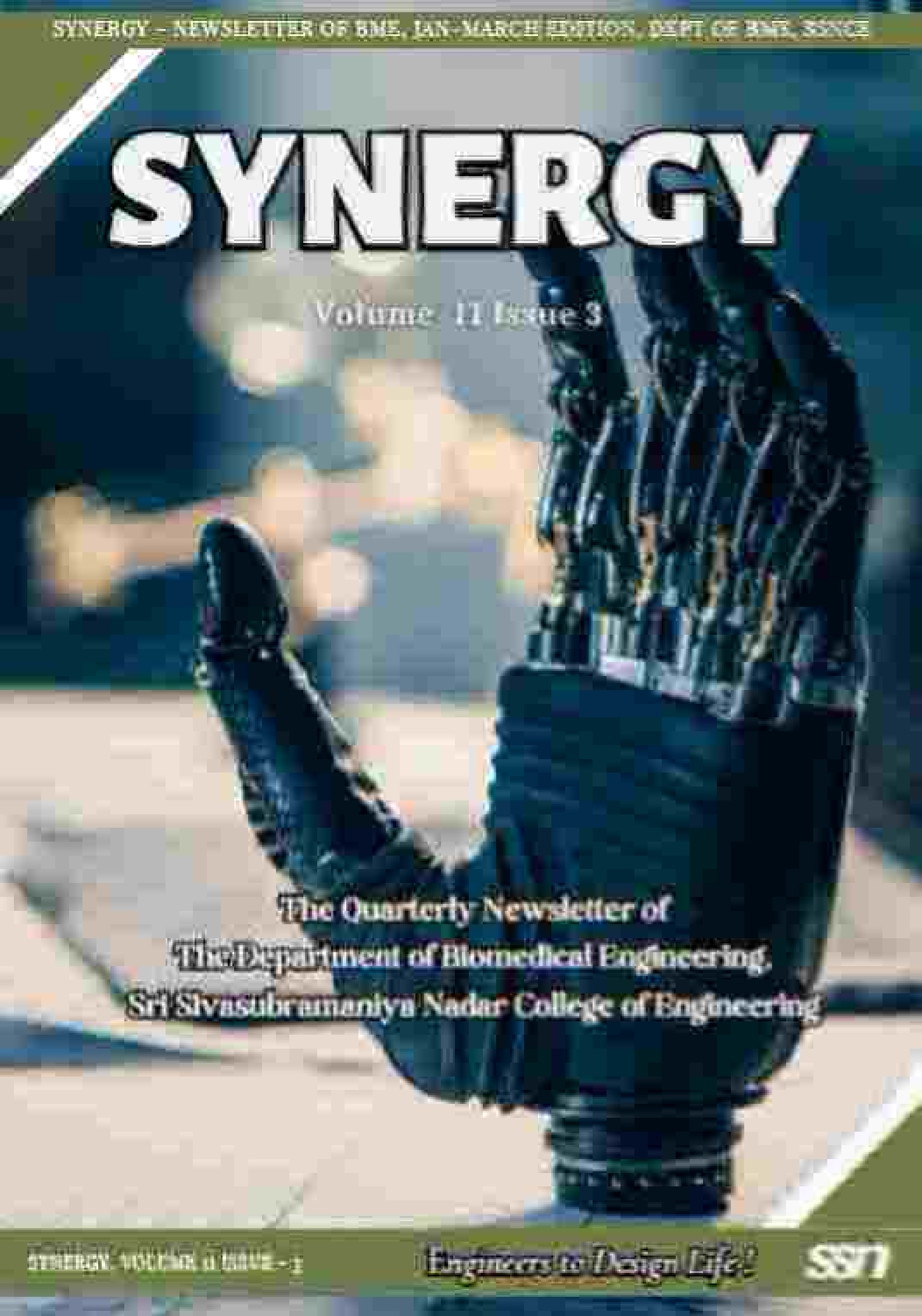
SYNERGY

Volume II Issue 3



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

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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 wondrous 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 explore paths 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 team-wise. 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 coordinated 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, [illegible] Mr. Vishnu and Mr. [illegible], technical experts from [illegible] 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 [illegible] potential of the biomedical community [illegible]. Around 30 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 applications in several fields. The workshop primarily focused on explaining the basics of AR and Virtual reality [illegible].

DEPARTMENT VENTURES

EVENTS ORGANIZED

DAY 1

The instructors introduced the participants to AR, MR, 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 include three-dimensional space, directional light, inspection window, 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 the choice. Hence, by the end of the first day, they started working on their own AR and VR projects in 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 to 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 engine (UE) tool. Vuforia is a comprehensive, scalable enterprise AR platform. Unreal engine is one of the world's most advanced real-time 3D creation tool for photoreal visuals and immersive experiences. They placed a figure into the 3D space and gave it animations to perform.

During the second half of day two, the participants worked on the creation of meta-humans using Avaturn. Avaturn is an open platform that can create a realistic 3D avatar with a selfie and exports it as a 3D 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.IAI & ISE 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 ICBME 2019 was conducted by Machem Innovations Pvt. Ltd. and the Centre for Healthcare Technologies, SSNCE. The interviewers were Mr. Vishnu PJ, CEO & Founder of Machem Innovations and Mr. Eswar KH, Product Strategist, Machem Innovations.

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

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

- Abdullah Sheriff

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 and members. And teachers for making this event an extremely informative and memorable experience.

Sahasra 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

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. Vasuki Karthi, Hon'ble Vice Chancellor, Sathyabama Institute of Science and Technology was welcomed and 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 Convener, 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 welcome of the honourable guests with words of appreciation, showing of enthusiasm and the spirit to be creative and expand our knowledge through ICBSII, having from eminent researchers around the world

DEPARTMENT VENTURES

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 Ramkumar delivered a lecture on the topic "Human augmentation with wearable exoskeleton" as part of the session. He emphasized the aspects of developing wearable device and their importance in rehabilitation through the visuals exposed in the research laboratory. It was a very informative session indeed.

The next keynote session is presided by Dr. Rajkumar Alphonse, Teaching Professor, Department of Electrical and Computer Engineering, Northeastern University, USA. He delivered the guiding about "Pattern recognition from a clinician's perspective". Dr. Rajkumar made the session very interesting by engaging with the audience. He began the lecture by discussing about a common issue. Visit to a clinic and his interactions with his physician.

DEPARTMENT VENTURES

NINTH INTERNATIONAL CONFERENCE ON BIOSIGNALS, IMAGES AND INSTRUMENTATION

EVENTS ORGANIZED

On the same evening Arthur Mcfarland 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 interacted 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 in singing, dancing, beat boxing and many such artistic talents. Their performances were thoroughly enjoyed by the audience present for the event. It was a delightful way to welcome guests [illegible]

DEPARTMENT VENTURES

ICBSII 2023

EVENTS ORGANIZED

NINTH INTERNATIONAL CONFERENCE ON BIOSIGNALS, IMAGES, AND INSTRUMENTATION

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 implementation of AI in the field of diagnosis and treatment of neurological disorders. The audience found the session very interesting to attend.

