SYNERGY

A BIOMEDICAL NEWSLETTER

Volume 9 Issue 3

CONTENTS

EDITORIAL DESK

Warm greetings to everyone!!!

"The purpose of Education is to replace an empty mind with an open one."

This edition of the department's newsletter, SYNERGY is dedicated to our beloved Prof Dr. S. Bagyaraj.

We would like to offer our deepest condolences to his family He may be no more but he will continue to be parts of our lives through the knowledge he imparted. May his soul rest in peace!

This edition covers the happenings in the department from the months of April to June 2021. We highlight the achievements and participation of the students and faculty.

Presenting to you the third issue of the ninth volume of SYNERGY.

- Editorial board

HOD's DESK

This issue is dedicated to our beloved friend, colleague and a great human being Dr. S. Bagyaraj whom we dearly miss in all our day to day activities….

Dr. A. Kavitha

A TRIBUTE TO DR. S. BAGYARAJ

BIOGRAPHY:

A first graduate from his family, he did his schooling in a government school near Neyveli, a small town in Tamil Nadu, Southern India. With a graduation in Electronics and Instrumentation, he entered Anna University for his masters in Medical Electronics after bagging a high GATE score. Specialized in Biomedical Signal Processing, he worked at the College of Engineering, Guindy Campus, Anna University as Teaching & Research assistant for 10 years and completed his doctorate during this period.

He joined SSN College of Engineering, Department of Biomedical Engineering as Associate professor in the year 2017. He was an astounding workaholic and surprised everyone with his prompt and reliable work style. He was a dependable mentor to the students; an amazing teacher who handled core biomedical engineering subjects with great involvement and a solid support to his fellow faculty members. He was a very kind, soft spoken, extremely matured human. In his very short tenure at SSN, he managed to receive the Best teacher award for the year 2018.
He used to be the Board Chairman in Anna university Central evaluation process for Biomedical Engineering. He was involved in various projects related to brain signal analysis and managed to complete many funded projects of high caliber.

We lost Dr. Bagyaraj to CoVID 19 recently. He is survived by his wife and two young children.

His death is a big blow to not only his family, but also to the entire SSN fraternity.

We all miss you badly, Dr. Bagyaraj! You will be in our thoughts, always.

You and your commendable work will always be remembered by the faculty and students of SSN!

Colleagues share their thoughts

Some people do not make great first impressions….

But when they suddenly leave……

They leave you with wonderful lessons and fond memories for your entire life!

What else can I say to my friend, project mate and my dear colleague…

MISS YOU, DR. BAGYARAJ!

- Dr. A. Kavitha

Colleagues share their thoughts

Dr. S. Bagyaraj @ SB is the most humble person I have ever met. Irrespective of the situation, the smile he always had in his face is the trait to be followed by all. I haven't seen him become angry at students, always approachable for any help - the go to man. Miss you SB.

Dr. V. Mahesh

A person that departs from this earth never truly leaves, for they are still alive in our hearts and minds, through us, they live on. Surely Dr. S. Bagyaraj will not be forgotten as he lives in our memories. Unfortunately, I had a chance to make only a brief acquaintance with him. Very recently, we had been interacting a lot during the organization of the conference, ICBSII 2021. I found him to be an honest, hardworking and a wonderful human being, who will be missed inconsolably. Our thoughts are with his grieving family for the devastating and incomprehensible loss. May his soul rest in peace.

Dr. S. Pravin Kumar

Colleagues share their thoughts

Dr. SB is very hardworking and dedicated to his work which lead him to the higher heights in his profession. It's unfortunate that his soul departed so early, even before seeing the fruit of it. Even though he is no more he still stays green in everyone's memory. The way he organized the technical events and conferences can't be compared, a very smooth sail. Dr .SB never said no when you ask for help whether it's small or big. We shared and took three subjects for UG and PG. He was always willing to learn new things and open for any discussion. Apart from that he was also the reviewer for most of my student projects, those discussions were very fruitful and helped a lot. He was also Anna University BME Board chairman, single-handedly solved all the issues raised by faculties and for many newcomers he was a good mentor, and it's a great loss for them too apart from BME department. I pray to the Almighty god to guard his family and be the guardian angel to them.

Dr. B. Geethanjali

Still I am not able to believe that Dr.SB is not with us. He is such a simple and dedicated faculty in our department. Whenever we need any solution he will be the first to share his views. His humble nature and helping tendency makes me think about him every minute. His enthusiasm for research and the pursuit of knowledge was unrivalled. Nobody can replace his place. It is a very big loss for our department. His sincerity, dedication and contributions to our department will continue to be remembered in our memories. To a large number of individuals in and outside the campus, he was a typically nice gentleman. I express my deepest condolence to his family and my prayers for his soul to rest in peace.

Dr. K. Nirmala

Colleagues share their thoughts

Dr. Bagyaraj S. was a good friend to me. He was extremely helpful and extremely resourceful. He was always aware about the current progress in the biomedical field and liked to share his knowledge. We wrote a DST project together with him as PI and myself and Dr. Arunkarthick as Co-PI. The project was sanctioned but we have lost him. He wanted to develop his idea into a product and could not see it happen. Apart from work he was a great family man. He was very much attached to his children and we used to discuss a lot many things regarding this. A noble person with a golden heart, I will miss him throughout my life. I wished to learn many, many things from him. His demise is a big loss for me. May he Rest In Peace.

Dr. Sachin Gaurishankar Sarate

Although I am not very close to Dr. Bagyaraj as we seldom have had chances of sharing our thoughts and views, as a colleague I knew he was very hard working and very punctual (means not in time but well in advance). He acted like a bridge between Anna University and SSN BME in many of the departmental activities and he coordinated very smoothly on many occasions. His sudden demise is not only a major loss to his family, but for our Department too. I pray for his soul to rest in peace.

Dr. R. Subashini

Dr. S. Bagyaraj and I were colleagues in Anna University prior to him joining SSN. He was a humble, sincere and very approachable gentleman ready to assist people in need. I was looking forward to working with him in SSN too, but sadly it never happened as we lost him even just before I joined here. It's very unfortunate and it will be a void that stays forever. He will definitely be missed. I pray to God that his family be given the strength to bear this irreplaceable loss and may he reach heavenly abode to rest in peace.

Saranya S.

Colleagues share their thoughts

I met Dr. Bagyaraj sir for the first time during my Undergraduate studies at Anna University. He was my lecturer and he taught two core subjects to me. He is a man of great integrity and I admire him a lot. He used to keep track of my performance and always encouraged me to keep going. I got to know him better when he accompanied our batch during our industrial visit to Kerala. It was a once-in-a-lifetime experience. He was not just a mentor but also a fun loving and caring individual. I may not remember the subjects he had taught me but I will never forget his voice. I shall cherish all the memories of him for the rest of my life. I count myself lucky to be one of his students. I expected to meet him at SSN and continue to seek his guidance throughout my career but unfortunately that never happened. Still cannot believe the fact that he has been called by the Heavens.

Dr. N. Punitha

Colleagues share their thoughts

I first met him at Anna University during 2004. He was my senior and used to handle lab sessions for me. He is very strict during lab sessions. After a long time, I again got to see him at SSN in 2017 when he joined here. I was very happy that he still remembered me. We had an opportunity to work together in conferences and other departmental activities. I admire his punctuality, sincerity and dedication towards any task that he does. He created a lot of positivity in my career as well as my personal life. I cannot forget those joyful and funny days where all our friends sat together to have food, going for a hangout in a coffee shop, discussing projects, doing documentation works etc. There are many to anchor his memories in our heart. We miss you sir!

M. Dhanalakshmi

Colleagues share their thoughts

Bagyaraj sir, was a great mentor, teacher, elder brother for me. I still can't accept that sir is not with us anymore. It is very painful to write these words to express the memories of SB sir and I am writing this with a heavy heart. He was such a person who can be contacted for any support be it technical, contact details of resource person, subject matters and much more. I still remember all the team work and discussions we had for the events we conducted and even more the events which were planned in the coming days. If at all we approach Sir for any difficult situations I would always get a positive reply as “Pannlam Madam,No issues”. A person who is highly committed, dedicated to work, a highly positive, hardworking and a team player are some of the qualities which we can learn from SB sir. Sir was instrumental in keeping all of us as a team. Had a chance to be a student of sir while doing my Coursework “Brain computer Interface”. The interest I got in this subject helped me continue taking the subject for my students. Sir is a person who was generous in sharing knowledge and was ready to offer any help. We both were in charge of the BMI lab, and the fruitful discussions we had during each budget preparation of BMI will be remembered forever. I consider myself lucky enough to work with Dr.S.Bagyaraj and get to know how great a man he was.

B. Divya

Dept. of BME will miss you dearly Sir!!

Dr. S. Bagyaraj and Ms. B. Divya at the conference

Colleagues share their thoughts

A sincere workaholic person. Always be first to meet deadlines. I used to wonder how a person can always be punctual like him. The way he takes up the toughest task very easily is a great lesson I learnt from him. He is reality an ignition factor to start the work in the group. Another best thing I observe with him is not to say No to any help when people approach him. He makes the working place live. Leaving a very big void space, you left us so early with an urge, same way like you finish the assigned task in the office too early…..too early to RIP.

Ms. R. Nithya

Students' messages

UG

Bagyaraj sir first started teaching our batch during the 2nd year of our B.E. BME. Sensors and Measurements was the name of the course that he taught us. The way he broke down stuff and taught us in the easiest way, making sure that we understood everything was very astounding. He always used to say that " I should be the last to enter the class and I should be the first to leave" and as the years went by and the courses that he took for us changed, he still stuck to the thing which he told us in the beginning. He gave my batch permission to use required equipment to finish our final year project without which the project work would have become much more complex. He even arranged a workshop on the particular equipment so that everyone can learn about it. The best thing about Bagayaraj sir for me was his very own sense of humor. I once visited clg quiet after the 1st wave of pandemic and happened to see him working in his room so I went in and he quickly recognized me and asked 'yes tell me shashank' to which i said 'Nothing sir just came in to ask how you were doing' and he replied saying that "U came all the way to college just to ask this?" with a little smile across his face. Such a great professor whom we will always have in our hearts!

Shashank

Bagyaraj sir was one of the most important mentors I've had in college. He never failed to push me to do more when I was complacent. He always kept track of what I was up to and kept motivating me to be better. His loss has left a huge hole. It still hasn't sunk in that we will not be able to see him when we go back to college. His sudden demise has left us all shocked. I sincerely wish and hope for all the strength for his family

lindhiya l an

Students' messages

The moment we spent with him was very little but in person he is a very genuine person with immense knowledge. Very straightforward person and in turn a good hearted person. We missed learning his knowledge and working with him.

Lokesh Kumar M

Dr. Bagyaraj sir was a truly inspiring teacher with an extraordinary teaching ability. He explained a lot of crucial concepts that were difficult to understand in an easy way. He enlightened us with the most important topics in the Biomedical field. He always made sure to clear our doubts. As a reviewer for our project he also guided us throughout the project process. We will always miss his presence.

Bakhiyalakshmi S

He had always given the push for improvement to me - be it in scoring marks as well as in projects. Never failed to give opportunities for many of us to participate in various academic activities from representing our college/department outside college to applications to other universities. He had always solved any problems that we as a class faced as the class in charge. And i would also like to talk about his style of teaching. He ensures that he repeats the particular concept during the course of the class that it directly gets into the brain and you can't afford to forget it. I have always admired his teaching. That had helped me a lot in the examinations. Thank you sir for all those amazing lectures! He will be remembered as long as I remember my Alma mater. The news of his loss was unbelievable. May his soul rest in peace.

Kavya V Kannan

Student's messages

PG

"I am not a teacher but an awakener"- Robert Frost. Bagyaraj sir is the perfect example for it. He taught us not only the subject but discipline, punctuality and more importantly how a person should work on which he/ she has been engaged in. We are grateful for what he taught us. He may be physically absent but the knowledge that he shared with us will make him alive forever. We will constantly work on his knowledge that he shared with us and make him proud.

Sowmiya, second year PG

I was totally devastated at the moment I heard about the loss of Dr. S. Bagyaraj. He was such a disciplined, caring, dedicated and resourceful person. I will never forget the effort he made in making this environment more favorable to me as an international student by connecting me with some of the Nigerian scholars at SRM University. He is no more but he will forever exist in my memory and I will forever be grateful for the knowledge and values he instilled in me. Really so proud of him. Rest in peace Sir!!

Isa Bashir Salisu, second year PG.

