ENGMEDNEWS

Newsletter of Biomedical Engineering Society of India

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Upcoming Events

The Department of Department of Biomedical Engineering, Manipal Institute of Technology (MIT), Manipal Academy of Higher Education (MAHE), Manipal is organizing a Hybrid Mode

National Symposium on "Recent trends in Biomedical Engineering 2023" from 31st March to 1st April 2023.

Interested research scholar/ students can register using the following link

https://forms.gle/cUqBdGZWU4pyJ47Z8

Details can be viewed in website https://sites.google.com/view/nsrtbme2023/home

Overview on Artificial Pancreas: Research Challenge

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Assistant Professor- Senior Scale

Department of Biomedical Engineering

Manipal Institute of Technology

Manipal Academy of Higher Education, Manipal

Diabetes Mellitus is a metabolic disease that is incurable and requires regular monitoring and adequate control for a better quality of life. The blood glucose of such a patient is always abnormal and may lead to life-threatening risks. Diabetes can be categorized into Type 1, Type 2 and gestational diabetes. Among the three categories, Type 1 is said to be quite risky because the pancreatic beta cells are destructed, and such a patient is insulin dependent and external insulin need to be infused in a regular regime. The importance of monitoring and regulating the blood glucose level in a diabetic patient is required to avoid the risk of hyper and hypoglycemia. Hyperglycemia is the condition where blood glucose raises above the normal range and requires insulin to regulate, and hypoglycemia is a condition where blood glucose falls below the normal range and requires glucagon hormone to regulate it. The normal blood glucose range is 70 − 110mg/dl. Insulin and glucagon are the two pancreatic hormones that play a major role in the regulation of blood glucose as shown in figure. Several types of research are being carried out to include the glucagon in therapies, which could be a challenge because it will be difficult to preserve glucagon for a long time under normal room temperature due to its chemical property. Even though a Type 1 diabetic patient's pancreas fails to produce insulin, they still can produce glucagon which makes the design complicated. Hence controlling and regulating blood glucose in a diabetic patient is an open research challenge. The commonly used therapy in multiple dosages of injection, where a patient has to calculate the dosage intake manually each time before or after meal. In the existing design of insulin pumps which require sufficient information about meal intake, the amount of carbohydrates intake that makes the design a semi-closed loop. For complete automatic or closed-loop control an automatic controller needs to be designed in such a way that if the blood glucose deviates from the desired threshold, the controller needs to take action immediately to maintain in the state of normal glycemic range for a long time . Semi closed-loop type insulin pumps are those which require manual interruption to set the amount of meal consumed along with the amount of carbohydrate and the bolus is manually calculated and fed into the system. When such a system is used the patient should have complete knowledge on how to

calculate the bolus dose for each day, which makes the design complicated. In complete automatic closed-loop control the disturbance is measured and the dose is calculated automatically for the infusion . Unmeasured disturbance at a random time should be considered if the controller can regulate the blood glucose varied by unmeasured disturbance. If this attains a good regulation then an Artificial pancreas can be developed.

When compared with the normal healthy person usually a T1DM needs regular injections of insulin to have Quality of life. In any healthy individual and in normal condition, the insulin in the body is secreted by the pancreas. The amount of insulin that is secreted depends on the level of blood glucose. Normally between the intake of meals when the glucose level is 90mg/dl the amount of secreted insulin is quite small about 0.5 − 1U/h and this is like a basal secretion from the pancreas. While considered at the meal intake, the glucose levels may rise and eventually, the secretion of insulin also increases which helps in regulation. But a T1DM pancreas fails to operate in such conditions, hence these insulin pump therapies become a very important part to save their life. Several insulin pump therapies have been of research interest in recent few decades, and the main aim of the development is to maintain and regulate the blood glucose metabolism. The dosage of insulin widely varies depending on body weight, insulin sensitivity and the level of physical activity. Type 1 diabetes patient usually lacks the endogenous insulin secreted by pancreas, due to this they depend on the exogenously administrated insulin. This helps them to maintain their blood glucose in the normal range for a longer time. Different technologies are progressing rapidly in administrating the insulin, along with the conventional therapies, single hormone and dual hormone is developed with automatic management. The existence of the insulin pump has completed nearly 30 years along with the development of the technology.

