two wouldonly be taught in the 6 th semester, I approached the respective professors during my study holidays to teach me the basics of each. I would like to thank them for their patience in not only going over the basics of each topic, but also giving me insight into what kind of questions could be asked and how to maintain my composure during the interview. During my presentation, Dr. Fayaz again questioned me on the topics presented, and appreciated my grasp on the concepts. I was contacted within the next week for Round 3, which would be a "culturefit" round with Dhanushya, co-founder, Neurostellar. On the surface, it was a casual talk about interests, previous projects and talents, but she used the call to gauge mypersonality and work ethic, to determine if I would fit in with the vision and culture of Neurostellar. A week later, I received my acceptance email into the team! I was also askedto submit the copies of documents, and sign the onboarding letter. My working duration and dates were fixed in another call with the HR.

The Work:

She started working as an intern on the 10 th of January, 2023. She was mainly responsible for analog engineering and biomedical signal processing. During her internship, she conducted literature surveys on EEG signal processing, how to extract heart rate, Heart rate Variability and Respiratory signal, all by processing PPG waves.

STUDENT PURSUITS

Extra-curricular Activities

Student Achievements

Ashwin Kumar M and Arushi Sahu from the final year were appreciated by our President Dr Kala Vijayakumar personally at the SSN Trust Office,Adyar for their exemplary contribution towards the SSN-SNUC Diary 2023 Design.

Dr. Sunita Nair honoured Ashwin Kumar M from the final year for his outstanding work as the public relations head for Instincts 2023.

Dr Sunita Nair honoured Arushi Sahu from the final year for her exceptional accomplishments as a Design Committee core member for Instincts 2023.

STUDENT PURSUITS

Extra-curricular Activities

Student Achievements

Aswathama, Sanjeeth, Suke Bhargav from the III yr BME, and **Rithika** from the final year BME kicked off in this years' Season of Dance Battles, 2023 representing N2K, The Western Dance team of SSNCE. Hardwork, dedication and passion for dance has earned them and the team a very good position and name amongst the dance teams of various colleges across the State. Yet, their first dance battle in MITAFEST conducted by MIT, chennai on March 12th was a failure. But the team bounced back with an indomitable spirit & has made their failure into a steppingstone for success. Following this, it was and is a victory run for them winning in all the competitions participated till date as listed below,

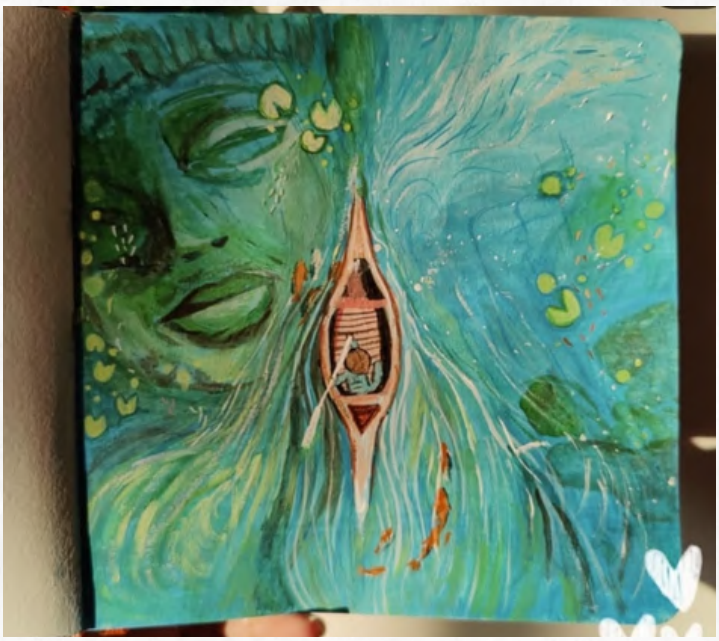
1) FINAC, Organized by Gurunanak College - Won Third Place.
2) ENTRAL, Organized by Alpha College of Engineering - Won First Place.
3) TAKSHASHILA, Organized by Chennai Institute of Technology - Won Third Place alongwith a cash prize of Rs. 10,000.
4) SAMGATHA, Organized by IIITDM, Kanchipuram - Won First Place alongwith a cash prize of Rs. 10,000.

The Department of Biomedical Engineering heartily appreciates the various achievements and efforts of all the students in extra curricular and co - curricular activities and wishes the students to reach greater heights in their future.