கவிதாஞ்சலி

பாக்கியம் பெற்றோம்

எங்கள் ஆசிரியரை அடிபணிய,

நேரத்திற்கு கட்டுப்பட்டவர்,

நேர்மையை கடைபிடித்தவர்,

அதிகம் புகழை விரும்பாதவர்,

என்றும் எங்களுக்கு புகலிடம் அளித்தவர்,

எங்களை அமர வைத்து பேசியவர்,

எங்கள் மனதில் சிம்மசொப்பனம் போட்டு அமர்ந்தவர்,

உறங்கிக் கொண்டிருந்த என்னை,

தட்டி எழுப்பியவர் – இன்று,

அவர் நீங்கா உறக்கத்திற்கு சென்றுவிட்டார்,

என்றும் தொட முடியாத தூரத்தில் இருப்பவர்,

தொட்டுப்பார்க்கவும் முடியவில்லை – இறுதியில்,

உயிர் மருத்துவக் கருவிகளை கண்முன் நிறுத்தியவர்,

மருத்துவக் கருவிகளாலேயே அவர் உயிர் நீண்டது,

அவர் காதல் கொண்டிருந்த கருவிகள் செயலிழந்ததால்,

அவர் இதயமும் செயலிழந்தது !!!

கொரோனா நினைத்தது இவரின் இதயத்தை நிறுத்திவிட்டேன்–என்று

இறைவன் சொன்னான் இவரின் இதயத்துடிப்பை நிறுத்த முடியவில்லையே !!!

துடிப்புடன் மாணவன்
உ.முத்தீஸ்வரன்.
முதுகலை– உயிர்மருத்துவ பொறியியல்

DEPARTMENT VENTURES

ASSOCIATION OF BIOMEDICAL ENGINEERS (ABE) INAUGURATION

With the start of a new academic year comes the much awaited elections for different positions of the student body of the Association of Biomedical Engineers (ABE). This year, the elections were held in two phases. The students were first asked to give their nominations for the different positions comprising the President, Vice President, Secretary, Treasurer and Event Coordinator. All the office bearers will be responsible for organizing and conducting all the events of the department and also for representing the students of the department. The first phase of elections was held on 27th May, 2021, for all the positions except the President of the student body where all the students voted for their person of choice.

The Inauguration function of the Association of Biomedical Engineers took place on the 29th of May, 2021. In the morning session, the nominees for the post of the President of ABE each presented their plan of action and promises they would keep up if they were voted into the post which enabled the students to vote for the person who would represent them the best. Then an election was held for the position of the President wherein all the students as well as professors cast their votes.

In the afternoon session, Ms. Dhanalakshmi M, Assistant Professor, BME, gave a brief introduction about the department and the various clubs as well as events and symposiums conducted by the biomedical department. The existing office bearers were thanked for their hard work and contributions throughout the year in making all the events a huge success. The current President of the student body delivered a report on the proceedings of the year 2020-21. Following the speech, the results of the student body elections were finally announced. The previous office bearers passed on the baton to the next office bearers.

The new office bearers of ABE 2021-22 are:

1. Lokesh Kumar M - President
2. SaiKaviya Neharika M C - Vice President
3. Aarthi V - Secretary
4. Crossny Snowlin R - Treasurer
5. Pooranima G - Event Coordinator

Association of Biomedical Engineers (ABE) Inauguration

Lokesh Kumar M
President

Saikaviya Neharika M C
Vice President

Aarthi V
Secretary

Crossny Snowlin R
Treasurer

Pooranima G
Event Coordinator

EVENTS CONDUCTED

2 - DAYS WORKSHOP ON REHABILITATION ENGINEERING

A workshop was conducted by the department of Biomedical Engineering on "Rehabilitation Engineering", for III year UG students and I year PG students during 9-10 April 2021. The aim of this workshop was to expose the students to various opportunities available in the field of Rehabilitation Engineering. The organizers of the workshop were **Ms. M. Dhanalakshmi** and **Dr. Sachin Gaurishankar Sarate**, Assistant Professors in Department of Biomedical Engineering.

On the first day of the workshop, the first speaker was Dr. Milind Banu Potdar, Director of Sawali Center for Mental Health and Research, Latur, Maharashtra. He is a Psychiatrist by profession. He gave a talk on the topic "Rehabilitation in Psychiatry, New Horizons, New Hopes". He divided his talk into three parts. The first part dealt with pediatric diseases, second on young adults and third on geriatric diseases. This talk gave students scope for biomedical engineers in designing new technologies for psychiatric patients.

The second talk on the first day was given by Dr. M. Marieswaran, Assistant Professor, Department of Sports Biomechanics, School of School Sciences, Central University of Rajasthan. He gave a talk on "Experimentation and musculoskeletal modelling of femur anterior cruciate ligament-tibia complex (FACT)". In his talk, he gave an excellent overview of experiments done in tissue Biomechanics. He showed the students the experimental setup he worked on in AIIMS Delhi, where he had worked on tissue samples and studied their mechanical properties on a special Universal Testing machine. He showed many visuals which gave the students a very deep insight into experimental work done in Biomechanics.

The first talk on the second day was given by Dr. Rajinikumar, Assistant Professor, Department of Exercise Physiology and Biomechanics, Tamil Nadu Physical Education and Sports University, Chennai. He gave a talk on "Recent Developments in Arthroses and Prostheses". In his session, students were acquainted with various devices used by amputees and disabled people. The presentation had many videos

showing recent advances in development of arthroses and prosthesis which gave a good exposure to our students to opportunities in this field.

The second talk on the second day was given by Mr. S. Viswanath who is working as Biocompatibility Engineer at HCL Technologies, Chennai. He gave the students information about "Medical Devices and Biocompatibility". As designs and solutions are given utmost importance in rehabilitating a patient from disabilities, biocompatibility is an important aspect as it becomes instrumental in real deployment of a product. If a good simulation in computers turns out to be non-biocompatible, it needs to be redesigned. He gave the students an informative talk on how various implants and devices which come in contact with patient tissue are tested in the labs by characterizing their surfaces and also how they are tested on mammalian cells as well as animals.

The last session of the second day was conducted by Mr. Praveenkumar G. and Mr. S. Omprakash. Both of them are software engineers working at HCL Technologies. They gave a hands-on training session on "LabVIEW – Signal Processing and Automation". This session gave students an opportunity to learn how this software can be applied to various problems in rehabilitation. Dr. M. Marieswaran, Mr. Vishwanath, Mr. Praveenkumar and Mr. Omprakash are alumni of Depatrtment of Biomedical Engineering, Sri Sivasubramaniya Nadar College of Engineering.

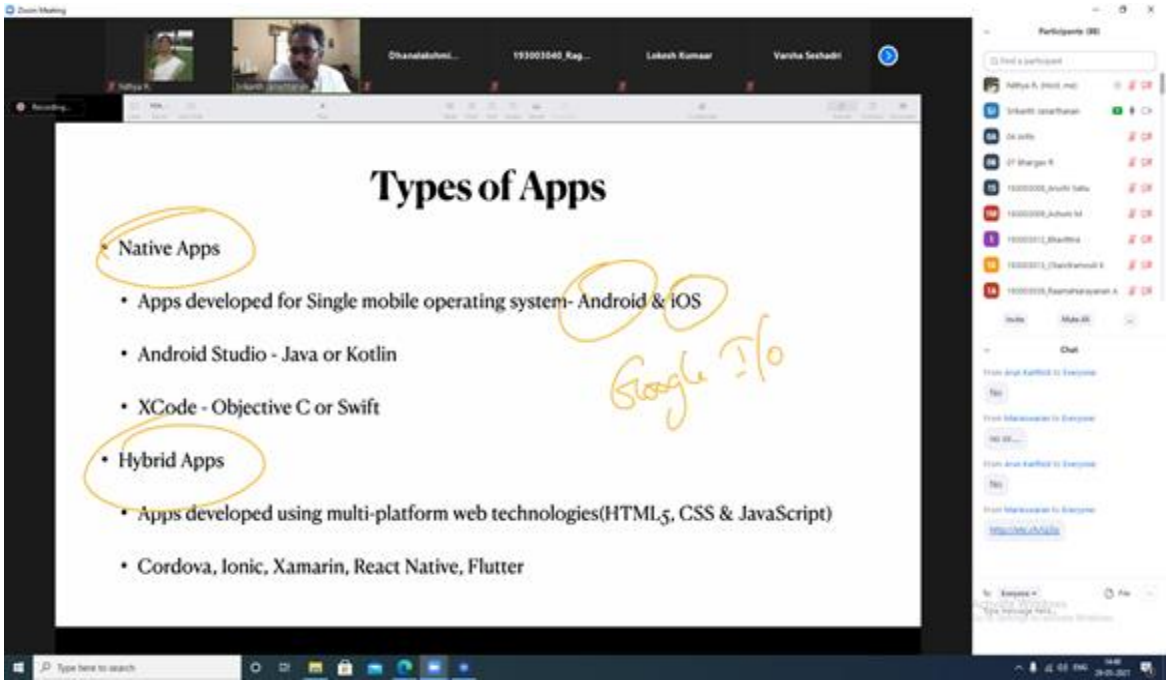
Dr. Milind Banu Potdar delivering his talk

EVENTS CONDUCTED

WEBINAR ON INNOVATION AND PRODUCT DEVELOPMENT

On the 29th of May, the Department of Biomedical Engineering conducted a webinar on Innovation and Product Development. The Institution's Innovation Council in collaboration with the Association of Biomedical Engineers conducted this webinar. Two speakers graciously addressed the participants. Around 100 Participants participated in the webinar.

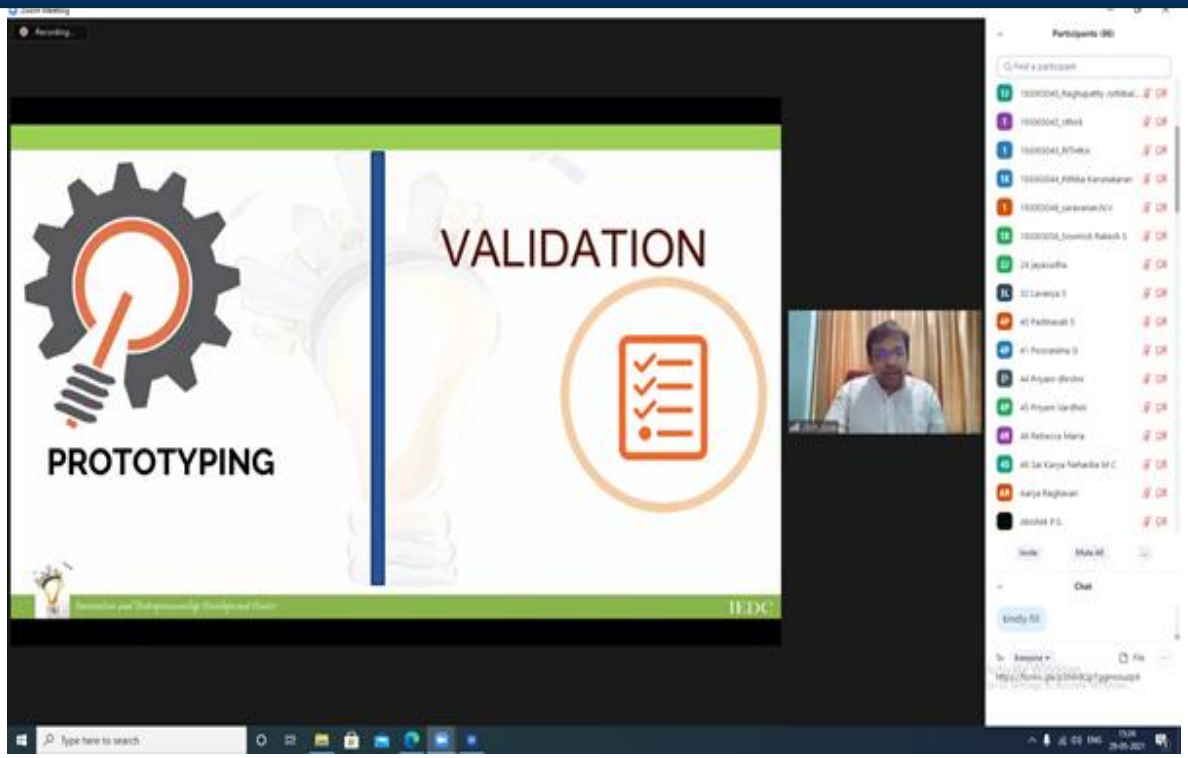
The first speaker for the day was Professor Srikanth Janarthanan, Director and CEO of GRADS LLP and a consultant at KG information Systems Limited. He started with his experience in this field and later moved on to various innovations and products developed in the past few years. He explained the various products and projects he has worked on and gave the participants a different perspective on the topic of Innovation. Not only did he address the participants on the given topic but also informed the students about the various possibilities for their future. He shed light on how all students have to set their goals early on in life and work towards them with determination. He encouraged the students to use their time judiciously to learn more skills. Explaining about the various projects he was working on currently, he motivated the students to take up such projects and do more hands-on work as well.



Screenshots of Prof. Srikanth Janarthanan delivering his talk

The second speaker was Mr. Jibin Jose, Innovator, mentor, Nodal Officer and Co-ordinator at Innovation and Entrepreneurship Development Center. Mr. Jose explained in detail the process of innovation and product design. He educated the participants on the importance of every step to innovation. He went on to explain how a team requires people of different qualities to make a successful innovation. Lastly, he encouraged all the students to innovate even if it's the smallest of innovations and to learn from our mistakes.