The third 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 a few 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

NINTH INTERNATIONAL CONFERENCE ON BIOSIGNALS, IMAGES AND INSTRUMENTATION

EVENTS ORGANIZED

Along with the keynote sessions, six of the paper presentation track sessions were held during the Conference, where participants were allowed to present their research articles. Each track was presided by an Invited Session Chair and a Session Chair who is an external expertise. A total of 62 papers across the globe were received under three categories: Biosignals, Medical Instrumentation, Medical Images and Systems. The shortlisted papers underwent a peer evaluation assessment by conference editors and papers with a similarity index of less than 0% were selected. All the reviewers have an expertise in assessing the clarity, quality, impact, and importance of the research. Reviewers considered the following key points related to technical content, quality, and presentation of the papers. 12 papers were selected post scrutiny, which were presented across the 4 tracks.

DEPARTMENT VENTURES

NINTH INTERNATIONAL CONFERENCE ON BIOSIGNALS, IMAGES AND INSTRUMENTATION

EVENTS ORGANIZED

The Conference ended with the Valedictory Session on 19th March. The chief guest was Dr. David Belo Senior Scientist, Machine Learning for Drug Series Foundation Portugal (FCD), Portugal. He was accompanied by Dr. A. Kavitha, Head of the Department, BME, Dr. M. Ramakrishnan, Conference Coordinator, BME and Dr. R. Nithya, Conference Coordinator, ICBSII '21 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 in the current scenario.

The Conference was organized by Dr. A. Kavitha, Conference Chair, Dr. M. Ramakrishnan, Conference Coordinator, ICBSII '21 and Dr. R. Nithya, Conference Coordinator, ICBSII '21 and Dr. L. Nagarajan, Conference Coordinator, ICBSII '21. The valley function went on very well and concluded with a formal vote of thanks. The conference was an excellent platform for researchers, academicians, and industry professionals across the globe to showcase their novel ideas in the field of biomedical engineering.

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 Bella, Senior Scientist, Machine Learning for Time Series Foundation, Portugal. Dr. Bella was accompanied by Dr. A. Kavitha, Head of the Department, BME, Dr. M. Dhanalakshmi, Faculty Coordinator, BME and Dr. R. Nithya, Coordinator, BME in the dias.

The function began with the Welcome address by Sneha JB, Secretary of ABE. She was followed by Dhanalakshmi M, President of ABE who delivered the Association report for the year. The next segment was the distribution of certificates and mementos by Dr. A. Kavitha, Head of the Department, BME and Dr. M. Dhanalakshmi, Faculty Coordinator for Association of Biomedical Engineers, SSN to BME Core committee, IEEE & EMBS members, INVENT coordinators and event heads, ISSN&CIN core committee members and the students who excelled in their academic performance.

DEPARTMENT VENTURES

Valedictory Function of Association of Biomedical Engineers

EVENTS ORGANIZED

The function was organized by Dr. A. Kavitha, HoD, BME, Dr. M. Dhanalakshmi, Faculty Coordinator, BME and Dr. S. Nithya, Conference Coordinator, ICBME 15. The entire function with the views will not conclude with a formal vote of thanks by Vishnu M, Vice President of ABE. Dr. M. Dhanalakshmi, Faculty Coordinator delivered a Vote of thanks on behalf of the ICBME committee.

DEPARTMENT VENTURES

Faculty Development Program

EVENTS ORGANIZED

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 NeoMagic Technology, SSNCE and IEEE Signal Processing Society, Madras Chapter, on the dates March 25-28, 2025 in hybrid mode. The event was convened by Dr. A. Kavitha, and coordinated by Dr. J. Vijay, Dr. K. Niranjana 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 equip faculty members with skills to potentially augment their research. Resource persons from diverse academia and industry backgrounds supported the program through their technical and practical expertise.

Sessions started at 9:00 a.m. and ended by 4:30 p.m. Day 1 began with an introduction to Neuromorphic circuits by Dr. Dipesh Kailash, BITS Pilani, Goa. This was followed by a talk on Medical Device Design by Dr. Jayakumar 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

Faculty Development Program

EVENTS ORGANIZED

Topics discussed on Day 1 included "Recent Trends in Biomedical Image analysis" by Dr. Vikram Gopi, NIT Trichy, Biomarkers and 3D Printing, Medical Device Standards, "Retinal Disease Classification with Electrooculography" and "Aids and assistive devices for mobility enhancement". The last day was with talks on Medical Robotics, Biomedical Image Processing, Medical Data Analytics, and Medical Image Processing.

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

DEPARTMENT VENTURES

EMB

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

EVENTS ORGANIZED

The One day UI UX Workshop was conducted on 28th March 2021 by the IEEE EMBS Student Chapter co-ordinated by Dr. S. Prabha kumar AP/BME and Dr. S. Sandeep AP/BME at the Department of Biomedical Engineering. There were 35 participants from BME, CSE, ECE and IT departments and M.E. students had also joined the workshop. The event was handled by 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 browser software for UI design. Students created different webpages based on their interests and had an interesting session of app Quiz. The second session of the workshop focused on testing and automation of the UI UX Design. Students were given an insight on software checking of the working of different websites using UI UX Programming Library – a test Programming Software was used for this session. Overall the workshop was a eye opener to the field of development and was informative for the students to take a leap in their projects.

DEPARTMENT VENTURES

EVENTS ORGANIZED

Materialise Innovation suite

Dr.A.Kavitha, Dr.Pravin Kumar, Dr.Sivaraju and Ms.Divya organized and Mr Udayachandran coordinated a demonstration session on "Materialise Innovation Suite - MIMICS Research 21.0" conducted by MATERIALISE Trainers Mr Gagan, Application Engineer and Miss Avinashini, Operations Manager on [illegible] 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 to 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 analyze landmarks were also highlighted.

UG, PG students, research scholars and faculty working in the areas of biomedical 3D modelling were interested and benefited 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 [illegible] Medtech Incubator [illegible] Partner in association with the Department of BME, SSN College of Engineering & SSN [illegible] on Jan [illegible], 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 N [illegible], Technical Architect, Philips Medical Systems, Bangalore on February [illegible].

DEPARTMENT VENTURES

Healthcare technology: Established and Emerging

EVENTS ORGANIZED

Dr S Pravin Kumar AP (SG) BME, Dr V Sharmila AP BME coordinated a guest talk organized by SSN IEEE EMBS wing titled "Healthcare technology: Established and Emerging" delivered by Mr. Sridhar Subramanian, Healthcare Technology Solutions Consultant on February 10, 2015.

Padma Bhushan Dr. Shiv Nadar is an early Visionary in the Technological revolution of India who founded Hindustan Computers Limited (HCL) in the mid - 1970s and transformed the IT landscape ranging from an IT Evangelist (HCL Tale).

He has focused his efforts on developing the high quality educational system of India through the Shiv Nadar Foundation which he found. The institutions, with their diverse and dynamic communities 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 in a sprawling 150 acres of verdant surroundings. It was a delightful time to conduct a session on "Healthcare Technology: Established and Emerging" on February 10th, 2015 for the students of Department of Biomedical Engineering at SSN College of Engineering.