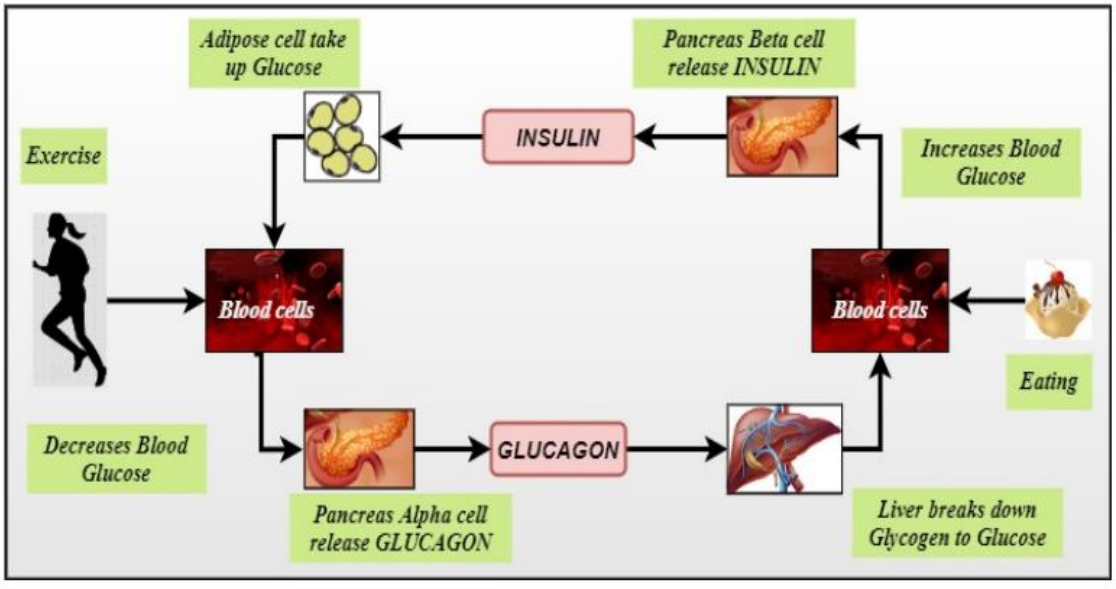


Figure : Blood Glucose Regulation in Human Body

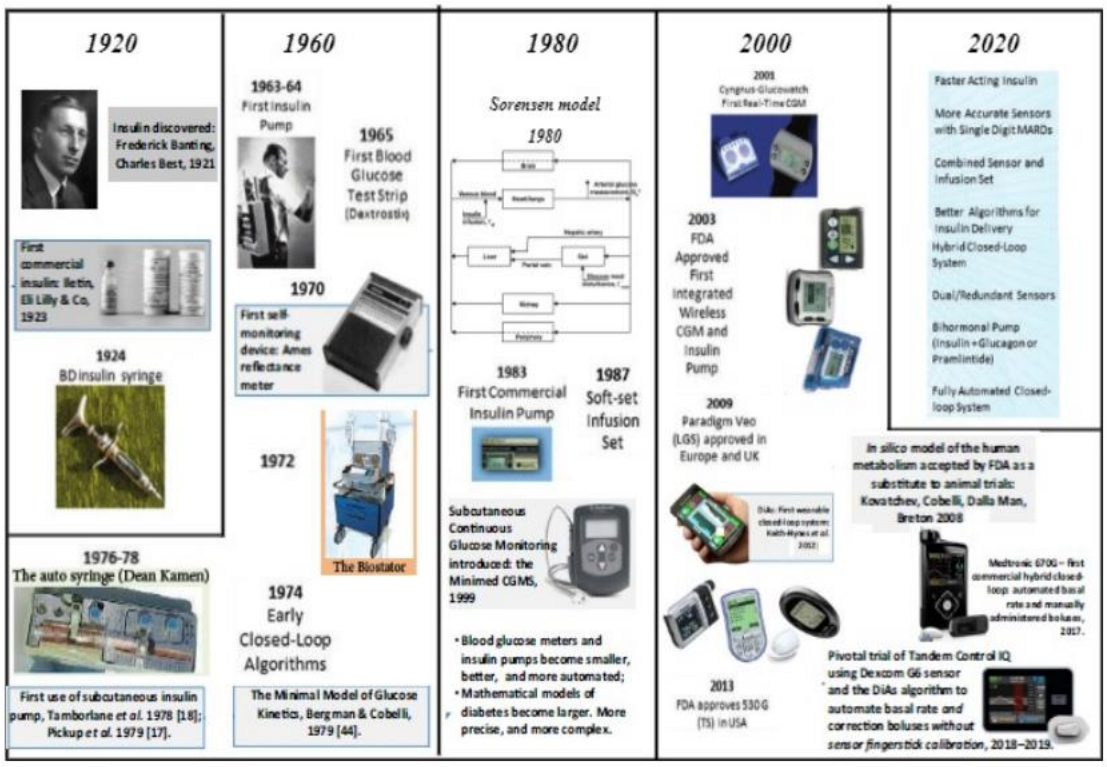


Figure : Evolution of Insulin pumps

Dual hormone infusion is mainly proposed to eliminate the risk of hypoglycemia by infusing glucagon when the blood glucose falls below the threshold. The main aim is to have a complete automatic closed-loop system that helps in the regulation of the glucose metabolism and is termed as "Artificial Pancreas" and this remained the open challenge for the research in the present scenario. Several research groups compared the performance of dual hormone with single hormone infusion and stated that dual hormone gives better control and hypoglycemia rate of occurrence decreased. Research on dual hormone using PID separate for insulin and glucagon was developed. In 2010, team of researchers from Boston developed a combination of PID and MPC for switching control, where MPC was used to administrate insulin and PID for glucagon. As a result of such a technique, they obtained better control and reduced scenes of hypoglycemia. Most of the research related to dual hormone was developed using switching control with two separate controllers, administrating insulin and glucagon separately. But the integration of a separate controller will make the design quite complicated and extra controller for separate administration. Further research on Bi-Hormonal therapy is an open challenge, especially in clinical trials.