STUDENT ENDEAVOURS

Art Corner

Art by Poorvica, III yr BME

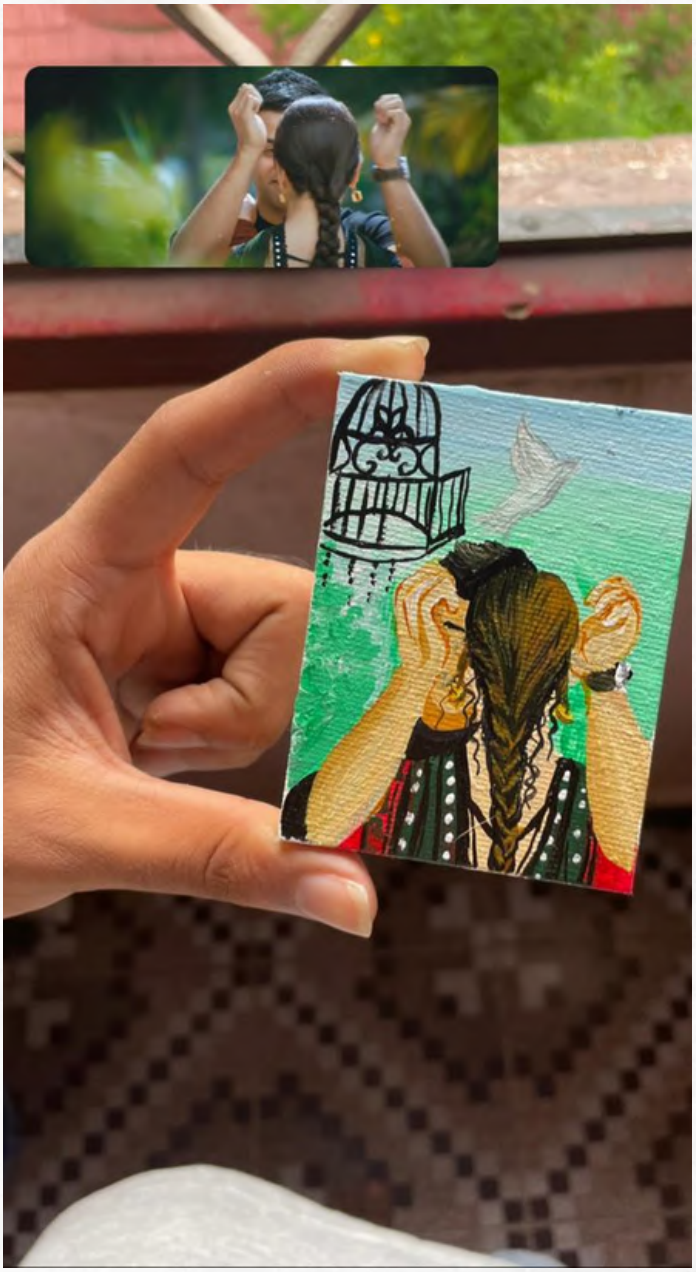


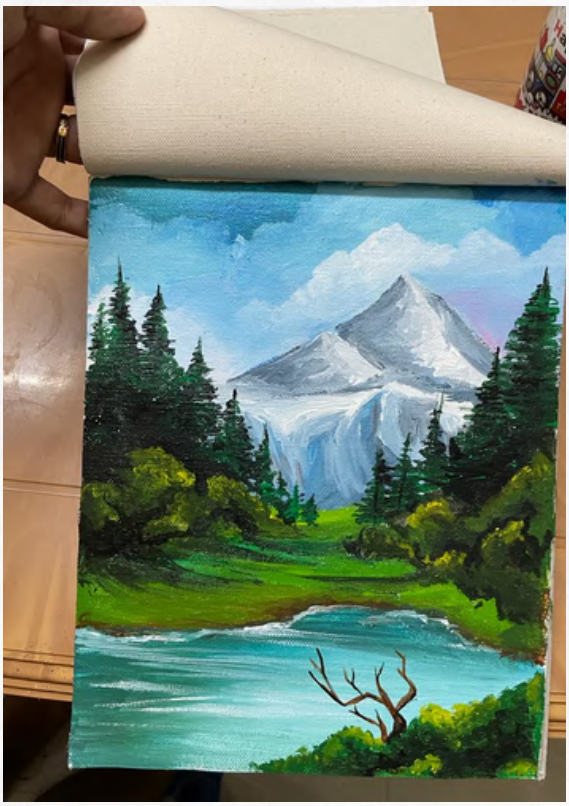
Creative and enterprising, Poorvica Ramanand of III Year BME shares some of her artwork with us. Find out more at her online art store: The Print Collective.