This event was organized by **Ms. M. Dhanalakshmi**, Assistant Professor and **Ms. R. Nithya**, Assistant professor in the Department of Biomedical Engineering. With the support of the HOD of BME, Dr. Kavitha, the speakers for the event and the participants, the event successfully came to an end.



Screenshot of Mr. Jibin Jose delivering his talk

WEBINAR ON PROTOTYPE VALIDATION – CONVERTING PROTOTYPE INTO A STARTUP

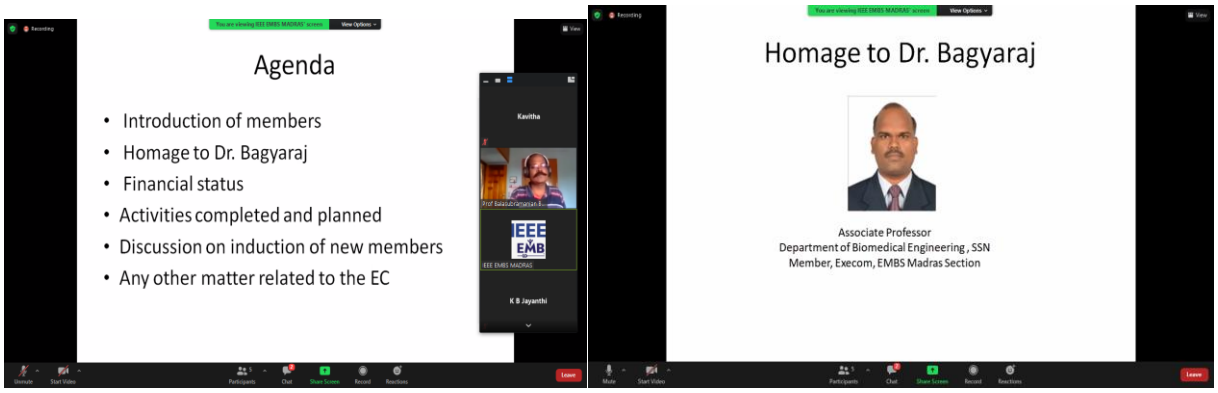
Dr. V. Mahesh, AsP, BME along with The Institution's Innovation Council organized a webinar on "Prototype Validation – Converting Prototype into a Startup" on 16th June 2021. Sri. Kumar Gururajan, Co- Founder- Strauss Healthcare Ptd. and Streben Healthcare Private Ltd., addressed the participants.

Screenshot of Mr. Kumar Gururajan delivering his talk

FACULTY VENTURES

EXTERNAL RECOGNITION

Dr. A. Kavitha attended the IEEE EMBS Execom Meeting on 11th June, 2021. The Executive Committee members paid homage to Dr. Bagyaraj – former Execom member of IEEE-EMBS.



Dr. Vijay Jeyakumar, AsP./BME delivered a talk on Image Compression in Anna university sponsored Faculty Development programme titled "Digital Image Processing" organized by the department of Electronics and Instrumentation Engineering, St.Josephs College of Engineering, Chennai on 11/06/2021.

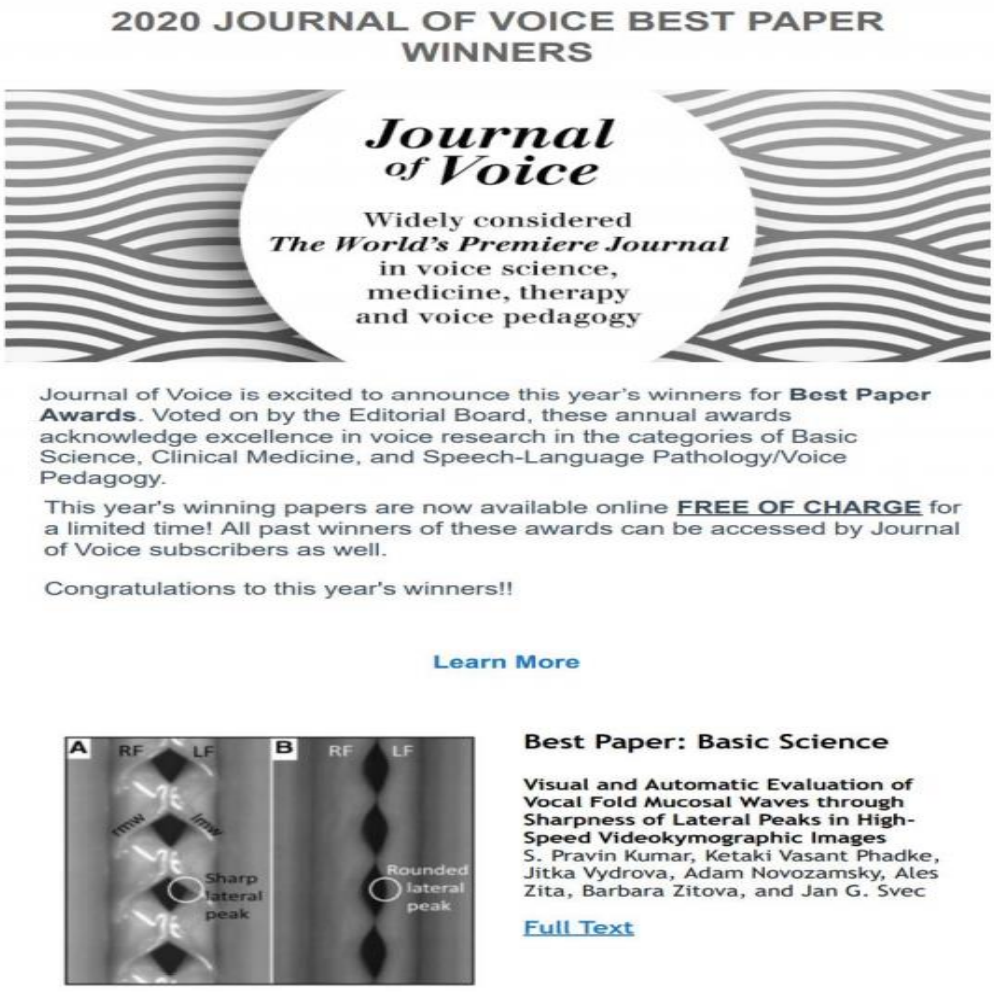
Dr. Vijay Jeyakumar, AsP./BME delivered a talk on "Deep learning approach for Medical Image retrieval System" in One week Online FDP "Advanced Trends in Biomedical Research using Deep learning Techniques" organized by the department of ECE, Mepco SChlenk Engineering College, Sivakasi, held between 17/05/2021 - 21/05/2021.

Dr. Vijay Jeyakumar, AsP./BME and **Ms. B. Divya**, AP/BME successfully completed the ISO 9001:2015 internal auditor training program conducted by TUV NORD Training Academy India Pvt Ltd.

Dr. Vijay Jeyakumar, AsP./BME delivered a talk on Image Compression in Anna university sponsored Faculty Development programme titled "Digital Image Processing" organized by the department of Electronics and Instrumentation Engineering, St.Josephs College of Engineering, Chennai on 11/06/2021.

EXTERNAL RECOGNITION

2020 Elsevier's Journal of Voice **Best Paper Award** in the Basic Science Category is presented to **Dr. S. Pravin Kumar,** AsP. /BME, Ketaki Vasant Phadke, Jitka Vydrova, Adam Novozamsky, Ales Zita, Barbara Zitova, and Jan G. Svec for their manuscript titled "Visual and Automatic Evaluation of Vocal Fold Mucosal Waves through Sharpness of Lateral Peaks in High-Speed Videokymography Images". The Journal of Voice is widely considered as the World's Premiere Journal in Voice research. The Journal of Voice Best Paper Awards are presented annually in three categories: Basic Science, Clinical Medicine, and Speech-Language Pathology/Vocal Pedagogy, and are decided by the Editorial Board.



Department of Biomedical Engineering congratulates Dr.Pravinkumar, Asp/BME for his achievements in Research

EXTERNAL RECOGNITION

Dr. R. Subashini, AP/BME has been appointed as an Examiner for Practical & Paper Evaluation for University Examinations held at Department of Biotechnology, Chettinad Academy of Research and Education on 21/04/2021.

Dr. Sachin Gaurishankar Sarate, AP/BME delivered a lecture on "Using Visualisation Tools in Presentations" in FDP organised by SSN Institute Innovation Council (IIC3.0), at Sri Sivasubramaniya Nadar College of Engineering, Chennai on 26/05/2021.

Dr. Sachin Gaurishankar Sarate, AP/BME, gave a guest lecture to SSN Youth Red Cross on the topic "Vaccine Awareness" at Sri Sivasubramaniya Nadar College of Engineering, Chennai on 21/05/2021.

Ms. B. Divya, AP/BME has been selected as an expert panel (Question paper preparation) for the upcoming university examinations at APJ Abdul Kalam Technological University (initially Kerala Technological University), a Kerala State Government University for the courses under ELECTRONICS AND BIOMEDICAL ENGINEERING.

RESEARCH ACTIVITY

JOURNAL PUBLICATIONS

P. Meenachi, **R. Subashini,** A.K. Lakshminarayanan, Manoj Gupta, In vitro degradation, haemolysis and cytotoxicity study of Mg-0.4 Ce/ZnO2 nanocomposites. IET Nanobiotechnology. 2021 Apr;15(2):157-63.

R. Subashini, R. Anitha, N. Kiruthika, G. Kowsalya, J. Sivadharshini. Isolation and Purification of Antimicrobial Protein from Cocos nucifera and its Efficacy on Human Pathogens. Indian Journal of Natural Sciences, 12(65), 2021, 30522-30528.

Sree,R. A., **Divya, B.,** & **Kavitha, A**. (2021, June). Task specific Brain Synchronization in EEG based Speech and Speech Imagery Procedures. In Journal of Physics: Conference Series (Vol. 1937, No. 1, p. 012044). IOP Publishing.

CONFERENCE PBLICATIONS

R. Anandha Sree, **B. Divya** and **A. Kavitha** presented and received the best paper award for the paper titled "Task Specific Brain Synchronization In EEG Based Speech And Speech Imagery Procedures" in the International conference on novel approaches and developments in Biomedical engineering - ICNADBE 2021 organized by the department of Biomedical Engineering, Karunya Institute of Technology and Sciences, Coimbatore between 22/04/2021 and 23/04/2021.

Bashir, S. I., **Kavitha, A.** (2021, May). Effect of gender in the onset and progression of Parkinson's disease. In 2021 10th International IEEE/EMBS Conference on Neural Engineering (NER) (pp. 577-580). IEEE.

Chrisilla, S., Ragav, T. R., Vidhusha, S., & **Kavitha, A**. (2021, May). Investigating Cognitive Global Coordination in normal and autistic children using virtual reality environments–An EEG Study. In 2021 10th International IEEE/EMBS Conference on Neural Engineering (NER) (pp. 1016-1019). IEEE.

RESEARCH ACTIVITY

R. Anandha Praba, **L. Suganthi,** E.S. Selva Priya and J. Jeslin Libisha presented a paper entitled ECG Signal Based Heart Disease Identification Using Neural Network Classifier in the 2nd International E-Conference on Information, Communication and Networking organized by Easwari Engineering College, Chennai on 9/04/2021.

R. Anandha Praba, **L. Suganthi** and E.S. Selva Priya presented a paper entitled ECG Based Classification of Heart Disease Using Machine Learning Algorithms in the International Conference on Multidisciplinary Innovations in Computing and Communications organized by Easwari Engineering College, Chennai on 19/04/2021.

S. Viswanath, G. Praveenkumar, S. Omprakash and **M. Dhanalakshmi** presented paper titled "Composite blade for lower extremity amputees" in the Third International Composite blade for lower extremity amputees Conference on Materials Science and Manufacturing Technology 2021 (ICMSMT 2021) held at Coimbatore, during 15/04/2021 - 16/04/2021.

Chetana Krishanan, Sandhya Varshini, and **Vijay Jeyakumar** presented and received a best paper award for the paper titled “Non-Clinical Pain Assessment System” in DST sponsored National Virtual Conference on Advanced Informatics, Electronics and Vision (NCAIEV’ 21) organized by Dr. Mahalingam College of Engineering and Technology, Pollachi held on 23/04/2021.

R. Anitha and **R. Subashini** presented and received the best paper award for the paper titled 'Bioactive compounds in Cassia auriculata: From herbal medicine to drug discovery" in the Second International Virtual Conference on Recent Trends in “Clean Technologies for Sustainable Environment (CTSE-2021)” organized by the Department of chemical engineering, Sri Sivasubramaniya Nadar college of Engineering, during 06/05/2021 - 07/05/2021.

L. Suganthi, E. S. Selva Priya and R. Anandha Pabha presented a paper entitled “FPGA Enforcing of Data Encryption and Decryption by virtue of Cryptographic Algorithm for Secured Data Transmission” in International Conference on “Innovations and Technological Developments in Electronics, Computers, and Communication (ITDECC- 2021) “organized by SRM Institute of Science and Technology, Ramapuram, from 17/05/2021 - 18/05/2021.