MAHENDRA COLLEGE OF ENGINEERING,

Salem Campus, Minnampalli, Salem-636106

Two-day workshop on

"Troubleshooting of Medical Equipment with Hands-on Training" & MoU Ceremony

(Medingers Healthcare Solutions, Erode)

Date: 01.09.2022 & 02.09.2022

Department of Biomedical Engineering in association with BMESI, at Mahendra College of Engineering, Salem Campus, Minnampalli, Salem organized a Two Day workshop on, "Troubleshooting of Medical Equipment with Hands-on Training" & MoU Ceremony", Medingers Healthcare Solutions, Erode.

Around 130, students and faculty members from Department of Biomedical Engineering, Mahendra College of Engineering participated in this event.

Day 1:

Inauguration:

The inauguration started at 09.30 AM on 01.09.2022 at Seminar Hall, MCE.

The workshop started with prayer song in the presence of Chief Guest, Principal and Heads of various Departments, Faculties and student and the lamp lighten by the dignitaries to start the auspicious day.

The welcome address:

The welcome address was given by Dr. S.Rajalaxmi, Head of the Department, Biomedical Engineering. She delivered the welcome address by welcoming the chief guest, Mr.S.Dhakshinamoorthy, Founder & Managing Director, Medingers Healthcare Solutions, Erode. She also welcomed Dr. N. Mohanasundararaju, Principal and Heads of various departments, faculty members and the students.