-Sridhar Subramanian, Consultant, Healthcare Technology Solutions

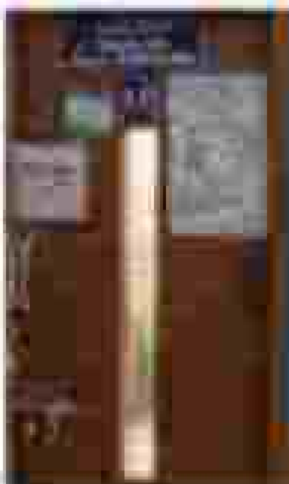
DEPARTMENT VENTURES

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, [illegible] 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 "[illegible]." 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 staff members, the students received special permission to view the various departments in NIEPMD. The institute majorly treated patients of various ages suffering from cerebral palsy. In the Neuro-developmental therapy room, enabling patients to walk with support within [illegible] 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.[illegible] per session. The students were moved by the patience required in all 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.

Sanjana Vaidyanathan, III yr BME

NIEPMD VISIT – GALLERY

DEPARTMENT VENTURES

NIEPMD VISIT - GALLERY

EVENTS ORGANIZED

DEPARTMENT VENTURES

Meeting with President

On March 22, 2013 a meeting with Dr. Kala Vijayakumar, President, SSN institutions was held at the Auditorium of CNE, accompanied by Dr. V. E. Annamalai, Principal, SSNCE, Dr. S. Rajha, Vice Principal, SSNCE, Dr. A. Kavitha, HoD, BME along with the Heads of Various Committees such as transport, hostel, mess, gym. Different queries raised by the students were addressed through the respective representatives in the meeting.

DEPARTMENT VENTURES

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

INDUSTRY COLLABORATIONS

Dr Kavitha, Dr. Ramvikkumar, Dr Vijay Jeyakumar and Mr. Divya R along with Dr Kala Vijayakumar, President, SSN Institutions and Dr Sudha S, Vice Principal take round with Prof. Nandivaram about the functioning of XTIC VR-AR laboratory established at UTM Researchpark, Chennai on Feb 03, 2022.

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 collaborations with them. Faculties from SSN Dr. A. Kavitha Holi, Dr. S. Poovizhiarasi, Dr. J.Vijay, Dr. M. Dhanalakshmi, Dr. R. Nithya & Ms. B. Divya gave presentations on their projects/works.

Working models and Software (healthcare) projects at the Centre for Healthcare Technologies were demonstrated to the team during the visit. SSN-med and BME department website was launched.

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 [illegible] Feb 2023. **Mr. Raghuraman, Ms. Sophia and Ms. Sujithra** visited [illegible] **AR/VR lab and other laboratories in the department.** PG Scholar Ms. Aksa M demonstrated the use of HTC Vive (VR device) to them during the visit where a game called [illegible] VR was played on the Alienware system interfaced with the VR device using Steam VR application. This kindled their interests posing many questions and more on the applications of VR in the healthcare, thus making it a very interactive session.

Following this, on March [illegible], 2023 ([illegible] pm to [illegible] 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. Sophia and Ms. Sujithra attended the meeting offline. They also discussed [illegible] for BME, EEE and CSE departments ([illegible] pm to [illegible] pm) and represented subject matter expertise for [illegible] the sessions.

DEPARTMENT VENTURES

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

INDUSTRY INTERACTIONS

Mr. Vishnu T.V., CEO, Machenn, had discussions with Dr. A. Kavitha, Asst. Prof. BME and Dr. S. Pravin Kumar, Asst. Prof. BME, for potential student internships and collaborative research works on IoT, AI, and Mr. Chandrasekaran, SSN Research discussed the startup ecosystem.

EduTech Startup

Dr. A. Kavitha, Asst. Prof. BME and Dr. S. Pravin Kumar, Asst. Prof. BME arranged a meeting between Mr. Nagavishnu Rout, Study Abroad Consultant, Vedantu and Mr. Chandrasekaran and they discussed about the EduTech Startup.

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

Dr. Unnati Varsanker, Physiotherapist and co-founder of Sonic Rehab Health Care Physiotherapy Services, Bangalore was contacted by Dr. Kala Vijayakumar, President, SSN Institutions to initiate possible collaborations with Dept. of BME. Accordingly, Dr. Unnati visited the department on 6 March, 2023 and interacted with a team of faculty members including Dr. Kavitha, Asst. Prof. BME, Dr. Nithya, AP, BME, Dr. Thanushkodi, AP, BME and Dr. Sharmila, AP, BME. She briefly presented the current prospective projects pertaining to the area of Prosthetics, Prosthetics and Orthotics. Dr. Unnati was interested to promote fulfilling creative projects that would benefit a large community of differently abled population. She also shared the requirements for developing a low cost home based rehab technology for gait analysis and showed her interest 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 8-22, 2023.

Dr. A. Kavitha, HOD, BME delivered a guest lecture on "Airflow 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 Gas Contact Measurement of Vital Parameters" in DRDO sponsored Three-Day workshop on "Emerging Trends in Medical Technology and Innovations in Healthcare" (ETMTIH2023) organized by the Department of Biomedical Engineering, Rajalakshmi Engineering College, Chennai on February 14, 2023.

Dr. Vijay Jeyakumar, AsP, BME was invited as a subject expert for the faculty recruitment conducted by [illegible] State Institute of Technology, Andhra Pradesh on February 18, 2023.

Dr. N. Venkateswaran, Professor/BME was invited as an Expert member by the Department of ECE, Hindustan Institute of Technology and Science, Padur for framing the syllabus for B.Tech. ECE with Specialization in Electronics Manufacturing Technology Programme (2023).

FACULTY VENTURES

External Recognitions

Dr. R. 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, Editorial [illegible], Taylor & Francis Books India Pvt Ltd to review the book proposal titled "Nanomaterials and Sensors for Healthcare Applications" dated 23 Jan 2023.

Dr. A. Kavitha, Prof & Head, BME attended the 27th BoS meeting of [illegible] College of Engineering on 20th 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 "[illegible] image analysis of [illegible] in PM2.5 environment – An overview" in [illegible] 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, [illegible] Engineering College, Tirupur on March 17, 2023.

FACULTY VENTURES

External Recognitions

Dr. [illegible], AsP, BME has attended fourth Research Advisory Committee (RAC) for the Ph.D Research Scholar Mr. [illegible] on [illegible] in the Department of Biomedical Engineering, School of Engineering, VISTAS, Pallavaram, Chennai-[illegible].

Dr. Vijay Jeyakumar, AsP, BME was deputed as an External examiner for the Anna University PG project phase I Viva voce examination on March [illegible], 2023.

Dr. N. Venkateswaran, Professor, BME conducted the Quarterly RAC meeting on Wednesday, the 22nd March 2023.

Dr. M. Dhanalakshmi, AP/BME is appointed as the Nodal for Cognizant Technology Solutions - Health Sciences Unit to strengthen the collaboration between SSN & CTS.