STUDENT ENDEAVOURS

Art Corner

Art by Sarvajith, II yr BME





STUDENT ENDEAVOURS

Art Corner

Art by Sarvajith, II Yr BME

"Art is something that has always been deeply personal to me, something that makes me feel Most like myself . It's more of a comfort zone rather than hobby and the way I feel most adept to express my thoughts.I draw inspiration from day to day events and strive to portray the same through this medium."

-Sarvajith P

STUDENT ENDEAVOURS

Poetry Corner

Literature

Half Formed resume

What are we all so worried about,
Frightened whispers into the night
Prayers beneath our breath
To score and achieve.
I put my life's work together
On a single side of paper
And choose it to determine fate-
Paint a picture of myself,
For your palate.
Things work sometimes,
Or they might hate your face-
Why cry over spilled beans
When you can just create means to buy more?

To be okay

You know you'll just be okay
When you work
Till your while being
Shivers with exhaustion
And your eyes cloud
With salty perspiration
And you push yourself
For that one last lap
And keep pushing
Till another- and yet another
I know
You won't fall.
The places where you tripped
Is your terrain now.
With all these lessons
You've learned in your way
You know
That you'll just be okay.

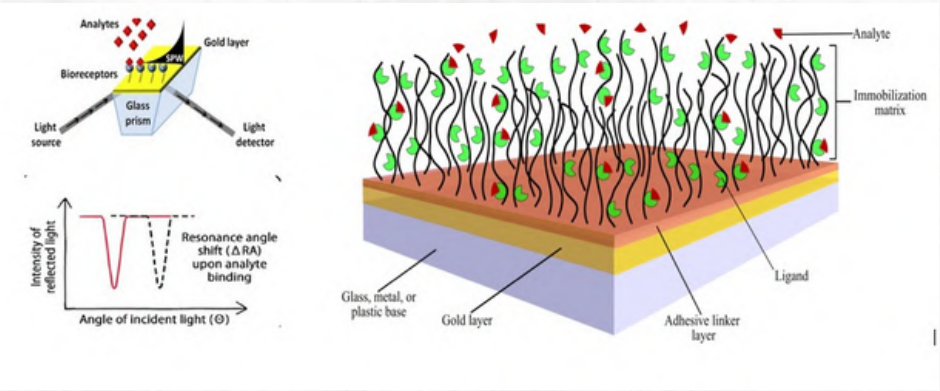
A prolific wordsmith, Supraja Vaidhyanathan of III Year BME taps into the student's pathos in the two featured poems.

THINK PIECE

Surface Plasmon Resonance (SPR) in Clinical analysis

Student Articles

Surface plasmon resonance (SPR) is a technique used to study the interaction between molecules, typically in the context of biochemistry and molecular biology. SPR refers to the collective oscillations of electrons on the surface of metal nanostructures that occur in response to an external stimulus such as light or a charge. When the particle size reaches the order of nanometres, the electron can spontaneously accelerate on the surface of the particle and absorb electromagnetic waves of a certain wavelength.SPR is commonly used in the study of protein-protein interactions, protein-ligand interactions, and DNA-protein interactions. It is a label-free technique, which means that it does not require the use of fluorescent or radioactive labels to detect the interaction. SPR has become a widely used tool in drug discovery and other areas of research where the study of biomolecular interactions is important.



Several scientists joined to explore novel analytical applications in areas including food safety (e.g., mycotoxins, genetically modified organisms (GMO)), microbiological contamination (e.g., Escherichia coli), doping analysis, laboratory medicine, proteomics, bacterium detection, and environmental monitoring. Clinical analysis has undoubtedly also been investigated as a promising application area among them.

THINK PIECE

Surface Plasmon Resonance (SPR) in Clinical analysis

Student Articles

An SPR biosensor is a type of biosensor that uses surface plasmon resonance (SPR) to detect the interaction between biomolecules. In an SPR biosensor, a thin metal film (usually gold or silver) is coated onto a glass slide or a prism. The metal film is then coated with a layer of molecules, such as antibodies, that are specific to the target molecule of interest. When a sample containing the target molecule is flowed over the metal surface, the target molecule binds to the immobilized molecules on the surface, causing a change in the refractive index of the medium near the metal surface. This change in refractive index causes a shift in the angle of the reflected light, which is detected by a detector and used to quantify the binding interaction.