Felicitation:

Dr. N. Mohanasundararaju, Principal felicitated the gathering with warm welcoming.

Introduction to the Chief Guest:

Ms. S.Thamailarasi, Final year Student of Biomedical Engineering introduced the chief guest of the day and she also emphasized the company growth. As a small start-up, the company was started at the year 2018 and now it is going to start their branch throughout the globe with their specialised health care solution equipment service team with good technical skills.

MoU Signing:

Then, MoU was signed between the Department of Biomedical Engineering and Medingers Healthcare Solutions, Erode, where they provide technical training, internship and supporting placement to the students.

Honoring the Chief Guest:

As a token of gratitude Dr. N. Mohanasundararaju, Principal, Mahendra College Engineering presented memento to the chief guest.

Keynote Address:

Mr.S.Dhakshinamoorthy enclosed the gathering with had brief about the medical equipments and also he explained about the work carried out at their company. He also discussed many queries from the students about the importance of Biomedical Engineers to the society.

Session:

Session started by making 4 batches and each batches were given training with the medical equipment like Ventilator, Defibrillator, Infusion & Syringe Pump and Patient Monitoring System. Each batch had been trained up with two equipment on the first day and the remaining handled on the Day 2 of the workshop.

Day 2

Assessment & Feedback:

At the end of the workshop (Day2), Short assessment was given to the student and the feedback was collected by the students and trainers about the program. Trainers felt the students were more enthusiastic to listen and get equipped about the equipment. They were keen in knowing the things. The students also gave a good feedback about the workshop and requested similar programs in future.

Certificate Distribution:

After the feedback session, certificates were distributed to the students who had participated in this workshop and Memento was given by the chief guest to Head of the Department.

ICCDBD 2022

Bmesi Sponsored

International Conference on ClinicalDiagnosis and Biomedical Devices

Conference Report

Organized By

Department Of Biomedical Engineering

Sri Shakthi Institute of Engineering and Technology

Scope of the Conference

The International Conference on Clinical Diagnosis and Biomedical devices ICCDBD 2022 (formerly International Conference on Computational Intelligence and Devices in Biomedical Engineering ICCBME - 2021) is held during November 11 and 12, 2022 at Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India. This conference attracted global participants to share their knowledge and explore the new realm of Clinical Diagnosis; Computational Intelligence (CI).This conference created an open and warm atmosphere between scientists and engineers and promoted quality research and real- world impact in the field of Biomedical Engineering.

The ICCDBD 2022 created a forum for the people involved in Engineering R&D activities to discuss about:

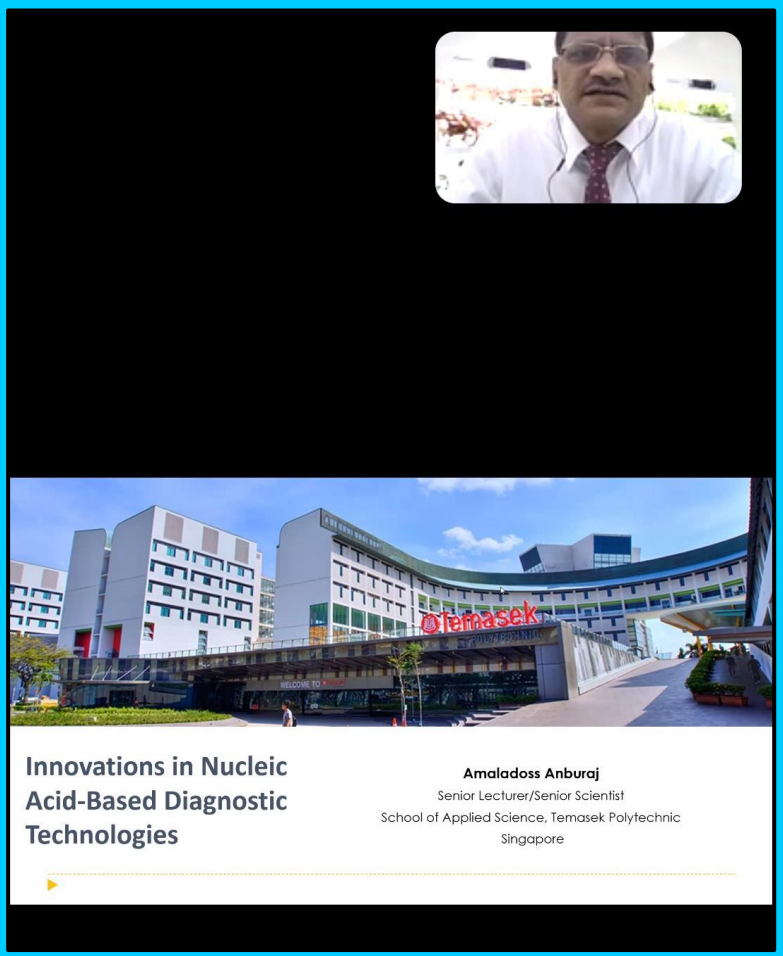
- Unique Opportunity to Partner for Maximum Visibility & Community Engagement
- An outstanding opportunity for both Academic and Industrial Communities to debate and address new trends and challenges with
- Focused sessions for specific verticals
- Master Classes for hand-holding on issues on the ground
- Share common challenges
- Avenue to ideate about emerging Technologies on topics relevant to today'sfast moving areas of Biomedical engineering in
- Exploring strategies
- Listening to the best of engineering minds
- Creating a common framework for the future
- Forum to collaborate with

a. Research scholars and PG students
b. Business Connect
c. Global leaders
d. Academia
e. Analysts
f. Peers

Day 1:

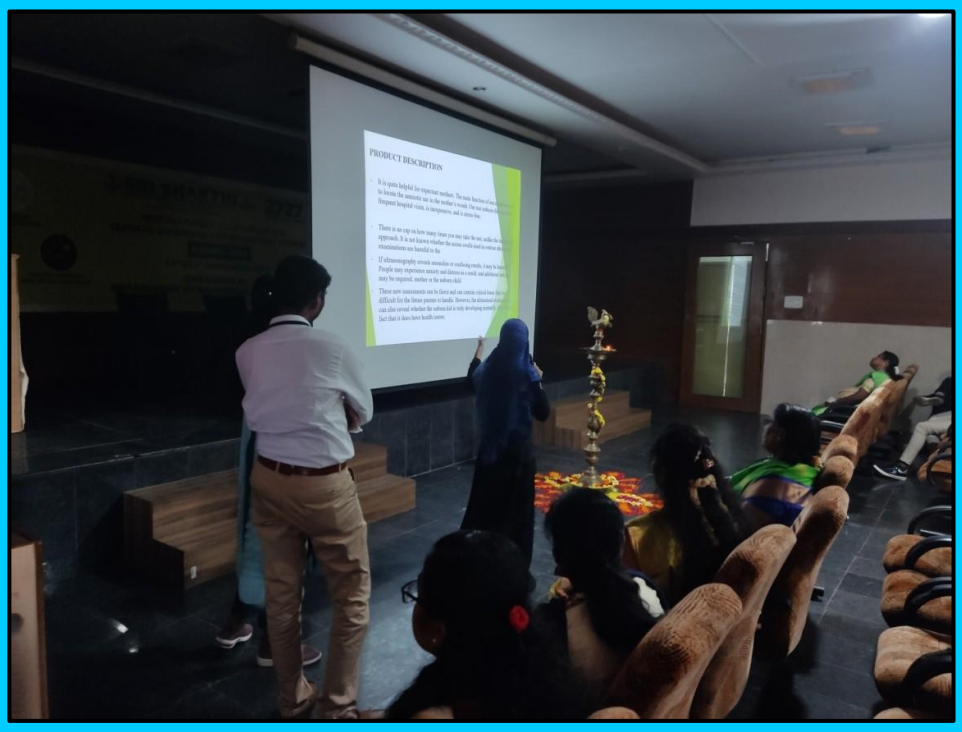
Dr. Rajendra kumar, Professor, Department of Nano science and Technology, Bharathiyar University Coimbatore