Dr. S. Arun Karthick, AsP/BME acted as Expert member for the [illegible] meeting of the Department of Biomedical Engineering, Vel Tech Rangarajan Dr Sagunthala R&D Institute of Science and Technology, Chennai on [illegible] Jan 2023 [illegible].

Dr. N. Venkateswaran, Professor, BME attended the [illegible] meeting with [illegible] Department of Electronics & Communication Engineering, KCG College of Technology, [illegible] Anna University, Chennai on [illegible].

Project prototype titled "Brain Computer Interface Controlled Wheelchair Prototype" mentored by Divya B., AP BME got selected for the final round of project exhibition - AVINYA 23 organized by KCG College of Technology. Project was presented by [illegible] of third year BME.

FACULTY VENTURES

External Recognitions

Womens Day Celebration

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.

SSN IEEE Women in Engineering student branch affinity group organized IEEE WIE Madras Section sponsored Women's Day Special Seminar "Maathare" on 8th March 2023 at SSN College of Engineering. The speakers, **Dr. D. Bhuvaneswari, Director, College Governing Council & HoD, Department of International Law, The Tamilnadu Dr. Ambedkar Law University, Perungudi, Chennai** and **Dr. A. Kavitha, Professor & HoD, Department of BME, SSNCE, Chennai** shared a lot about the role of women in the emerging World. Dr. Bhuvaneswari explained the statistics of various cybercrimes that occurs in India against women. She discussed the limitations of existing cyber laws and gave awareness to the students regarding the need for safety in cyber space. Dr. Kavitha shared her journey of leadership as [illegible]. She discussed her ways of balancing the personal and professional life and [illegible] efforts.

FACULTY VENTURES

External Recognitions

Women's Day Celebration

Dr. A. Kavitha, Prof & Head- BME was invited for a talk on "The World Needs Empowered and Resilient Women" on 8th March 2021 for a webinar on "Motivating the Future engineers" organized by Sathyabama Institute of Science and Engineering technology, Chennai.

Dr. A. Kavitha, shared the responsibilities of the young women with the audience and motivated the girls to face the challenges as Engineers for the bright future.

Resilience is an important quality to be possessed by every women to make the dreams come true, to bounce back from adversity and have a strong belief in ourselves.

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 characterized by UV-visible Spectroscopy and FT-IR. Then, individual stock solutions of 2% (w/v) Chitosan (CS) in acetic acid and 10% (w/v) of PVA in deionized water were prepared. To enhance the antimicrobial property to the wound dressing, silver nanoparticles (Ag NP) was prepared using Cynodon dactylon (Bermuda grass) leaves extract and characterized using UV-visible Spectroscopy. The prepared Ag NP was incorporated in the nanofiber as solution preparation. Furthermore, three blended PVA/SS/CH solutions were prepared in the following ratios 8:1, 10:1:1, and 8:1:1 and electrospun to obtain 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.

FACULTY VENTURES

Journal Publications

Artificial Intelligence-Based Predictive Tools for Life-Threatening Diseases

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 capability. The excessive 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 longstanding 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 analytic solutions could 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 glean insights into the prospective benefits to focus the fight against the pandemic.

Hence, this 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 emerging methods are also discussed.

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 deoxy 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.

Nandhini, V.C., Hemala, K., Nagarajan, S. (2023). Pulse Rate Estimation with a Smartphone Camera Using Image Processing Algorithm. In: Kumar, A., Senthilkumar, S., Gunjan, V.K. (eds) [illegible] 2021. Lecture Notes in Electrical Engineering, vol [illegible]. Springer, Singapore. [illegible]

FACULTY VENTURES

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

Journal Publications

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 arithmetic skills when compared with factors having normal intelligence. This paper proposes a framework for early detection and classification of LD with non-LD children from raw electroencephalogram (EEG) signals using shallow and deep neural network. Forty 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, theta and delta sub-bands using digital wavelet transform (DWT). Fisher based feature selection method was employed for the selection of most relevant features that reduces the computation burden on models. Afterwards, these ranked accumulated features were evaluated separately by support vector machine (SVM) classifier and neural network (shallow and deep models) to investigate the performance. The performance of the NN classifier and multihidden layer shallow neural network and pyramidal layer deep neural network were compared. Experimental results depicted that the most relevant features computed by Relief algorithm along with the shallow neural network based classifier attained the highest average and maximum classification accuracy of 97.5% and 99.1% respectively, which is greater among the existing literatures. The efficient and automatic LD classification from EEG signal could aid in the development of computer-aided diagnostic systems for early detection.

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 neural noise 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 must 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 technique for EEG will remain a challenging task. This work focuses on employing and comparing the different pre-processing techniques and here we 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.

FACULTY VENTURES

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

Journal Publications

To analyse brain connectivity dynamics during listening to music and estimate the potential impact on task performance. Fifteen participants (9 males and 6 females) participated in the 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 format was used to evaluate visual spatial attention during exertion by evaluating mean, command power, and reaction times. In Task 2 (listening to music only) it was reported that there was a change in the potential of the electrode (F_3, F4) located in the left frontal lobe. The energy of the relative beta component was significantly higher only at F_3 during task 2 ($p = 0.005$). Event-related desynchronization alpha and theta synchronization were significant ($p = 0.005$) in all electrode sites in the bilateral frontal lobe (F_3, F_4, F_7 and F_8) while listening to music and performing tasks (task 3). When the task without music (task 2) was performed, the energy of the relative alpha component was significantly higher in the F_4 electrode position ($p = 0.005$). It is noteworthy that the energy of the theta component was significantly lower in the location of the F_4 electrode ($p = 0.005$). The frontal asymmetry index were measured were significantly high in F_4-F_3 and F_8-F_7 during task 2. The connectivity map of theta synchronization showed a robust correlation between F_4 and F_8 which was in turn correlated to P_4 and C_4 during Task 2. Results indicated an increased emotion and stimulation levels during Task 2.

FACULTY VENTURES

In vitro biological assessment of green synthesized iron oxide nanoparticles using Azadirachta Indica (Neem) leaf extract

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 Azadirachta Indica (A. Juss) (neem) 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 (EDX) 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. Indica and biosynthesized IONPs were observed at 310 nm and 390 nm respectively. Functional groups such as alkenes, phosphine, 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 24 nm. SEM analysis revealed most of the formed nanoparticles were in spherical shape with pompom 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 used for the biosynthesized IONPs antibacterial efficacy. With an inhibitory zone measuring 28 ± 0.5 mm 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 lead oxide nanoparticles using Azadirachta Indica (Neem) leaf extract

Journal Publications

The percentage antioxidant activity of biosynthesized PbO NPs rises with an increasing concentration, and the highest activity of 78.96% 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 PbO NPs was hazardous to the MCF-7 cell line, with concentrations ranging between 25 and 200 µg/mL displaying the strongest and lowest anti-cancer activity, with IC50 values of 93.1%. The hemolytic activity of biosynthesized PbO NPs demonstrates that the rate of lysis steadily increased with increasing concentration. At a high concentration of 1000 µg/mL, 24% of lysis and at a low concentration of 31.25 µg/mL 2.1% 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.