Applications of SPR for Pharmaceutical Analysis:

·High-Throughput Screening
·Hormone detection
·Protein biomarker
·Cancer biomarker
·Cardiac biomarkers
·Antibodies for immune disorders
·Nucleic acid sensing
·Pathogen detection
·Pharmacokinetic drug profiling

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-VENKATESH M
II YEAR , BME

THINK PIECE

Shedding Light on the Brain – The Revolutionary Technique of Optogenetics

Student Articles

Have you ever wished you could read minds, control your dreams, or even move objects with your thoughts? Though these may seem like superpowers, the cutting-edge field of neurotechnology is bringing us to closer to fulfil our wish than ever before. Neurotechnology is a field which combines both neuroscience and engineering which helps us understand our brain and provide new ways to interact with it. This field has been seeing new mind-blowing innovations from brain-computer interface (BCIs) to Optogenetics.
Optogenetics, as the name suggests is a technique which uses light to control the activity of neurons in brain. The neurons are genetically modified to express light-sensitive proteins called opsins. This allows activation or inhibition of specific neural networks. The researchers can study specific neural circuits by shining light on these neurons, which selectively activate or silence them.

Optogenetics has been a powerful tool for researchers to understand the complex working mechanism of brain. This helps investigate multiple brain functions like memory, learning, perception, emotions etc. It also plays a vital role in understanding the complex mechanisms behind neurological and psychiatric disorders like Parkinson's disease, addiction, depression, anxiety. Optogenetics also has the potential to revolutionize the field of Precision Medicine. Due to their ability of targeting specific networks, they help provide targeted treatments for these disorders. This field has already started making its breakthroughs. The precise control over protein expression and oligomerization helps researches gain a better understanding of the molecular effects of AD. More recent studies have shown that optogenetics also promotes neural remapping and helps improve cell survival after injuries. These properties have led researchers to study the application of optogenetics in CNS injuries to help patients attain full functional recovery post injuries.

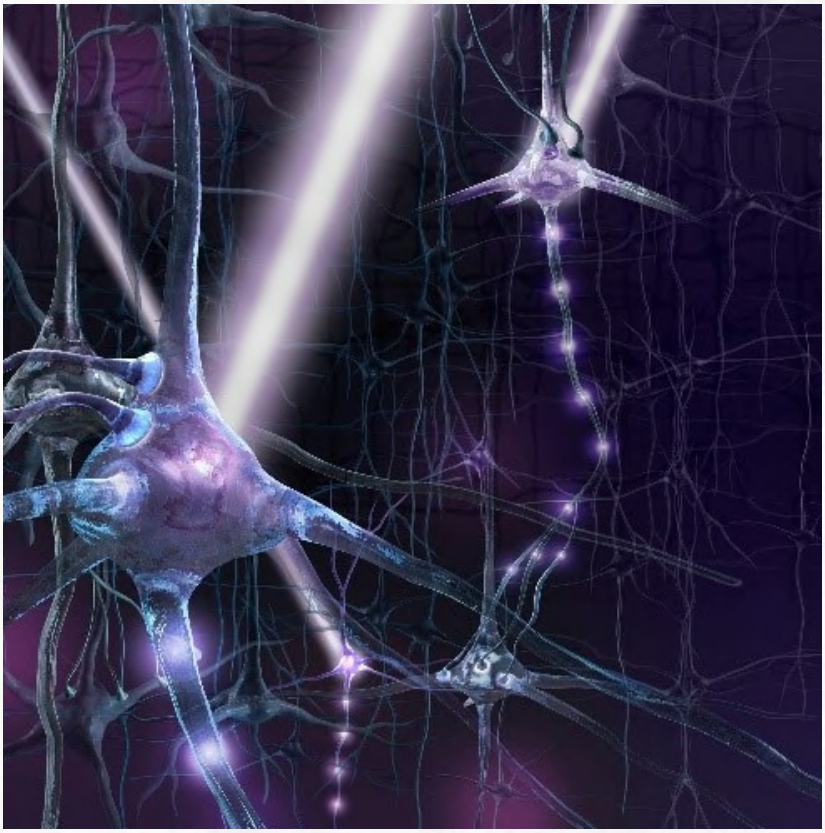
THINK PIECE

Shedding Light on the Brain – The Revolutionary Technique of Optogenetics

Student Articles

Despite its promising potential to revolutionize the field of medicine, this technique is still in early stages of development. The biggest challenge is delivering light precisely to specific regions of brain as the skull and brain tissue can scatter and absorb light. Another challenge is precise genetic targeting to ensure that only the desired neurons express opsin proteins.