RESEARCH ACTIVITY

EXTERNAL FUNDED PROJECTS

Dr. A. Kavitha, Dr. S. Pravinkumar, and **Dr. J. Vijay** along with **Dr P Selvaraj,** Professor of Clinical Medicine, Madras Veterinary College and HCL, Chennai submitted a project proposal titled "Blockchain, AI & IoT based Smart Vet Ecosystem for Advancing Animal Patient Care and Real-time Disease Monitoring & Prediction: Prototype Development" to ICAR - National Agricultural Science Fund. Budget: 4014000/-

Dr. S. Pravin Kumar, Dr. A. Kavitha and **Ms. B. Divya** submitted a proposal titled "Connected homecare" to Innovative and Entrepreneurial Project Proposals Under Technology Incubation Hub (TIH) of National Mission on Interdisciplinary Cyber Physical Systems (NMICPS) for Data Analytics and Predictive Technologies (DAPT).

Palani Thanaraj, B Parvathavarthini, **Dr. Vijay Jeyakumar** received financial support of Rs. 1161629 for the project titled "Development of Multi-spectral (Thermal/Visible) Imaging system for Fever screening in crowded places for detection of infectious diseases" by DST under the Core Research Grant Scheme. SERB/F/8770/2020-2021 dated March 23, 2021, Duration: 02 Years.

PATENTS

Dr. L. Suganthi, along with EEE Students Santhosh Aravind S, Praveen S B, Sai Prashanth B. published Patent titled “A CUFFLESS NON-INVASIVE BLOOD PRESSURE MONITOR” Application number:202141017842; Publication Number: 17/2021; Publication Date: 23/04/2021.

RESEARCH ACTIVITY

RESEARCH SCHOLAR

Dr. R. Subashini, convened the Doctoral Committee Meet on 23/04/2021 at 02:00-pm in the ZOOM Platform, and recommends a panel of experts for constituting oral examination board in Department of Biomedical Engineering, SSN College of Engineering, Kalavakkam, 603110, Chennai.

INDUSTRIAL COLLABORATION

Dr. L. Suganthi AsP./BME, Anupam Bhaskarbhatta, Kesavaraj V, Prem Aravindan J (2016-2020 batch) have worked on the "High Fidelity Digital Rectal Examination Setup With Haptic Feedback" which is a collaborative work with Verena Haptic & VR Systems Pvt. Ltd, Chennai. After several project reviews, this project has been approved for incubation at IITM Incubation Cell and HTIC incubator.

Dr. L. Suganthi AsP./BME has been invited by Verena Haptic & VR Systems Pvt. Ltd, Chennai to work along with them as one of the directors for promoting collaborative research work.

WORKSHOP/WEBINAR/ GUEST LECTURE/ FDP

ORGANIZED

Ms. M. Dhanalakshmi, AP/BME and **Dr. Sachin G. Sarate** AP/BME organized a two day workshop on rehabilitation engineering during 09/04/2021 - 10/04/2021.

Ms. M. Dhanalakshmi, AP/BME and **Ms. R. Nithya** AP/BME organized a webinar on "Innovation and product development" in Association with Biomedical Engineers (ABE) and Institute's Innovation Council (IIC) on 29/05/2021. **Prof. Srikanth Janarthanan**, Director and CEO, KG information systems Ltd., and **Mr. Jibin Jose**, Nodal officer & coordinator, Innovation and Entrepreneurship development centre, Kerala startup Mission, Thrissur gave away the presentations to BME students.

Dr. Mahesh Veezhinathan, AsP./BME organised a IIC webinar titled “Prototype Validation - Converting Prototype into a Startup” on 16/06/2021. Sri.Kumar Gururajan , Co-founder Strauss Healthcare, Pvt Ltd and Streben Healthcare Pvt. Ltd. was the resource person of the webinar.

ATTENDED

Dr. A. Kavitha was invited as a Panel Speaker in the "Second Engineering, Medicine, Biology, and Healthcare Research and Innovation Colloquium”, held virtually at Bangladesh by the IEEE EMBS Bangladesh Chapter on 9th June. She delivered a talk on AI in Memory and learning disorders.

Screenshot of the event “Second Engineering, Medicine, Biology, and Healthcare Research and Innovation Colloquium” event.

WORKSHOP/WEBINAR/ GUEST LECTURE/ FDP

Dr. A. Kavitha, HOD/BME attended webinars organized by India COVID Task Force (India COVID SOS) members from 29/04/2021 - 30/04/2021. The talks were based on "oxygen shortage" and the current situation of India by speakers from US and Canada.

Dr. N. Punitha, AP/BME attended 5 Days FDP on "Artificial Intelligence and Machine learning" from 24/05/2021 - 28/05/ 2021.

Dr. B. Geethanjali, AsP./BME attended a Virtual Faculty Development Programme on “Creative and Innovative Teaching Strategies for the New Normal” organized by SSN –Institute Innovation Council (IIC3.0) from 24/05/2021 - 31/05/2021.

Ms. S. Saranya, AP/BME attended 5 Days FDP on "Artificial Intelligence and Machine learning" conducted by NIT Warangal from 24/05/2021 - 28/05/2021.

Ms. S. Saranya, AP/BME attended one Day workshop on "Computational Fluid Dynamics Fundamentals - Theory and Practice" organized by the Department of Mechanical Engineering, Sri Sivasubramaniya Nadar college of Engineering on 18/05/2021.

Dr. R. Subashini, AP/BME, has participated in the webinar on "Introduction to Intellectual property rights (IPR), Types and examples" organized by the institution's Innovation council of Sri Sivasubramaniya Nadar college of Engineering on 19/05/2021.

Dr. Mahesh Veezhinathan, AsP./BME has attended a Webinar on “Critical COVID Conversations: ICU equipment” organized by Fluke Biomedical and Ray Safe on 13/05/2021.

Dr. Mahesh Veezhinathan, AsP./BME has attended a IEEE-SPS Madras Chapter organized Distinguished Lecturer talk on “Making Sense Out of Restless Brain Activity with Computational Neuroimaging " by Professor Dr. Dimitri Van De Ville, Professor of Bioengineering, Center for Biomedical Imaging, Department of Radiology and Medical Informatics, University of Geneva, Switzerland on 5/05/2021, 1.30 to 3.00 PM.

WORKSHOP/WEBINAR/ GUEST LECTURE/ FDP

Dr. Mahesh Veezhinathan, AsP./BME attended a webinar on "The role of Elsevier's research reference books in enhancing the quantity & quality of publications" organized by SSN CE and Elsevier India on 21/05/2021, 11.00 AM.

Dr. Mahesh Veezhinathan, AsP./BME, attended a webinar on "Understanding Radiation Survey Meters: The Pros and Cons of this powerful technology" organized by Fluke Biomedical and Raysafe on 19/05/2021.

Dr. S. Arun Karthick, AsP./BME has attended a Webinar on "LCMS-MS and Spectroscopy techniques (AAS, ICP, ICP-MS)" organized by PerkinElmer, India on 21/05/2021.

Dr. S. Arun Karthick, AsP./BME has attended a Webinar on "Virtual prototyping for pharmaceutical equipment with Rocky DEM" organized by CADFEM India Private Limited on 25/05/2021.

Dr. S. Arun Karthick, AsP./BME has attended a Webinar on "Skin-Inspired Organic Electronics" organized by American Chemical Society on 28/05/2021.

Dr. K. Nirmala, AsP./BME has attended five days online ATAL FDP on, "Combating Cancer: Role of ML techniques in Prevention and Treatments" organised by KIT, Coimbatore from 07/06/2021 - 11/06/2021.

Dr. Mahesh Veezhinathan, AsP./BME attended 5-day Faculty Development Program on "System Design for healthcare and Assistive Technologies" organized by the Department of ECE, Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam, Chennai, Tamil Nadu, from 14/06/2021 - 18/06/ 2021.

Dr.B.Geethanjali, AsP./BME attended five days FDP on System Design for health care and Assistive Technologies conducted by the Department of Electronics and Communication,Sri Sivasubramaniya Nadar college of Engineering from 14/06/2021 - 18/06/2021.

WORKSHOP/WEBINAR/ GUEST LECTURE/ FDP

Ms. S. Saranya, AP/BME attended AICTE sponsored 5-day Professional Development Programme on "Artificial Intelligence in contemporary Biomedical & Healthcare applications: fundamentals & hands-on Matlab" Organized by Department of Electrical Engineering, School of Engineering, Gautam Buddha University, Greater Noida, UP from 21/06/2021 - 25/06/2021.

Dr. S. Arun Karthick, AsP./BME attended 5 Days FDP on "System design for Healthcare and Assistive Technologies" conducted by Department of Electronics

and Communication Engineering, Sri Sivasubramaniya Nadar College of Engineering from 14/06/2021 - 18/06/2021.

Dr. S. Arun Karthick, AsP./BME has attended a Webinar on "**A**rtificial Intelligence in Chemistry: Current Trends and Future Opportunities" organized by American Chemical Society on 03/06/2021.

Dr. S. Arun Karthick, AsP./BME attended a Webinar on "Bioinspired Nanomaterials: From Discovery to Market Pipeline" organized by American Chemical Society on 11/06/2021.

Dr. N. Punitha, AP/BME, attended 3-days online workshop on "AICTE Examination Reforms" organized by All India Council for Technical Education (AICTE) and KLE Technological University, Hubballi from 28/06/2021 – 30/6/2021

STUDENT PURSUITS

External Recognition-Co Curricular

V. Aishwarya, II year BME completed MATLAB Onramp course in Math Works - Online on 16/04/2021.

V. Aishwarya, II year BME completed Signal Processing Onramp course in Math Works - Online on 29/04/2021.

J. Raghupathy, II year BME completed the MATLAB Onramp course in Math Works - Online on 25/04/2021.

External Recognition-Co Curricular

J. Raghupathy, II year BME completed Image Processing Onramp course in Math Works - Online on 25/04/2021.

Yaamini, I year M.E Medical Electronics participated in LabVIEW workshop organized by SRM - MTS student chapter from 13/05/2021-15/05/2021.

Tuhina Abraham, I year M.E Medical Electronics attended the 3D Graphy workshop - 3D Visualisation for dental and medical - AR and VR 2021 on 23/05/2021.

External Recognition-Co Curricular

Tuhina Abraham, I year M.E Medical Electronics was part of the Guvi event in learning the basics of python organized by Guvi from 24/05/2021 - 25/05/2021.

Tuhina Abraham, I year M.E Medical Electronics attended the webinar Critical COVID Conversations: ICU Equipment organized by fluke biomedical on 13/05/2021.

R. Dhanush Babu, II year BME Build a Face Recognition Application using Python as a part of AI-For-India - GUVI Completion held on 25/04/2021 – Online.

R. Dhanush Babu, II year BME attended the Webinar on “Innovations and product development” organized by SSN-IIC & ABE on 29/05/2021.

Mohammed Adhil, I year M.E Medical Electronics has participated in one day webinar on the topic "Transforms Domain Analysis in Biomedical Signals" conducted by the Department of ECE, Amrita Vishwa Vidhyapeetham School of Engineering, Coimbatore on 15/05/2021.

Mohammed Adhil, I year M.E Medical Electronics has attended a course training program on "Image Processing on ramp" conducted by Math Work Training services on 10/05/2021.

Mohammed Adhil, I year M.E Medical Electronics has attended 5-day workshop on "Image Processing using MATLAB" conducted by Pantech Solutions from 12/04/2021 - 16/04/2021.

External Recognition-Co Curricular


CERTIFICATE NO : PS-IP-APR-MC-0228

PANTECHSOLUTIONS

CERTIFICATE
OF PARTICIPATION

NAME : Mr.MOHAMMED ADHIL S
COLLEGE : SSN COLLEGE OF ENGINEERING

has Successfully Completed
IMAGE PROCESSING USING MATLAB(5 DAYS WORKSHOP)

at Pantech Prolabs India Pvt Ltd

From : APRIL 12,2021 to : APRIL 16,2021

M.MALAIYAPPAN
DIRECTOR
PANTECHSOLUTIONS


MathWorks | Training Services

Course Completion Certificate

Mohammed Adhil S

has successfully completed 100% of the self-paced training course

Image Processing Onramp

10 May 2021

N.V. Saravanan, II year BME completed MATLAB Onramp course in Math Works - Online on 25/04/2021.


MathWorks | Training Services

Course Completion Certificate

saravanan nv

has successfully completed 100% of the self-paced training course

MATLAB Onramp

05 May 2021


MathWorks | Training Services

Course Completion Certificate

saravanan nv

has successfully completed 100% of the self-paced training course

Image Processing Onramp

18 May 2021


MathWorks | Training Services

Course Completion Certificate

Janani Thirukumar

has successfully completed 100% of the self-paced training course

MATLAB Onramp

25 May 2021


MathWorks | Training Services

Course Completion Certificate

Raghupathy Jothibalaji

has successfully completed 100% of the self-paced training course

Image Processing Onramp

25 April 2021

External Recognition-Co Curricular

Mannat Uppal, I year M.E Medical Electronics has attended the workshop "Training course on Labview" organized by SRM, Chennai from 13/05/2021-15/05/2021.