FACULTY VENTURES

Journal Publications

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

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 use the data by following certain health standards HIPAA, and DISHA. Among this EHR, storage and transmission 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 procedural 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 like features like texture, shape, and color-based search. However, both these approaches fail to preserve the privacy and security of private 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 ledger 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 retrieval 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 shielded with additional countermeasures to address privacy concerns. In this chapter, a conceptual framework for blockchain-enabled edge computing applications along with the Internet of medical things (IoMT) 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.

FACULTY VENTURES

Conference Publications

S. Manikumari and S. Venkateswaran, Professor, Department of BME presented a paper titled "EEG Based 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 Mithilesh, Siva Abhinav 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 [illegible] 2023.

Gowri Vidhya N, Vijay Jeyakumar, and Aravind C.R. Evaluation of Deep learning methods and face detection frameworks with Convolutional Neural Network. In proceedings of 6th IEEE International Conference on Electrical, Electronics and Computer Science (SCEECS 2023), flagship conference of IEEE MP Sub-section organized by Maulana Azad National Institute of Technology (MANIT) Bhopal, India on [illegible] 2023.

Sneha Agrawal N.P, [illegible], Bikash Kumar Singh, B.Geethanjali, V. Mahesh. EEG Based Classification of Learning Disability in Children using Probabilistic Neural 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 [illegible] 2023.
(Won best paper award)

FACULTY VENTURES

Conference Publications

Chandramouli K, Bakshana 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 2025) organized by Department of Biomedical Engineering, Bannari Amman Institute of Technology, Coimbatore, March 10, 2025.

[illegible] NEC, [illegible] presented a paper titled "STUDY OF WIRELESS CHARGING CIRCUITS FOR MEDICAL IMPLANTS" at the International Conference on Renewable and Sustainable Energy Technologies (ICRSET – 2025) organized by the Department of Electrical and Electronics Engineering during 27–28 March 2025.

[illegible], Vaishali S, Subashini R, Synthesis and characterization of collagen based hydrogel with alkali and silver nanoparticles. In the proceedings Scopus with ISBN of 7th International Conference on Nanoscience and Nanotechnology (ICONN 2025) at SRMIST Chennai, on March 27–29, 2025.

[illegible] Ananthanarayanan, [illegible], "[illegible] Verification : Implementing a Calibration System for Dynamic Parameters using a Web-based approach" in proceedings of 2nd International Conference on Biomedical Engineering Science and Technology: Roadmap from Laboratory to Market (ICBEST 2025) organized by Department of Biomedical Engineering, NIT Raipur, Chhattisgarh, India during [illegible] Feb 2025.

[illegible] presented a paper titled "Fiber Bragg Grating Based Wearable Device for Monitoring Respiratory Activity" at the IEEE 3rd International Conference on [illegible] organized by Vidya Vikas Institute of Engineering and Technology, Mysuru during [illegible] 2025.

FACULTY VENTURES

Conference Publications

Dr Vijay Jeyakumar, ASP, BME presented (physically) 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 [illegible] and Vijay [illegible] in 2nd IEEE Delhi section flagship 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 25.02.2023.

Patent Info

Dr. S. Pravin Kumar, ASP/BME attended the hearing session for the patent application [illegible] titled [illegible] support for microscope on 23.02.23.

Research Scholar Activity

Dr Vijay Jeyakumar, ASP/BME conducted the first Doctoral Committee meeting for the research scholar Ms Nithya [illegible] on February [illegible], 2023.

FACULTY VENTURES

PROJECT NEWS

A proposal for Regional Meeting on Signal Processing for Healthcare AI has been recognised by IEEE SPS, USA and sanctioned an amount of USD [illegible] 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 Principal Investigator (PI) as Dr. G. Subhash Kumar, Associate Professor, Co-PIs as Dr. M. Dhanalakshmi, AP/BME, Dr. P. Vijayalakshmi, Prof & Head ECE, Dr. R. [illegible], Tamilnadu Sports University have been sanctioned a total budget of Rs. [illegible] under SERB CRG Scheme.

Dr. K. Nirmala, Asst.Prof/BME and Dr. R. [illegible], AP/BME submitted a project proposal titled "Development of a decision support system for ocular disorders using thermal images" to SERB CRG, [illegible] lakh.

FACULTY VENTURES

Faculty Development Programmes Attended (FDP)

FDP

Dr. M. Dhanalakshmi AP/BME and Dr. E Vijay AP/BME attended "Course design workshop" organized by SSN School of Advanced Career Education during [illegible] Jan 2023.

Dr. M. Dhanalakshmi AP/BME and Mr. V [illegible] N presented their business model of "Compute Hub" in the "Lean Canvas business model competition" held on [illegible] 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 20, 2023.

Dr. S. Saranya AP/BME attended a 5 day webinar on "Web of Science Training & Certification Series 2023" conducted by Clarivate from [illegible] January 2023.

Dr. A. Kavitha HoD/BME, Dr. S. Pravin Kumar AP/BME, Dr. K. Arun Karthick AP/BME, Dr. M. Dhanalakshmi AP/BME, Dr. R. Nithya AP/BME, Ms. B. Divya AP/BME, Ms. Thangam [illegible] Research Scholar BME and Mr. [illegible] have attended a four day workshop on "LabVIEW" Program conducted by [illegible] organized by SSN [illegible] during [illegible] 2023.

Dr. R. [illegible] AP/BME and Dr. [illegible] AP/BME attended a two day hands-on workshop [illegible] Technology Enabled [illegible] on 13th and 14th March 2023 at [illegible], SSN College of Engineering.

FACULTY VENTURES

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

FDP

Dr. A. Kavitha, HoD/BME, Dr. S. Sravin Kumar, AP/BME and Ms. R. Divya, AP/BME, attended a talk on "Towards the Foundations of Perception Engineering" conducted by IIT Madras on February 2, 2023.

Perception Engineering is an emerging discipline that involves designing, creating, and implementing perceptual illusions in virtual realities, haptic etc.,. It fuses engineering and mathematics principles with concepts taken from the sciences of psychology and neuroscience. Dr. Steven M. LaValle, the speaker from University of Oulu, Finland discussed about the progress towards developing mathematical foundations that integrate to bring the human sensorimotor loop of perception, psychology, neuroscience, and philosophy closer to core engineering principles for creating the design and delivery of illusions as a coupled dynamical system. He also shared about his work on developing a unified "Laws of Illusions" which covers both robotics and VR by applying Von Neumann-Morgenstern game theoretic principles of information states.