In conclusion, optogenetics is an ingenious technique, which has the potential to improve targeted therapies that could significantly improve the lives of people with neurological and psychiatric conditions.



-AISHWARYA S
II YR, BME

ALUMNI CORNER

SSN'S TRIBUTE

On January 7th 2023, Around 40 BME alumni visited the department and attended **Tribute 23.** Around 15 alumni from Batch 2021, 7 alumni from Batch 2019, and 18 from other batches visited the department and attended the Tribute '23.

Few notable alumni, **Mr. Pranav Krishna R (Batch-2021)** who has completed his Master of Science in Biomedical/Medical Engineering from The John Hopkins University in Baltimore attended the Tribute '23. He was also the Anna University gold medal winner in his undergraduate program. Also **Mr. Gurucharan (Batch-2021)** who is currently studying Master of Science in Neuroscience in McGill University, Canada also attended the Tribute '23. He was the 'Best Outgoing Student' of the department in his batch.

ALUMNI CORNER

ACCOMPLISH -MENTS

Mr. Viswanath. S (Batch-2019) along with **Dr. M. Dhanalakshmi AP/BME,** presented their **Business model of ˝Composite blade˝ in the ˝Lean Canvas Business model competition˝** held on 18 Jan 2023. The programme was organized by SSN incubation foundation and SSN IIC. External jury members evaluated the projects and the project won **second place.**

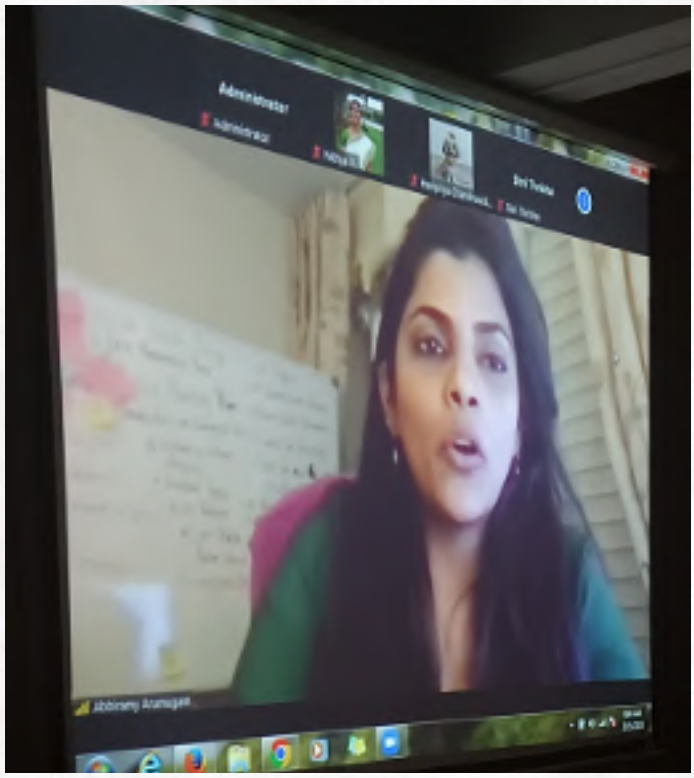
Abhinaya (Batch of 2015), CEO of Merkel Haptic (First startup for touch technologies in India) met **Dr. Kala Vijayakumar, Dr. A. Kavitha** and team from SSN to demonstrate the functioning of XTIC center at IITM research park, Chennai on Feb 05, 2023.

ALUMNI CORNER

PATHFINDER

Abbiramy Arumugam (Batch of 2011), UX Leader, Digital Health, Massachusetts, USA gave a talk to current BME students on her career path towards **UX development on 15.02.23 in the alumni talk series Pathfinder.**

She Worked in Cognizant for a short time before moving to US for her master's in biomedical engineering from University of Connecticut after which she worked in Philips for more than 5 years and is now currently in Verily as a UX Research lead Lead.