N.V. Saravanan, II year BME completed Image Processing Onramp course in Math Works - Online on 25/04/2021.

J. Raghupathy, II year BME completed Signal Processing Onramp course in Math Works - Online on 02/05/2021.

J. Raghupathy, II year BME completed the course on "Introduction to Machine Learning" in - Coursera on 16/05/2021.

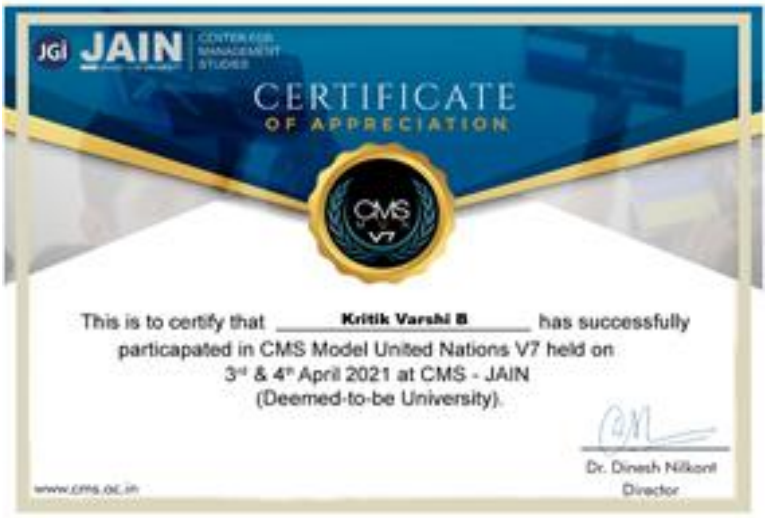
Janani Thirukumar, II year BME completed MATLAB Onramp course in Math Works - Online on 25/05/2021.

Aarya Raghavan, II year BME has attended the International webinar on "Evolutionary Learning and its Engineering Applications" organized by IEEE Mysore Chapter on 21/05/21.

External Recognition-Extracurricular activities

V. Aishwarya, II year BME Performed bharathanatyam in "Baani " a documentary at Kalashetra foundation Thiruvanmiyur Chennai.

External Recognition-Extracurricular activities



Sachin Raj, I year M.E Medical Electronics has attended the "All India AI Guinness record" by GUVI on 24/04/2021.

T.V Santhoshiya, II year BME Participated in International Yoga Day Quiz organized by Ministry of Ayush, GOVERNMENT OF INDIA on 01/05/2021.

B. Kritik Varshi, II year BME participated in CMS MUN - Centre of management studies, Bangalore - Honorable Mention n 03/04/2021 - 04/04/2021.

B. Kritik Varshi, II year BME participated in AUMUN - Anna University - Verbal Mention - 16/04/2021-17/04/2021 – Online.

ALUMNI CORNER

The Golden Era

Right from my childhood, I wanted a career and in turn a life that would be an amalgamation of all my interests. During middle school, I came across a neighbor who completed Biomedical Engineering and I got obsessed with the course. When I completed high school, I was sure that was what I would study. There were very few colleges that offered the course. I had good grades but I wanted to make it into a college with nothing but merit. SSN was one of the finest institutions that considered CBSE students based on their talent and not just grades. My joy knew no bounds when I got the admit. Everything from there was a rollercoaster ride.

During the start of my Bachelors, I was excited to explore the vivid subjects and staff made it highly interesting. Getting to know the huge campus took days, but all the walking and cycling was totally worth the effort. What amazed me was the perfect balance between top-notch infrastructure and the beautiful ambience. Right from the classrooms to the auditorium everything was equipped to our needs.

Moving on to my department, it was again tailored to the students with great equipment and inspiring faculty. Workshops and seminars were conducted frequently on a multitude of topics like from technology advancements to \

volunteering and career goals. Our feedback was constantly obtained and valued. Collaborations with prestigious organizations like IEEE and NI presented us with quality content and widened our knowledge.

During my final year, I was elected as the Department's association president. I owe all the confidence that I had to take up that post, to the college and my inspiring peers. Being the student representative of my department during my final year, I was in-charge of conducting multiple events and in hosting our International conference with my professors. I had been an active member of the IEEE EMB society for two years; hence volunteering was something I had mastered. This eased my responsibilities as a leader. Holding the post, I coordinated with 7 other department presidents to conduct our college's first National technical fest "Invente" which was a huge success. Believing in myself helped me simplify and conquer all tasks which was certainly a quality that I obtained from the aura of such an institution.

Everyone says that college gives a huge chunk of great moments to one's life. SSN proved that to me. With everything a student can ask for, be it a motivating atmosphere, great equipment, supportive faculty or challenging classmates, SSN had everything. In grooming students to reach their potential to getting placed or becoming entrepreneurs or studying further, students are delicately nudged and transformed into a version they never thought they had within themselves. It was a privilege to spend four incredible years of my college life at SSN, I was a proud SSNite and now I am a proud Alumni studying in the most innovative college in Germany, majoring in medical engineering. From being a shy girl who wanted to take up biomedical as a career option to travelling cross country to the hub of the Healthcare sector, SSN played a major role and I will forever be grateful to the institution.

Aathira Haridas
SSN BME 2013-17
Masters in Medical Engineering 2019-21,
FAU Erlangen, Germany.

THINK PIECE

TRANSDERMAL PATCHES

Raghupathy J & R Dhanush Babu
II Year BME

WHAT IS A TRANSDERMAL PATCH?

A transdermal patch is a medicated adhesive patch that is placed on the skin to deliver a specific dose of medication through the skin and into the bloodstream. Often, this promotes healing to an injured area of the body. An advantage of a transdermal drug delivery route over other types of medication delivery such as oral, topical, intravenous, intramuscular, etc. is that the patch provides a controlled release of the medication into the patient, usually through either a porous membrane covering a reservoir of medication or through body heat melting thin layers of medication embedded in the adhesive. The main disadvantage to transdermal delivery systems stems from the fact that the skin is a very effective barrier; as a result, only medications whose molecules are small enough to penetrate the skin can be delivered by this method. A wide variety of pharmaceuticals are now available in transdermal patch form. A transdermal patch which delivers medication is applied to the skin in a medical setting. The patch is labelled with the time and date of administration as well as the administrator's initials.

TRANSDERMAL DRUG DELIVERY SYSTEM (TDDS)

Transdermal drug delivery system (TDDS) has been an increased interest in the drug administration via the skin for both local therapeutic effects on diseased skin (topical delivery) as well as for systemic delivery of drugs. The skin as a site of drug delivery has a number of significant advantages over many other routes of drug administration, including the ability to avoid problems of gastric irritation, pH and emptying rate effects, avoid hepatic first-pass metabolism thereby increasing the bioavailability of drug, reduce the risk of systemic side effects by minimizing plasma concentrations compared to oral therapy, provide a sustained release of drug at the site of application; rapid termination of therapy by removal of the device or formulation, the reduction of fluctuations in plasma levels of drugs, and

avoid pain associated with injections. The transdermal delivery can also eliminate pulsed entry into the systemic circulation, which might often cause undesirable side effects.

Diabetes mellitus is a major and growing health problem worldwide and an important cause of prolonged ill health and early death. It is a chronic metabolic disorder characterized by a high blood glucose concentration (hyperglycemia) caused by insulin deficiency, and it is often combined with insulin resistance. Repaglinide is an oral blood-glucose-lowering drug of the meglitinide class used to treat NIDDM (noninsulin-dependent diabetes mellitus). It lowers blood glucose by stimulating the release of insulin from the pancreas. It has an extremely short half-life of 1 h. In addition, the oral bioavailability of Repaglinide is low (56%) due to extensive hepatic first-pass effect. Dosage frequency of Repaglinide is 0.5 to 4 mg in 3 to 4 times in a day. It has a melting point of 130-131°C and mol. wt. 452.58. It belongs to class 2 drugs. Repaglinide topical preparation may be beneficial to the patient since it reduces adverse effects and avoids hepatic first-pass metabolism. The need for transdermal delivery of Repaglinide is further justified due to the requirement of maintaining unfluctuating plasma concentrations for effective management of blood sugar for a long period in diabetic patients. The purpose of the present work was to develop transdermal formulation of Repaglinide which increases the patient compliance and also sustain the release of drug to increase the bioavailability by using different grades of HPMC and PVP K30 as polymers.

MANUFACTURING OF TRANSDERMAL PATCHES

A continuous process for forming a transdermal patch which comprises the steps of: continuously feeding a strip of material comprising a layer of permeable membrane; continuously feeding into close proximity and in face-to-face relationship with the first strip a second strip is formed of impermeable backing material; passing the first and second strips together through a filling and sealing station in which the material containing an active substance is introduced between the strips and pouches are formed by first sealing devices which seal the strips together in a longitudinal direction of the strips and second sealing devices which seal the strips together in a transverse direction of the strips; the size of the pouches

being adjusted by adjusting the number position and/or frequency of operation of the first sealing devices and/or by adjusting the number position and/or frequency of operation of the second sealing devices.

NICOTINE PATCH

The nicotine patch releases nicotine in controlled doses to help with cessation of tobacco smoking. Nicotine patches are applied directly to the skin. They are applied once a day, usually at the same time each day. Nicotine patches come in various strengths and may be used for various lengths of time.



CONDUCTING EXAMS IN VIRTUAL REALITY

N. Srinidhi II Year BME

Amidst the pandemic, online education and exams are being conducted all over the world. Students are taking online proctored exams which are timed. The proctoring software which works with AI monitors the computer desktop along with Webcam's video and audio. However, AI proctoring is not 100 percent efficient for monitoring. So, using Virtual Reality (VR) gives students the freedom to take exams anywhere. VR can authenticate and proctor students using cameras and biometric sensors during online exams.

Interacting with virtual objects and providing real time feedback allows students and proctors to resolve technical issues such as errors during authentication. Sensors can detect anomalies such as other people, sounds such as people talking and identifying objects such as textbooks or other web applications during the exam time.

THINK PIECE

The term VR first appeared in 1963 where Hall and Miller described HMD (Head Mounted Display) and how they can be used for VR purposes. Soon after an HMD with sensor gloves were developed to interact with virtual objects. With the right set of tools, VR is capable of efficiently engaging users and help them to see how a complex system works. These tools include high-resolution Head Mounted Display (HMD), audio, cameras, a framework to create interactive content and IR sensors.

An example of integrating VR to education and testing is problem-solving through collaboration at Seoul University which integrates virtual map and questionnaire to test the effectiveness of collaborative learning in the virtual environment (Cho and Kim, 2017). Research is developed to ask users to develop a map in a group setting 20 and place various buildings on the map.

Unity3D is a game engine that is cited to be easy to use for beginner developers. It can be used to create Three Dimensional (3D) and Two-Dimensional (2D) games.

THINK PIECE

Framework of VR: Current research focused on engaging the interest of students by various methods of engaging students with classroom learning, videos on HMD, object interaction/manipulation ability, and feedback.

EVE Framework for VR is a framework for setup, implementation, and evaluation of experiments in Virtual Reality. This framework is based on Unity3D and has support for database scripting and visualization tools. Benefits of the framework are first, VR provided better spatial recognition and stimuli when users interacted with virtual objects, the focus is on creating an object that users can partially see and create objects that they cannot see.

Second, various environments are loaded including ones that are familiar to users and a behavioral pattern is observed. Thirdly, a force feedback is provided to users to engage and immerse them in the virtual world. Fourth, facilitating the accuracy, reliability, and record that can speed up the experiment process.

Objects for creating virtual world are often replicated from the real world. A classroom setting or a 31 map of music theatre is used to create a topographic map to provide a more detailed and immersed sense for the user.

THINK PIECE

Wired HMDs connected to a computer can offload any data and graphics processing to workstations and create draw objects on HMD and detect collisions during interaction with virtual objects. Virtual object is designed in Unity3D and real-world characteristics are attached to the properties of the object. The object is imported into EVE framework, and questionnaires are attached to the environment. Any instructions are passed through and feedback system is used to monitor for data when a collision is detected with objects. The data is sent using WebGL to an application server, which is recorded in MySQL database and SPSS is used to analyze the data.

Challenges: The advantage of VR is to interact with objects in the virtual world, construct and deconstruct them. Exams developed around the same principle could be more efficient of testing the knowledge of students.