FACULTY VENTURES

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

Dr. A. Kavitha Prof/BME, Dr. S. Pravin Kumar AP/BME, Dr. S. Arun Karthick AP/BME, Dr. M. Dhanalakshmi AP/BME, Dr. R. Nithya AP/BME, Ms. S. Divya AP/BME, Ms. Thangam Regi Research Scholar BME and Mr. Vishwanath S [illegible] attended a four-day Workshop on "i-NITIATE" Program conducted by GDC, IIT Madras organized by SSN I-Found during [illegible]. Shreya M, Srinidhi K, Aswin P, Prathibha P and Shri Thrisha N, 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 needed for developing an entrepreneurial mindset, appreciating the main risks at different stages of the 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 presentation 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" [illegible] program by the Gopalakrishnan Deshpande Centre for Innovation & Entrepreneurship (GDC)

On the 1st Day of the Workshop, the participants were taken on an IITM Research Park campus tour to the Healthcare Technologies Innovation Centre (HTIC). There were many projects displayed including ArtSens, Mobile Eye Surgery Unit, Neonatal Transport Unit and [illegible]. HTIC developed the [illegible] lateral flow immunofluorescence assay test kit reader, that utilizes a specially designed optics module that houses a laser, optical elements, and photodetector 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's 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 procedures. The MESU, developed by HTIC in [illegible], was handed over to Sankara Nethralaya in [illegible]. 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 [illegible] cataract surgeries were performed till March [illegible]. From April [illegible] to March [illegible] the MESU was used to conduct [illegible] surgical camps, in which nearly [illegible] subjects were screened and [illegible] surgeries were performed. By March [illegible] over [illegible] surgeries have been performed with more than [illegible] surgical camps.

FACULTY VENTURES

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

FDP

Shreya M and Sthuthi R presented a prototype of a prosthetic arm on behalf of Team Prosthe, under the guidance of Dr. A. Kavitha HoD BME, Dr. S. Pravin Kumar Asso.Prof BME, Dr. R. Nithya AP BME, Ms. R. Divya AP BME and Mr. Umar Saleh, Founder & CEO, RECYCLO.

DR. A. KAVITHA

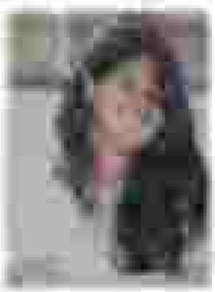
DR. R. NITHYA

DR. S. PRAVIN KUMAR

MS. R. DIVYA

MR. UMAR SALEH

SHREYA M



STHUTHI R

Mr. Viswanath S presented his project on Composite Moulds for lower extremity prosthesis representing Innov Biomedical Solutions along with Dr. M. Dhanalakshmi AP BME. Mr. Thangam Raj, Research Scholar BME explained the idea of Recyclo which includes recycling of plastic waste into 3D printing filaments.

FACULTY VENTURES

Experiencing the Brain Up Close - The Brain, Computation and Learning Workshop (BCL 2025)

FDP

The Brain, Computation and Learning Workshop was held at the Indian Institute of Science, Bangalore from the 9th to the 15th of January, 2025. Ms. Divya R, AP/BME and Poorvika R, III Yr BME had the opportunity to be selected as two of the 60 participants out of the 900 applicants from all over India, which happened through a competitive and rigorous selection process. The workshop was funded by a generous contribution from the Pratiksha Trust, which has been significantly promoting fundamental and translational neuroscience research within the country through the establishment of research centers and chair professorships at the Indian Institute of Science Bengaluru and Indian Institute of Technology Madras Chennai.

The purpose of the workshop was to promote meaningful 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 were lit with talks by a total of 25 eminent speakers such as Professor Rajesh P N Rao, Professor [illegible], Professor [illegible], Professor [illegible] and many more. The participants were able to get an insight into the different topics of Neuroscience including Theory and Physics of Brain Function, Neuromorphic Techniques for BCI, Non-Invasive Brain Sensory Stimulation, Assistive Technologies for Rehabilitation and Motor Cortical circuits, among many others.

FACULTY VENTURES

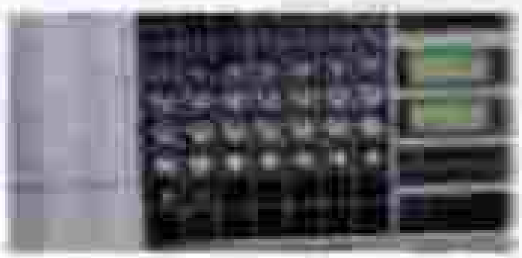
Experiencing the Brain Up Close: The Brain, Computation and Learning Workshop (BCL 2025)

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 gaining their perspectives on different subjects, was an added bonus", says Poornima.

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 his brain to be imaged. The BOLD response of the person was visualised using the Turbo BrainVoyager software. Several slices of the brain were made and the different points of activation 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 recorded 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 2025)

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 cute. 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 visualizing the face was a more complex reaction.

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

This also visited the NeNe Biomedical Lab which gave them an insight into the functioning process of the electrodes the various applications and their uses. It was explained methodically by one of the PhD students and simple electrodes made to the same lab were shown to them. They also had the opportunity to understand the different applications of these electrodes ranging from measuring the synaptic spread of neurons to implantation of the electrodes and subsequent tests and even the ways to repair other less significant of the body.

FACULTY VENTURES

Experiencing the Brain Up Close - The Brain, Computation and Learning Workshop (BCL 2025)

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 undergo 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 sessions. Various tables were setup with prototypes and the working of different technologies were demonstrated including systems for emotional detection through EEG. The flow of discussions were quite evident.

FACULTY VENTURES

Experiencing the Brain Up Close: The Brain, Computation and Learning Workshop (BCL 2025)

FDP

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

-Patricia R, IIIrd Student BME

BCL 2025 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 Science, 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, AP/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 notable 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, Biological Processing, Brain Cognition, Muscle Perception, Virtual Reality and Machine Learning. Highly skilled in technical tools like MATLAB, Python and LabVIEW, he has published many data for 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 PhD degree successfully, leaving his mark here. He exhibited an amazing group of student psychology, and was known for the liveliness and care with which he addressed students. Over the years, he has left multiple lessons to Master's in the mutual sense, both technical and other innovation challenges.

FACULTY VENTURES

Farewell to Dr. Mahesh Veezhinathan, AAP/BME

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

A formal farewell was organized by the department on February 10th, 2021. We wish him all the best in his pursuit of biomedical innovation.

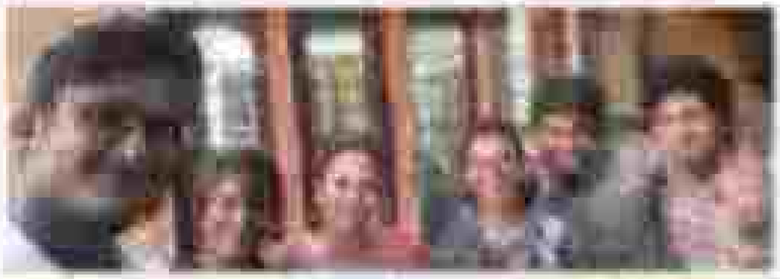
It was a great pleasure working with you. Thank you for being a great colleague and good luck for your future endeavors
- Dept of BME, SSN

STUDENT PURSUITS

Co-curricular Activities

The following students have completed an internship at Cardiac Design Labs from [illegible] in offline mode in the Cardiac Design Labs office in Bangalore.

- Abishek P S
- Harish Narayanan
- Joel Christina
- Praveenkumar K R
- Sharmila C



Monica Kumari, Devadharshini and Poornima of 3rd year BME and Keerthi Vignesh of 4th year BME successfully completed the [illegible] program [illegible] Dec 2022 conducted by [illegible] Mysore.