ALUMNI CORNER

INSPIRE

Thamizhamuthan Shanmugam
An Inspirational Biomedical Journey

I am Thamizhamuthan Shanmugam from the BME 2017 batch, and I currently work as an Associate Technical Engineer at Span Healthcare. Whenever I hear the name SSN, it brings back memories and excitement. Joining SSN College is a dream for many, and I was no exception.

Coming from a rural background, my school studies were not up to the mark, and my 12th grade was just about 50%. However, my passion for engineering was very high, so I joined a diploma course. I enjoyed each and every subject, especially the practical work, and in the end, I scored 93% and got placed in a France-based MNC. However, I always had the desire to do a bachelor's in engineering, so I resigned from my job and joined SSN College of Engineering, even though I was not financially independent.

As a lateral entry student, I found it difficult to adapt, but our faculties helped me a lot in this regard. I had a high fear of the M3 and M4 papers, which are very tough for lateral entry students, but the Math Department faculty helped me a lot to overcome this hurdle. In our department, our faculties helped me a lot, and as Socrates said, "I cannot teach anybody anything; I can only make them think," here our faculties made me think about what's next.

In one instance during my final year, my team's final project was selected for the "Demonstrating Prototype for Viable Startup" competition at the National Research Development Corporation (NRDC)-Delhi. We didn't have critical laboratory equipment like LabVIEW DAQ, decade resistance box, and others, and we had no time as we had to board the train the same night.

ALUMNI CORNER

Thamizhamuthan Shanmugam
An Inspirational Biomedical Journey

INSPIRE

However, our HOD helped us in a very quick manner and approved our request to carry the equipment. We competed with more than 150 teams from IITs, NITs, and other prestigious colleges in India and won that competition, bagging a cash prize of 50k. Our project mentors had prepared us in a very strong way. Not just in this one instance, but our faculties helped me in various phases of my college time.

In fact, SSN College of Engineering welcomed me with merit-cum-mean scholarships, and I got the merit scholarships all three years. I thank the SSN management and alumni for reducing my financial burden.

Now, I am going to pursue my master's in biomedical engineering abroad. I started as a diploma student, and now I am going for a master's. Nothing is impossible. I want to motivate everyone to believe in themselves, work hard, and achieve their dreams. Your background or grades do not define your capabilities. With determination and commitment, you can overcome any hurdle and clear everything.
I wish you all the best for your future and hope that you all achieve great heights in your careers.

-Thamizhamuthan Shanmugam

BIOMEDICAL INSIGHTS

Source:
IEEE Spectrum

LEARNING NEVER STOPS!

Growing Electronics Inside the Brain! Experiments in live zebra fish and leeches may one day lead to growing microchips in living tissue

Do you wonder how is it possible to grow electronics within the brain, not placing it in the brain invasively? I did. We, the editorial team did and so we are discussing about the same below.

Scientists from Sweden are growing bioelectronics in the brains of live zebrafish and leeches. They have injected a group of molecules into the brain, where the molecules after undergoing reactions with the live cells of the brain tissue, have turned out to become electronics.

They have developed a gel electrode within the brain, heart and in the tails of zebrafish simply by injecting some molecules. This greatly reduces the invasiveness of using electrodes. The Scientists are further planning to go ahead with the research on cows, swine and chicken muscle.

The scientists are now exploring chemicals that might guide molecular building blocks to specific parts of the nervous system in an attempt to build up components and even circuits. Their detailed findings are available in the 24 February issue of the journal Science.

Visit IEEE spectrum -> Biomedical to know more.

-Pradiep kumar G D, III Yr BME

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Synergy is the quarterly newsletter published by the department of Biomedical Engineering, SSN College of Engineering. The newsletter team consists of the BME students, comprehensively guided by the Department Head and faculty editors.

Every edition of Synergy accommodates innovative thoughts, concepts, notable publications and rewards achieved by the department students and staff community.

The newsletter covers the happenings in the department, every quarter, motivates the readers and gives them the reason to celebrate our accomplishments.

The newsletter also includes brainstorming and intriguing articles that takes the readers into the astonishing world of biomedical engineering.

உள்ளுவ தெல்லாம் உயர்வுள்ளல் மற்றது
தள்ளினுந் தள்ளாமை நீர்த்து.

Think ever of rising higher.
Let it be your only thought.
Even if your object be not attained,
the thought itself will have raised you.

-Thirukural