- Developing exams in-house means training hundreds of staff members in thousands of educational institutes to create and develop content in VR.
- Second challenge and the one that needs to be tackled immediately is to get more educational institutes on aboard to use VR HMDs for exams. Currently, educational institutes are testing VR HMDs as a teaching tool and maybe as an alternative to classrooms. No research data is available on the validity and authenticity of VR as an examination tool

THINK PIECE

EVE framework and Unity3D tools create objects for interaction, collect data and SPSS can analyze the collected data. The challenge is to find convincing data that VR sensors are used to provide feedback during an experiment, and feedback would actively be part of the learning. Automation process for monitoring data in real-time would solve authentication issue

Using VR for exams would need a new program to monitor all the data coming from sensors and a two-way feedback between VR server, Proctor (human or artificial intelligence) and student. Real-time data from sensors such as a microphone, background application

Monitoring, network monitoring and perhaps facial recognition are used for authentication during exams. Simplifying the process of creating detailed virtual objects that mimic real- world properties with a click of few buttons, instead of coding would lead content creation much easier and accessible to more people. Adaptability rate of using VR content would increase by making content creation much simpler. Educational institutes should consider expanding VR usage to more faculty, larger user base leads to more applications being developed and more VR content being created. This would help with analyzing the true potential of VR HMD and the areas requiring improvement.

The biggest challenge for VR HMD is the expensive price due to newer technologies and students would not be able to afford owning Virtual Reality headsets. More companies manufacturing headsets would increase the competition and reduce prices making them affordable for both students and educational institutes.

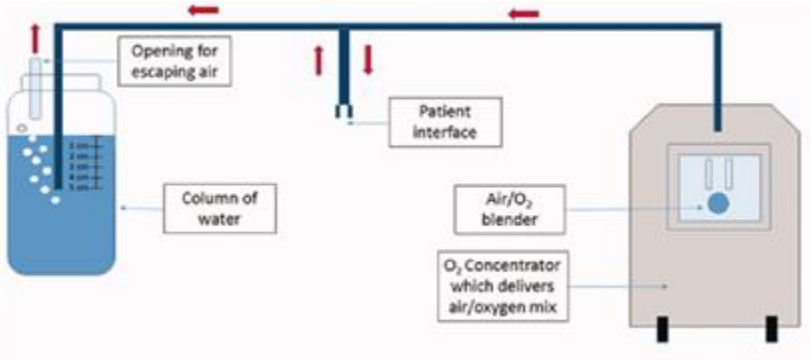
Future Research: One key area that has much potential for research is integrating various sensors for real-time monitor and feedback. Exams are invigilated; any inappropriate behavior would lead to immediate feedback. The same system must be implemented to monitor various sensors where a video stream is monitor by an invigilator and listen to any noises or talking during exams. The invigilation part could be done by human or ideally an Artificial Intelligence program which can

monitor any anomalies in data and provide a prompt warning as feedback. Implementing automatic evaluation for VR exams would further reduce the

workload from instructors. Creating detailed virtual objects that allow students to interact with them and deconstruct/reconstruct would engage them in the 3D environment along with encouraging them to learn and maintain interest in various topics.

BUBBLE CPAP – CONTINUOUS POSITIVE AIRWAY PRESSURE

Raamanarayanan A, BME II Year



Continuous positive airway pressure (CPAP), is an effective intervention for respiratory distress in new-borns and widely used in high-income countries. Severe respiratory distress is a serious complication common to the three major causes of neonatal mortality and morbidity. In low and middle-income countries, 20% of babies presenting with severe respiratory distress die. Following the development of simple, safe and relatively inexpensive CPAP devices, there is potential for largescale implementation in the developing world.

Severe respiratory distress is a serious complication which is common to the three main causes of neonatal death. Three main causes account for the majority of deaths: prematurity (34%), intra-partumrelated conditions (25%) and infections (including pneumonia, 22%). In preterm new-borns, respiratory distress is predominantly secondary to a deficiency in surfactant, a condition known as

hyaline membrane disease or respiratory distress syndrome. Other causes are pneumonia, sepsis and pulmonary haemorrhage. In term new-borns, Respiratory Distress Syndrome, pneumonia, intra-partum-related hypoxia and meconium aspiration syndrome are the main causes of respiratory distress. The case fatality rate for neonatal respiratory distress in LMICs can be as high as 20%.

Respiratory support to treat this condition is provided by CPAP or mechanical ventilation in high-income countries. Surfactant is also used in new-borns presenting with RDS. However, the high cost and the need for endotracheal intubation for its administration makes surfactant unsuitable for low-resource settings and in settings lacking medical staff trained in endotracheal intubation. Mechanical ventilation is expensive and requires a high level of expertise. CPAP is the only intervention which has the potential to be implemented on a large scale in LMICs as simple, safe and relatively inexpensive CPAP devices have been developed recently. CPAP is a non-invasive type of respiratory support which can be delivered without endotracheal intubation although classical mechanical ventilators can also provide CPAP. It works by providing a continuous level of positive pressure to the airways which distends the lungs, overcomes collapse and improves the ventilation.

CPAP can be generated in different ways like:

- by using a variable flow of air and oxygen, toward the patient during inhalation and away from the patient during exhalation (variable flow CPAP)
- by blowing a high flow of air and oxygen (high flow nasal cannula)
- by immersing the end of a respiratory circuit and making the patient exhale against a column of water, generating bubbles (bubble CPAP)

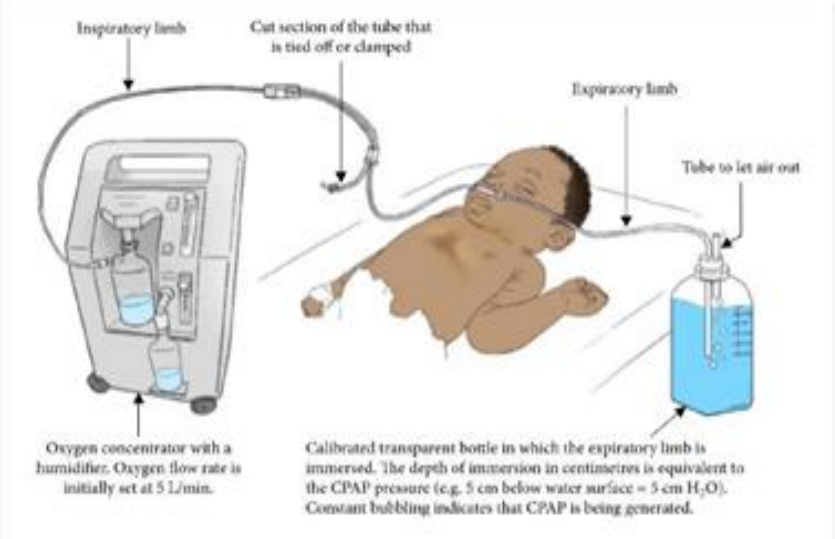
Effectiveness:

The main findings of this study are that the low-cost bubble CPAP device was capable of delivering pressures and flows equivalent to that of the commercially available B&B Bubbler system, and that the low-cost bubble CPAP device was

marginally better at maintaining pressure over a prolonged period of time, but worse at maintaining flow.

The results demonstrate that, overall, the low-cost bubble CPAP system is able to deliver pressures and flows equivalent to those of bubble CPAP systems used in developed settings. However, there were several individual comparisons that reached statistical significance and represented a > 10% difference. The differences in pressure generated by the 2 devices could be due to the simple method of water-depth measurement on the low-cost bubble CPAP device. The water-depth levels were measured with a ruler, and each line was marked with a pen, which could create slight variability in the actual volume measurement.

The differences in both pressure and flow could also be due to the different respiratory circuits used with each system. Comparing delivered versus intended intra-prong, proximal-airway, and distal-airway pressures of a bubble CPAP device and it was found that delivered pressures at both the intra-prong and proximal-airway overshot the intended CPAP level, which could be due to the resistance of the exhalation arm of the circuit tubing. During the exhalation phase of the respiratory cycle, the patient exhales into the circuit tubing, which has its own



intrinsic resistance, creating an increase in pressure sustaining the CPAP level.

Conclusion

Respiratory distress syndrome is the most common cause of death among preterm neonates. Low-cost CPAP has been proven to be an effective and safe intervention for improving oxygenation of neonates with respiratory distress

and abates the need for invasive ventilation, which has been linked to bronchopulmonary dysplasia. This intervention should be considered as a primary modality of respiratory support for neonates in resource-constrained settings. Interest in using CPAP for new-borns with respiratory distress in LMICs has increased recently. It is a promising intervention but research to assess the feasibility of its implementation in existing health systems of LMICs is needed before implementation at scale. There is also a need to study outcomes, including case fatality rates and incidence of adverse events, in LMICs before and after the introduction of CPAP.

Organ-on-a-chip (OOC) Technology

Jeslin Libisha J,

II ME Medical Electronics

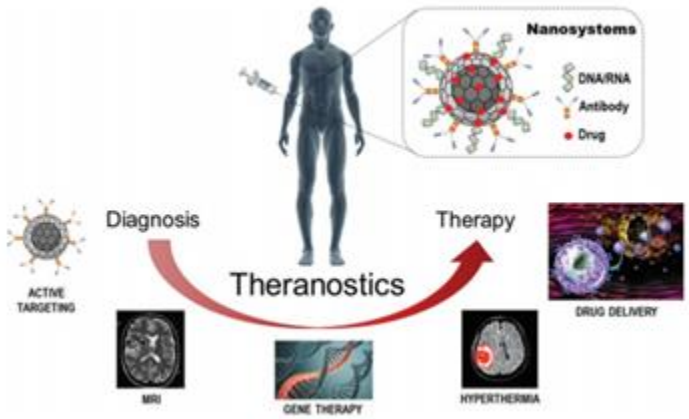
The organ-chips are biomimetic system with multi-channel 3-D microfluidic cell culture chip that can mimic the environment of a physiological organ and mechanical forces that cells experience in the human body. OOC deals with the ability to regulate key parameters including concentration gradients, shear force, cell patterning, tissue-boundaries, and tissue–organ interactions. It provides a useful platform to conduct real-time preclinical tests of disease in living organs. OOC is an extension of labs-on-chips (LOCs) and cell biology, permitting organ – specific context and organs that have been simulated include brain, lung, heart, kidney, artery, skin, bone, cartilage, etc,. In addition to properties of biocompatibility, mechanical stability and processability under physiological conditions, specific constraints should be considered in OoC design such as Choice of scaffold materials, three dimensional (3D) microarchitecture, biomimetic structures and Functional tissue-tissue interfaces.

i. Choice of scaffold materials - The use of polydimethylsiloxane (PDMS) is advantageous in comparison to many other materials, owing to its transparency, flexibility and permeability to gas. The optical transparency of OoC micro-devices is a key advantage over animal models, because it enables direct real-time visualization and quantitative high resolution analysis of diverse biological processes in ways that have not been possible in animal models.

ii. Three dimensional (3D) microarchitecture defined by the spatial distribution of multiple tissue types. The geometry of each organ must be able to convey a certain number of cells, as defined by physiologically based pharmacokinetic/pharmacodynamic (PBPK/PD) rules. Specific ranges of shear stress to cells must be considered, depending on the type of cells cocultured for each organ tissue.

iii. Biomimetic structures constituted to mimic complex organ specific mechanical and biochemical microenvironments.

iv. Functional tissue-tissue interfaces.



OOC design concept:

Culture systems require the control of external and internal cell environments. OOAC combined with micromachining and cell biology can control external parameters and accurately simulate physiological environments. Dynamic mechanical stress, fluid shear and concentration gradients are required on the chip. Cell patterning should also be realized to fully reflect physiological processes.

(i) Fluid shear force

(ii) Concentration gradient

(iii) Dynamic mechanical stress

(iv) Cell patterning

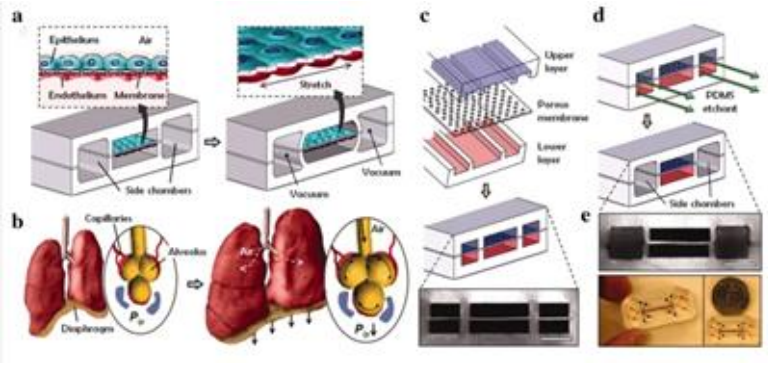
Lung – on – a – chip:

The first chip in this field is human lung alveolus-on-a-chip, which reconstitutes the mechanically active alveolar–capillary barrier in the human lung, developed by Donald E. Ingber. It contains two microfluidic channels, each culturing human alveolar epithelial cells or pulmonary micro vascular endothelium, to mimic the complicated physiological functions of the normal lung and the growth of orthotopic lung cancer.

Gas exchange in the lungs is regulated by the alveoli which can be challenging to reproduce in vitro. Microfluidics can establish extracorporeal lung models and lung pathologies through accurate fluid flow, and sustained gaseous exchange. Several design are carried out using i) soft lithography to divide the chip into regions separated by 10 μm PDMS membranes with an extracellular matrix (ECM). The upper PDMS regions had alveolar epithelial cells, whilst the lower regions contained human pulmonary micro vascular endothelial cells, thus mimicking the

THINK PIECE

vacuum to simulate expansion/contraction of the alveoli during respiration. Inflammatory stimuli were introduced into the system through neutrophils that were passed to the fluid channels. This produced a pathological model of pulmonary edema through the introduction of interleukin-2 (IL-2).