Dharshana R and Supriya R of 3rd year BME successfully completed a one week internship program in big data for data engineering from [illegible] on [illegible] 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 January 2022.

STUDENT PURSUITS

Co-curricular Activities

Sanctioned Internally Funded Projects

[illegible] 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: 2000

[illegible] of III year BME was sanctioned an Internal funded student project titled "Drowsiness detection [illegible] using [illegible] rhythms" guided by Dr. S. Saranya, Assistant Professor, BME. Budget: 2000

Internal funded student project by [illegible] titled "Assistive [illegible] device with biofeedback for amputees" guided by [illegible] and Dr. S. Saranya was selected to be pursued under [illegible] initiative by SSN [illegible] incubation cell.

[illegible] of III year BME was sanctioned an internal funded student project titled "Development of [illegible] Virtual Environment for Post Stroke Treatment" guided by Dr. [illegible], Associate Professor, BME. Budget: 2000

[illegible] of III year BME, [illegible] from II Year BME was sanctioned an internal funded student project titled "Brain computer interface using [illegible] – 'Tamil language'" guided by [illegible], Assistant Professor, BME and Dr. [illegible], Associate Professor, CSE. Budget: 2000

[illegible] IV Year BME, [illegible] of III year BME was sanctioned an internal funded student project titled "Fabrication of flexible wearable sensor using [illegible]" guided by Dr. [illegible], Associate Professor, BME and Dr. [illegible], Associate Professor, BME. Budget: 2000

STUDENT PURSUITS

Co-curricular Activities

Sponsored & Internally Funded Projects

J. Jeevan, R. Lodigha , C.Merinaeen , S.Hareenidh of II year BME was sanctioned an Internal funded student project titled " Automated sensor for continuous physiological Monitoring in the neonatal intensive care unit"(NICU) guided by Mrs.Vani Karthik , Associate Professor , BME and Dr.I.Sujatha , Associate Professor , BME , budget :2000

K. B. Karthikha, B. Karthik Siva , M. Renukha Shanmuga Sundari, II Year B.E, B.Rajalakshmi ,II Year B.E was sanctioned an Internal funded student project titled " Wearable bowling action analyser" guided by Dr. Sudha Ganeshkumar Senior Assistant Professor , BME , budget :2000

G.Jeni Christina , K.Nandhini , G.Sharmila , III Year BME was sanctioned an Internal funded student project titled "Ultrasonic as a canvas to deliver Multisensory based ambulance drug" guided by Dr. R. Sathishkumar , Assistant Professor , BME , Budget :2000

STUDENT PURSUITS

Let's Hear it from Suprajaa, III yr BME

Internships Experience

INTERNSHIP AS AN ANALOG ENGINEERING INTERN AT NEUROINTELLAB, ANTARCUP AT IIT MADRAS RESEARCH PARK

How did it Begin?

Post the tech talk by Dr. Kavitha, the co-founder of Neurointellab, 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 mateage Dr. Saranya to follow up on the same. Luckily, they were hiring, and Dr. Saranya sent me 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 Neurointellab called me within 10 days of my application, informing me that I was selected for the Round 1 Interview. Round 1 was a viva process with Dr. Rajat Pathan, Chief Technology Officer, Neurointellab, and he questioned me over the basic concepts of analog electronics, fibers and embedded systems. Since I expressed an interest in Neuroscience, he also questioned me on neurophysiology, BCI's basic and analysis of waves of mind. I was able to answer most of his questions, and at the end of the call, Dr. Rajat informed me that he was satisfied with my overall knowledge of basic 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 would only 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 insights into what kind of questions could be asked and how to maintain my composure during the interview. During my presentation, Dr. Vayas 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 "culture-fit" round with Dhananjaya, co-founder, Neurostellar. On the surface, it was a casual talk about interests, previous projects and salaries, but the task of the call was to gauge my personality and work ethic, to determine if I would fit in with the values and culture of Neurostellar. A week later, I received my acceptance email into the team! I was also asked to 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 [illegible] January, 2023. She was mainly responsible for analog engineering and biomedical signal processing. During her internship, she conducted literature surveys on ECG signal processing, [illegible]

STUDENT PURSUITS

Extra-curricular Activities

Student Achievements

Ashwin Kumar M and Arushi Saha 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. Kavitha Nair honoured Ashwin Kumar M from the final year for his outstanding work in the public relations team for Instincts 2023.

Dr Kavitha Nair honoured Arushi Saha 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, Sangeeth, Saba Bhargav from the III yr BME, and [illegible] from the final year BME kicked off in this year's Season of Dance Battles 2023 representing N2L, 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 [illegible] conducted by MIT, Chennai on March [illegible] 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 end less victory run for them winning in all the competitions participated till date as listed below:

1. [illegible]: Organized by Gurunanak College - Won Third Place.
2. [illegible]: Organized by Alpha College of Engineering - Won First Place.
3. [illegible]: Organized by Chennai Institute of Technology - Won Third Place along with a cash prize of Rs. [illegible]
4. [illegible]: Organized by SRM [illegible] - Won First Place along with a cash prize of Rs. [illegible]

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 energetic, Poorvica Ramanand of III Year BME shares some of her artwork with us. Find her talent in her online art store The Pixie 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. More like myself. It's more of a comfort zone rather than hobby and the way I find most ways to express my thoughts & true impression from the so day events and strive to portray the same through this medium."

-Sarvajith.P

STUDENT ENDEAVOURS

Poetry Corner

Literature

Half formed resume

What were we all so worried about
Frightened whispers into the night
[illegible]
To learn and achieve
I put all life's work together
On a single side of paper
And [illegible] to determine fate –
[illegible]
For your [illegible]
Things work sometimes
Or they might turn your [illegible] –
Why cry over spilled beans
When you can put [illegible] resume to beg more?"

To be okay

You know you'll just be okay
When you wait
Till your whole being
Shivers with exhaustion
And your eyes shed
With salty perspiration
But you push your will
For that one last leg
And keep pushing
Till [illegible] – and yet [illegible]
I know
You won't quit
The places where you [illegible]
As your [illegible]
With all these lessons
You're [illegible] your way
You know
That you'll just be okay

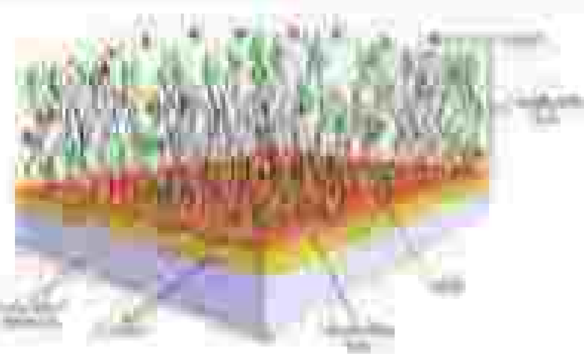
A prolific wordsmith, [illegible] of III Year BME expresses the students' psyche in the two featured poems.

THINK PIECE

Surface Plasmon Resonance (SPR) in Clinical analysis

Student Articles

Surface plasmon resonance (SPR) is a technique used to study the interactions 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 nanometers, the electrons can spontaneously oscillate 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. pesticides, genetically modified organisms (GMO), microbiological contamination (e.g. Escherichia coli)), doping analysis, laboratory medicine, proteomics, biomarkers detection, and environmental monitoring. Clinical analysis has undoubtedly also been recognized as a promising application area among these.

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
- Biomarker detection
- Protein biomarker
- Cancer biomarker
- Cardiac biomarkers
- Antibodies for immune disorders
- Nucleic acid sensing
- Pathogen detection
- Pharmacokinetic drug profiling

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 move objects with your thoughts? Though these may seem like superpowers, the cutting-edge field of neurotechnology is bringing us so close 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 such as brain computer interface (BCI) and 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 to enlighten 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 [illegible] control of [illegible] protein expression and [illegible] helps researchers gain a better understanding of the molecular effects of SCI. Many recent studies have shown that optogenetic [illegible] promotes neural remodelling and helps improve cell survival after injuries. These prospects 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 groundbreaking potential to revolutionize the field of medicine, this technique is still in its 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.

- ASHWARYA S
B.E (CSE)

ALUMNI CORNER

SSNS TRIBUTE

On January 9th 2021, Around 40 BME alumni visited the department and attended Tribute 21. Around 15 alumni from Batch 2020, 7 alumni from batch 2019, and 18 from other batches visited the department and attended the Tribute 21.

From batch 2020 alumni, Mr. Praveen Krishna B (batch 2020) who has completed his Master of Science in Biomedical Medical Engineering from The Ohio State University in Columbus attended the Tribute 21. He was also the Asian University gold medal winner in his undergraduate program. Also Mr. Gowtham Shinde (batch 2020) who is currently studying Master of Science in Neuroscience in McGill University, Canada also attended the Tribute 21. He was the Best Outgoing Student of the department in batch.

ALUMNI CORNER

ACCOMPLISH -MENTS

Mr. Viswanath S (Batch-2009) along with Dr. M. [illegible] AP/BME, presented their Business model of "Composite Mold" in the "Lean Canvas Business model competition" held on [illegible] 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.

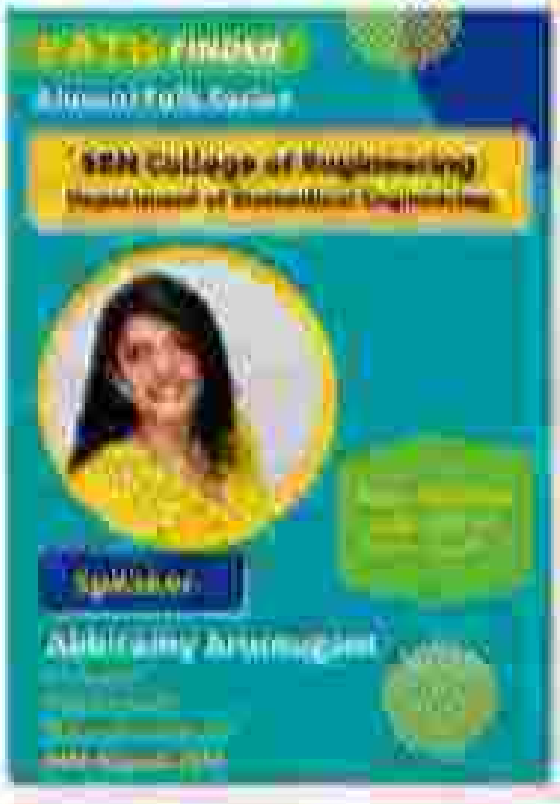
[illegible] of 2012, CEO of [illegible] startup for health technologies in India met Dr. [illegible] Vijayakumar, Dr. A. Kavitha and team from SSN to demonstrate the functioning of NTIC center at IITM research park Chennai on [illegible] 2023.

ALUMNI CORNER

PATHFINDER

Abhirami Arumugam Batch of 2018 UX Leader Digital Health, Massachusetts, USA gave a talk to current BME students on her career path towards UX development on 03.02.23 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 lead and



ALUMNI CORNER

Thamizhamuthan Shanmugam: An Inspirational Biomedical Journey

INSPIRE

I am Thamizhamuthan Shanmugam from the BME [illegible] batch, and I currently work as an Associate Technical Engineer at [illegible] 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 above 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 [illegible] 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 [illegible].

In one instance during my final year, my team's final project was selected for the "Demonstrating Principle 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

INSPIRE

Thanizhamuthan Shanmugam
An Inspirational Biomedical Journey

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 mentor 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-means scholarship, and I got the same scholarship 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 come to realize everyone is talking in themselves, work hard, and achieve their dreams. Your background or grades do not define your capabilities. With determination and consistency, you can overcome any hurdle and gain everything.

I wish you all the best for your future and hope that you all achieve great heights in your careers.

-Thanizhamuthan Shanmugam

BIOMEDICAL INSIGHTS

Source: IEEE Spectrum

Growing Electronics Inside the Brain!

Experiments in live zebrafish and leeches may lead to growing interchips in living tissue

LEARNING NEVER STOPS

Do you wonder how is it possible to grow electronics within the brain, not placing it in the brain invasively? Well 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 electronic within the brain tissue and in the case 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 in more, whole and thicker tissues.

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.

Posting Source: 25.02.2010

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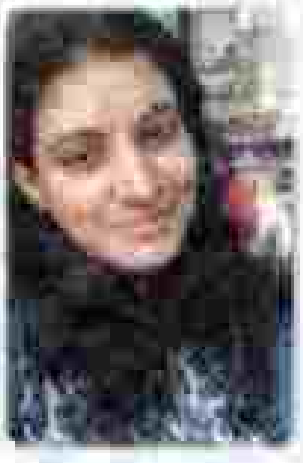

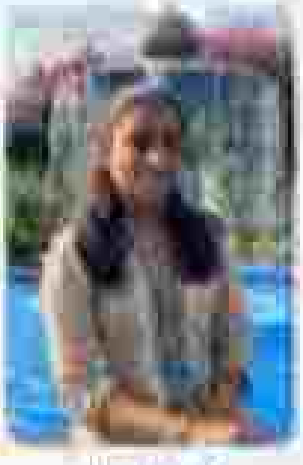

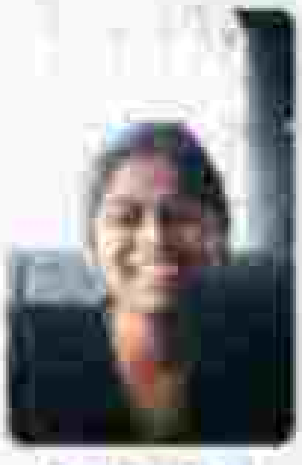

Synergy is the quarterly newsletter published by the department of Biomedical Engineering, SSN College of Engineering. The newsletter team consists of the BME students, comprehensively guided by the Department Head and faculty editors.

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.

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.

-Thiruvalluvar