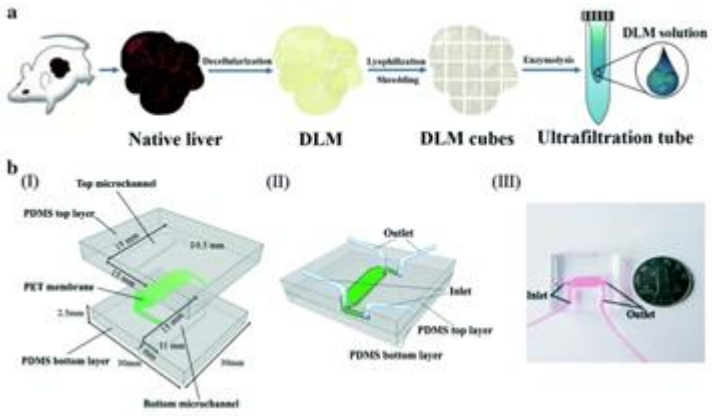


Lung tissue organ chips are useful as implantable respiratory assistance devices. In 2018, a lung assists devices (LAD) was designed to permit additional gas exchange in the placenta for preterm infants during respiratory failure.

Liver – on – a – chip:

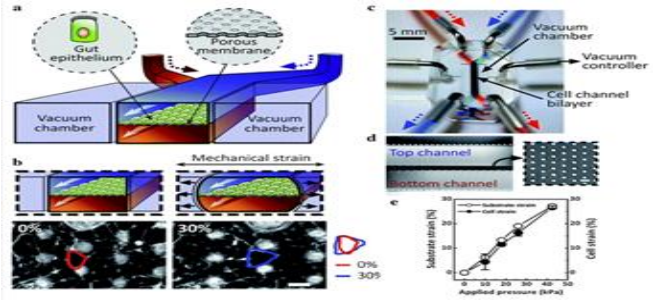
The hepatic system is the major site of drug/toxin metabolism. The liver constitutes a series of complex hepatic lobules that confer multicellular functional communication. Maintaining the physiology of hepatocytes over an extended time period is challenging. The first liver based system consisted of microfluidic pores in which 3T3-J2 fibroblasts and rat liver cells were co-cultured to mimic an airway interface. Rat hepatocytes cultured in the chip could continuously and stably synthesize albumin and undergo metabolism. Several design are carried out using i) interstitial structure of endothelial cells and cultured primary hepatocytes, ii) radial electric field gradients that were produced using electrophoresis to pattern cells onto circular polydimethylsiloxane (PDMS) chips and iii)using a porous polyethylene terephthalate(PET) membrane and continuously perfused collagen and fibronectin-sanded rat primary hepatocytes. To improve the physiological

models, 3D hepatocyte culture techniques have been used form microfluidic chips. In 2018, a system for biomimetic liver tumors through integrating decellularized liver matrixes (DLM) with gelatin methacryloyl (GelMA) to mirror the 3D tumor microenvironment (TME) was designed.



Intestine-on-a-chip:

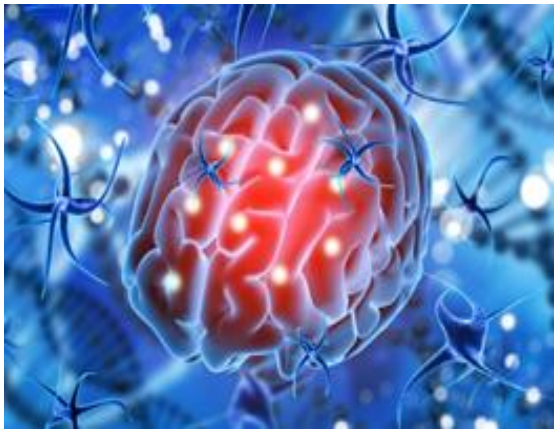
Oral drugs have to transverse the small intestine to enter the bloodstream. Villi are key to absorption and their morphology must be maintained on the chip. The chips are developed to simulate the intestinal system, consisting of a glass slide permeable membrane and PDMS sheet containing the channels. Caco-2 cells were cultured on the chips. The micro-environment of the intestine was reconstructed through shear force and cyclic strains. Caco-2 cells show prolonged growth and maintained the microbial flora in the human intestine. The device permitted the exploration of the etiology of intestinal disease and identified therapeutic targets and drugs.



SONOTHERMOGENETICS - A NEW BRAIN SIMULATION TOOL THAT COMBINES ULTRASOUND AND GENETICS

Nithyashree B, II year BME

Imagine being able to non-invasively and precisely control your brain by turning on and off your neural activity, you could treat brain disorders that affect billions of people around the world like Parkinson's disease, epilepsy and depression. *Sonothermogenetics* is a new technique that might someday just deliver that. A multidisciplinary team at Washington University in St. Louis has developed this new brain stimulation technique using focused ultrasound that is capable of turning specific types of neurons in the brain on and off and precisely control motor activity without surgical device implantation. The team, led by Hong Chen, assistant professor of biomedical engineering in the McKelvey School of Engineering and of radiation oncology at the School of Medicine, is the first to provide direct evidence showing non-invasive, cell-type-
specific activation of neurons in the brain of mammal by combining ultrasound-induced heating effect and genetics, which they have named sonothermogenetics. It is also the first work to show that the ultrasound- genetics combination can robustly control behaviour by stimulating a specific target deep in the brain. Sonothermogenetics provides new tool for non-invasive cell type specific neuromodulation in the whole brain.

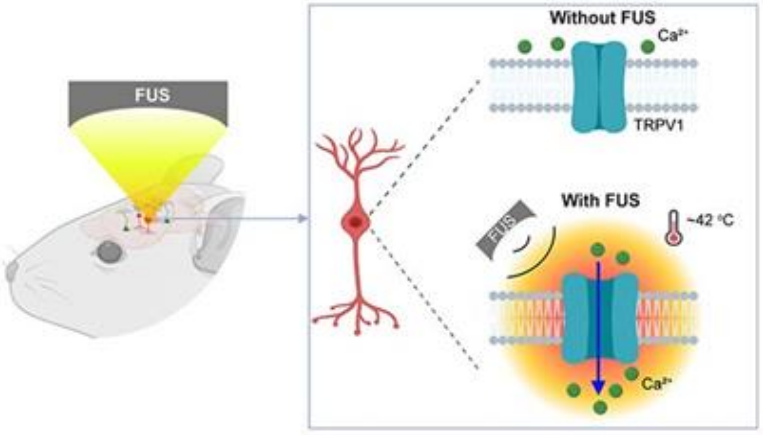


They developed a viral construct that can deliver these thermosensitive ion channels into selected neurons. These genetically selected neurons express the ion channels on the cell membrane. A few seconds of ultrasound sonification safely warms up the neuron and opens the expressed thermosensitive ion channels. These ion channels function as ultrasound controllable switches that can turn on selected neurons with densely wired brain circuits.

The team started using wild-type mice, and used adeno-associated viruses (AAVs) to express transient receptor potential vanilloid (TRPV1) specifically in CaMKII-expressing neurons in the stratum of the brain. TRPV1 is a member of the thermosensitive transient receptor potential channel (ThermoTRP) family, and is exquisitely sensitive to temperature, and controls intracellular Ca^{2+} influx.

Using a miniaturised wearable device on the head, a small burst of heat via low-intensity focused ultrasound was delivered to the brain, which resulted in a localised small temperature increase. This activated the TRPV1 ion channel in the genetically
altered neurons, switching them on. The team was able to precisely and temporarily modulate the neural activity using sonothermogenetics by altering the ultrasound properties for example altering wave types (pulse or continuous), duration and time intervals between sequential stimulation. $TRPV1^{+}$ neurons switched from a silent to active state only in response to FUS simulation meanwhile, nearby neurons without TRPV1 overexpression were not affected. The team also witnessed a change in behaviour of freely moving mice upon sonothermogenetics. FUS simulation repeatedly evoked rational behaviour in $TRPV1^{+}$ mice which was not seen upon FUS stimulation of untreated ($TRPV1^{-}$) control mice.

THINK PIECE



“Our work provided evidence that sonothermogenetics evokes behavioural responses in freely moving mice while targeting a deep brain site,” Chen said. “Sonothermogenetics has the potential to transform our approaches for neuroscience research and uncover new methods to understand and treat human brain disorders.”

The team successfully showed for the first time sonothermogenetics can robustly control behaviour by stimulating a specific target deep in the brain. The new technology has the potential to transform approaches for neuroscience research, delivering a new method to understand and treat human brain disorders and it has the promise to target any location in the brain with millimetre-scale resolution without causing any damage. It offers the potential of scalability, to large animals hopefully humans in the future.

THINK PIECE

A REVIEW: MULTIOMICS AND ITS APPROACHES

Mohammed Adhil S,

I year Medical Electronics

Multiomics means a biological analysis approach that uses multiple "omes" like the genome, proteome, transcriptome, epigenome, metabolome, and microbiome as a dataset. In other simple words we can say it as using of multiple omics technologies to study life states in a combined way. The scientist or researchers would add up all these omes to analyze complex large biological data to find novel associations between all living organisms, and also to identify relevant biomarkers and building of those markers.

Epigenomics

The terms epigenomics means identifying modifications of DNA or DNA-associated proteins which is DNA acetylation/deacetylation and methylation. Based on environment changes cell fate and functions can be modified by performing modifications in DNA and histones, apart from genetic changes. These changes are passed into progeny. In genome epigenetic changes can also act as markers for metabolic syndromes, cardiovascular diseases, and physiological disorders. These changes can be cell-and tissue-specifc.

Transcriptomics

This approach are used to identify the qualitative and quantitative RNA levels in the whole genome. From it only 2% of the DNA is translated in to protein and almost 80% of the genome is transcribed like coding RNA, short RNA, including microRNA, piwi RNA, small nuclear RNA. Besides, DNA and protein the intermediate between (ie) RNA also has structural and regulatory functions during normal and altered states. They have been shown to have a role in myocardial infarction, adipose differentiation, diabetes, endocrine regulation, neuron development, and others.Thus, it is crucial to understand which transcripts are expressed at a time.

Proteomics

It is about identifying protein levels, modifications, and interactions in the genome. Protein-protein interactions can be studied through phage display, classical yeast two hybrid, affinity purification, and ChiP-Seq. The regulation of majority of proteins are happens through post-translational modifications, such as phosphorylation, acetylation, ubiquitination, nitrosylation, and glycosylation. These changes are involved in maintaining cellular structure and function. Mass spectroscopy based techniques are being used to analyse the global proteomic changes and quantifying the post translational modifications.

Metabolomics

It explains about all metabolites present in a cell, tissue, or organism, including small molecules, carbohydrates, peptides, lipids, nucleosides, and catabolic products. They are representing the final product of gene transcription, and consists of both signaling and structural molecules. Since the size of metabolome is much smaller than the size of proteome, it is easier for investigate.

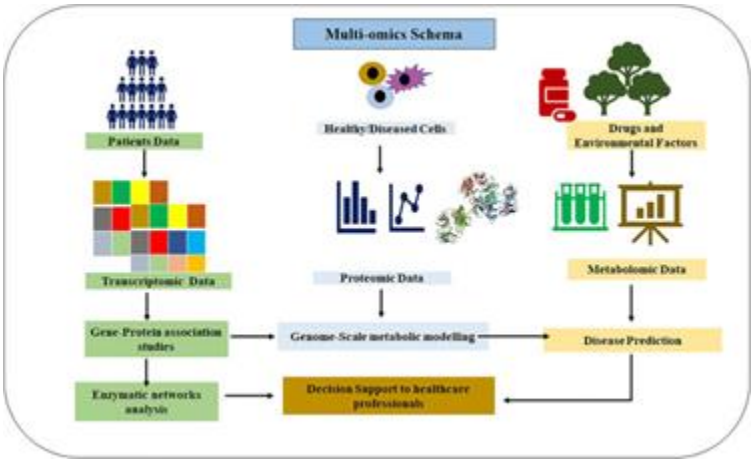
Microbiomics

The term microbiome consists of both the microbiota which means community of microorganisms and their "theatre of activity" which means structural elements, metabolites/signal molecules, and the surrounding environmental conditions. It is defined as a characteristic microbial community occupying a reasonably well-defined habitat like human beings who has distinct physio-chemical properties. The microbiota consists of the assembly of microorganisms belonging to different kingdoms like Prokaryotes [Bacteria, Archaea], Eukaryotes [e.g., Protozoa, Fungi, and Algae], while their theatre of activity involves their microbial structures, their metabolites, mobile genetic elements such as transposons, phages, and viruses, and relic DNA embedded in the environmental conditions of the habitat.

Multiomics strategy

The above diagram explains about the decision making or predictions can be made by healthcare professionals using multi-omics data. To answer a research question a single omics cannot used effectively. It is important to know and perform all

these multiple omics. Comparing to single datas omics this multiple omics approach can help treating disease in effective way. They also provide researchers with a greater understanding of the flow of information, from the original cause of disease to the functional consequences or any relevant interactions.



This multiomics encloses all the omics fields and they are more trustful in understanding the normal and abnormal state of an organism by the analysising each data from different omics experiments. In nature, omics studies deals in large numbers of comparisons, statistical analyses, and an accountable investment of time, skilled manpower, and money. Therefore, careful planning and execution are required. To perform the multiomics strategy it is important to know some of the parameters like: Complexity of disease etiology, downstream analysis, sample sizes, and power, Human studies and animal models of disease.

An Integrative analysis approaches in multi-omics

The approaches like “genome first”, “phenotype first”, and “environment first”, are used in analysis depending on the initial focus of the investigation. The genome first approach helps in determining the mechanisms by which GWAS loci contribute to

disease. The phenotype first approach helps in understanding the pathways contributing to disease without centering the investigation on a particular locus. And the environment first approach invigilates the environment as a primary variable, and will help in knowing how omics data perturbs pathways or interacts with genetic variation.

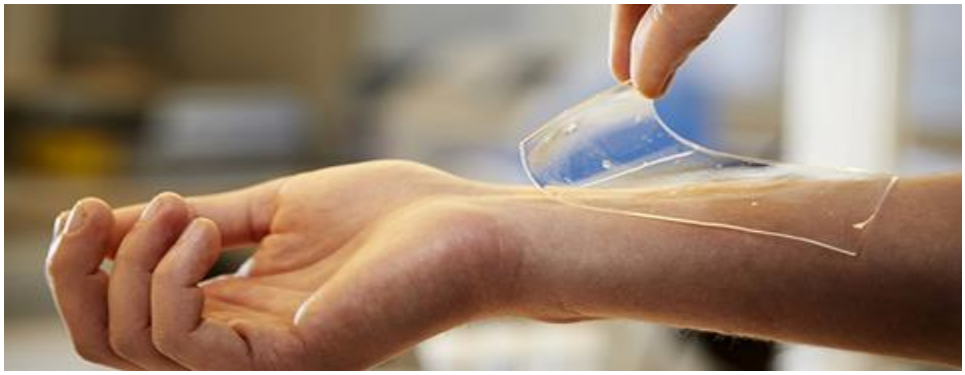
Multiomics approach in covid19 therapy

Due to many advancements in biotechnology and computational biology in the past decade has provide lot of possibility of analysis the disease variants, and also they have provided massive amounts of new data that has given a positive scope for increasing the disease treatment developments . Every disease and clinical research area has exploded with numerous data using those computational analysis of the available diverse omics data could provide an in-depth understanding of molecular mechanisms and associated transitions of the diseases. The approaches like clinical data management, analysis of genome and proteome, next-generation sequencing data mining, machine learning, and deep learning algorithms have significantly paved way for mining patterns from enormous data. With their immense possibilities and strategies, the powerful multi-omics techniques looks like it will be continuing supporting researchers and healthcare professionals in exploring and exploiting SARS-CoV-2. And also help them in knowing pathophysiology of it with deeper understanding of its processes and also helps in understanding the disease for diagnosis, screening, and prognosis.

THINK PIECE

ANTIBACTERIAL HYDROGEL

Janani T, II BME

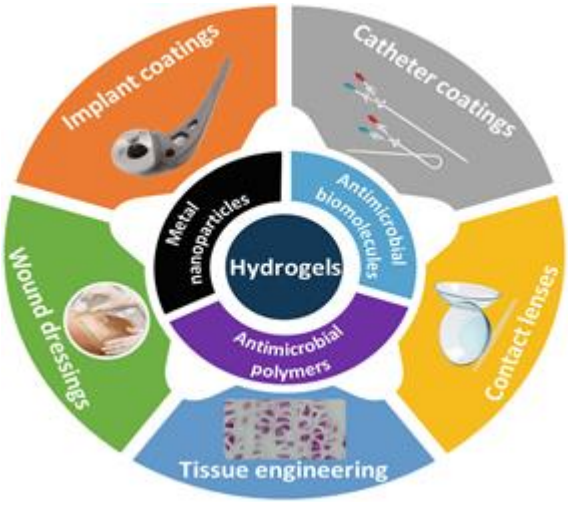


Researchers at Chalmers University of Technology in Sweden have developed an antibacterial hydrogel that can kill antibiotic-resistant bacteria. The material is conceived as a wound dressing, and is composed of antimicrobial peptides which are naturally produced by the immune system. The gel binds the peptides together and protects them, yet allows them to still kill bacteria.

Antibiotic resistance is a growing crisis. Infections caused by resistant bacteria can be extremely difficult to treat and cause significant levels of suffering and death each year. If new treatments and technologies are not developed in time, then even undergoing routine surgery could become an unacceptably risky prospect without the means to prevent or treat post-operative infections.

To prevent this dystopian future, researchers are turning to new materials and techniques to kill these bacteria. The new hydrogel is a prime example.

“With these types of peptides, there is a very low risk for bacteria to develop resistance against them, since they only affect the outermost membrane of the bacteria. That is perhaps the foremost reason why they are so interesting to work with,” said Martin Andersson, a researcher involved in the study.



While the peptides are highly effective, they are also quite delicate and rapidly degrade when they come into contact with blood. This has been a major limiting factor for researchers who hope to use them as an antibacterial treatment. However, the Swedish researchers have discovered a way to protect the peptides while still maintaining their efficacy.

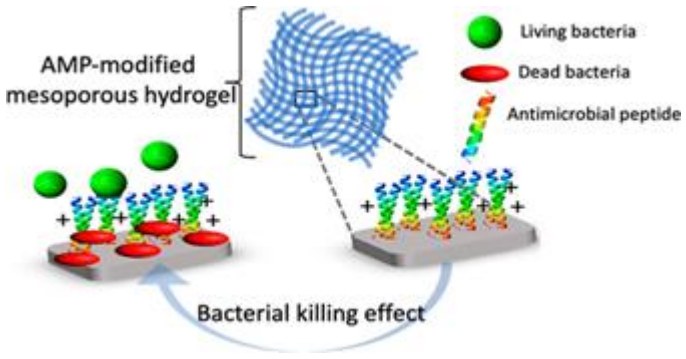
They bound the peptides within a protective hydrogel, meaning that they degrade much more slowly, and the resulting hydrogel is highly suited as a topical treatment

for wounds. “The material is very promising. It is harmless to the body’s own cells and gentle on the skin. In our measurements, the protective effect of the hydrogel on the antimicrobial peptides is clear – the peptides degrade much slower when they are bound to it,” said Edvin Blomstrand, another researcher involved in the study.The researchers have developed a spinoff company called Amferia AB which is working on commercializing the technology.

Currently, as one of the first steps in the treatment of an infected wound, antibiotics are frequently prescribed to patients despite their ineffectiveness. However, an effective antibiotic treatment requires microbial identification and careful selection of antibiotics.

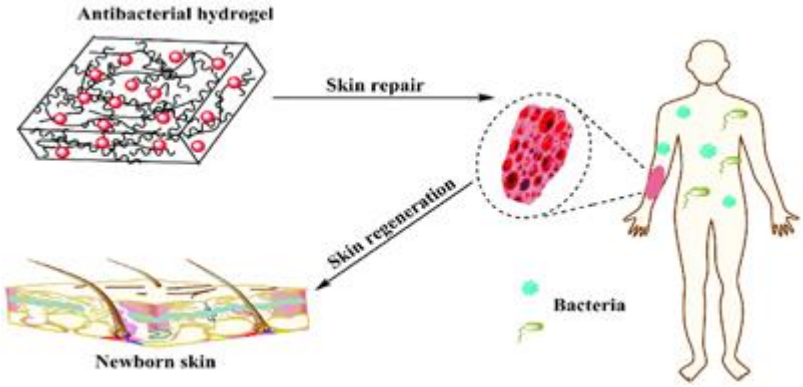
In some cases, bacteria present in the wound have the ability to form and exist within a biofilm. Such biofilms have a complex structure and are usually resistant to host immune responses and antibiotic treatments. Moreover, systemic antibiotic treatment often does not provide the right antibiotic concentration to the infected site and has been shown ineffective in chronic granulating wounds. Most importantly, antibiotic resistance is an increasing concern in wound infections, and the Centre for Disease Control in the United States is predicting more deaths from antimicrobial infections than from all cancers combined by 2050. Wounds colonized with multiresistant bacteria cause further morbidity to the patient and certainly complicate wound management

There have been numerous attempts to decrease wound infections without resorting to antibiotic use. For example, in recent years, wound dressings with a slow release of silver (Ag) compounds have been marketed and used clinically. However, apart from the effective role of Ag in killing bacteria, silver ions can be toxic to all microorganisms and cells. Equally as problematic, recent research has also demonstrated that bacteria can develop a resistance to Ag nanoparticles, placing Ag as no better than antibiotics in regard to antimicrobial resistance.



Considering all of the above-mentioned limitations, the management of open skin wound infections will continue to be a challenge for clinicians. Therefore, when it comes to infection, prevention is the first line of defense for every open wound. Thus, preventive wound care should mean managing a wound at an early stage where microbes in a contaminated wound still have limited proliferation and have not yet penetrated deeper into the tissue to evoke a host reaction.

In this work, a contact-killing material for the prevention of skin wound infections using antimicrobial peptides (AMPs) is introduced. AMPs are part of the innate immune system with a broad spectrum of activity against microbes. AMPs work by interacting with the bacterial membrane followed by rapidly rupturing it causing breakdown of the bacterial cell; this mechanism of action is less prone to result in bacterial resistance, making AMPs a better alternative than antibiotics or some nanoparticles.



Antimicrobial peptides (AMPs) are seen as a promising replacement to conventional antibiotics for the prevention of skin wound infections. However, due to the short half-life of AMPs in biological environments, such as blood, their use in clinical applications has been limited. The covalent immobilization of AMPs

onto suitable substrates is an effective solution to create contact-killing surfaces with increased long-term stability. In this work, an antimicrobial peptide, RRPRPRPRPWWWW-NH2 (RRP9W4N), was covalently attached to amphiphilic and ordered mesoporous Pluronic F127 hydrogels made of cross-linked lyotropic liquid crystals through 1-ethyl-3-(3-(dimethyl amino)propyl) carbodiimide (EDC) and N-hydroxy succinimide (NHS) chemistry. The AMP-hydrogels showed high antibacterial activity against Staphylococcus epidermidis, Staphylococcus aureus, Pseudomonas aeruginosa, methicillin-resistant S. aureus (MRSA), and multidrug-resistant Escherichia coli for up to 24 h. Furthermore, the AMP-hydrogels did not present any toxicity to human fibroblasts. The AMPs retained their antimicrobial activity up to 48 h in human blood serum, which is a significant increase in stability compared to when used in dissolved state.

Overall, the results suggest that the combination of amphiphilic hydrogels with covalently bonded AMPs has potential to be used as antibacterial wound dressing material to reduce infections and promote hemostatic activity as an alternative to antibiotics or other antimicrobial agents, whose use should be restricted.

STUDENTS SHARE EXPERIENCE

"The whole secret of a successful life is to find out what is one's destiny to do, and then do it."

– Henry Ford

Life is full of twists and turns, ups and downs, and full of surprises. Our college life is just as exciting where we experience a roller coaster ride. Our journey in SSN was short, entering the college as the 2019 ME batch, overcame the pandemic and ended up completing ME in 2021. We as a batch of 6 people, had more exciting moments throughout a period of 2 years facing all happiness, stress together as a family. Even Though it was a shorter period of our Postgraduate course, we had wonderful days in the department giving us more opportunities to sharpen our skills which happened only through the freedom given to use lab equipment.

STUDENTS SHARE EXPERIENCE

We faced a pandemic during semester 2 and 3, without our staff's constant support we wouldn't have balanced the situation and academics. SSN taught us to have faith in our ideas and to believe in oneself.

In order to enjoy our 2 years' college ride, we were fully prepared to accept the challenges and the tough situations thrown our way. We have had the time of our life at SSN. Whenever we think of our days in SSN, we remember those exciting moments during department conferences, workshops, the challenges we faced during the pandemic situation, how we handled those difficulties and obviously by guidance given by both teaching and non-teaching staff throughout the year.

"Do not give them a candle to light the way, teach them how to make fire instead. That is the meaning of enlightenment."

— Kamand Kojouri

The above quote best suits SSN, the best place to sharpen our skills in our field and mold us academically and socially. We are always grateful for what the department has given us.

- 2019 - 2021 batch
Medical Electronics

CHIEF EDITOR

Dr. A. Kavitha
Professor and HOD/ BME

FACULTY EDITORS

Dr. S. Arun Karthick
Associate Professor/BME

Dr. K. Nirmala
Associate Professor/BME

Dr. N. Punitha
Assistant Professor/BME

STUDENT EDITORS

2nd YEAR M.E

Isa Bashir S.
Sowmiya EC
Jeslin Libisha