Amaladoss Anburaj Senior Lecturer/Senior Scientist School of Applied Science, Temasek Polytechnic, Singapore



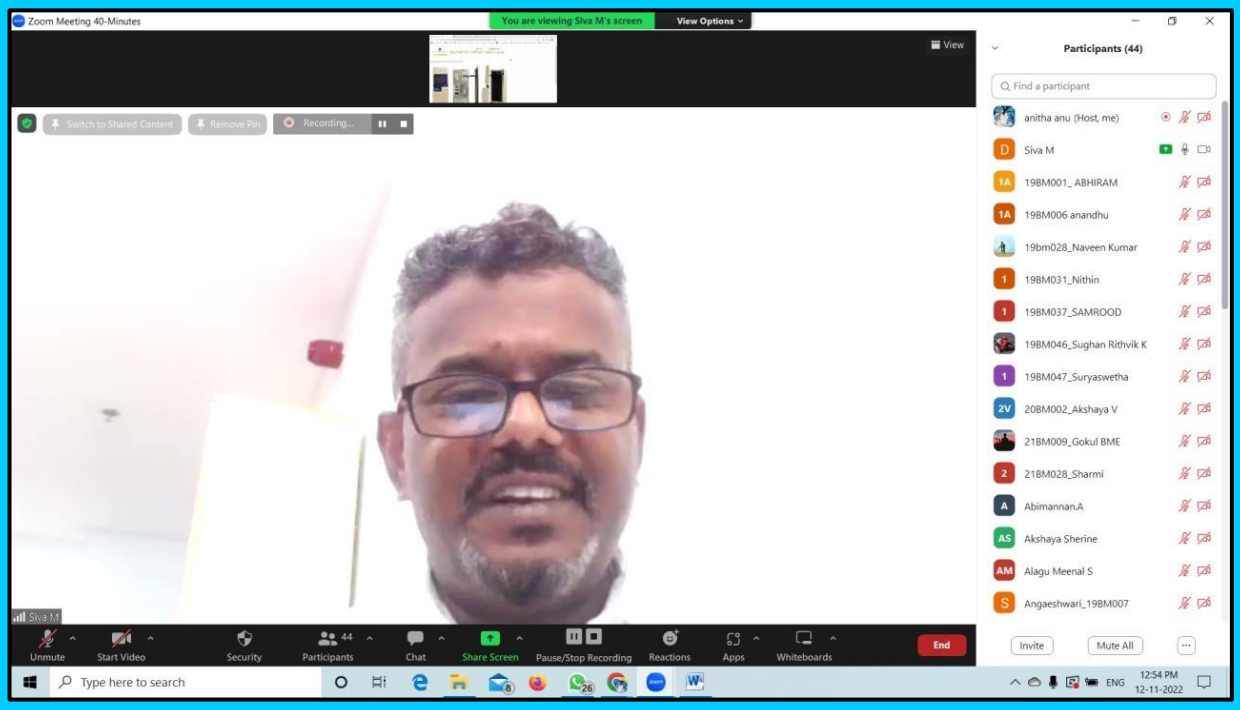
Student Presentation:

21 Batches presented their papers on the first day



Day 2:

Mr. Siva, Senior Technical Support Engineer-Lab Diagnostic, Gulf Corporation for Technology, Bahrain



Student Presentation

20 Batches Presented Their Papers On Second Day.

Certificate Distribution

Certificates Will Be Distributed To All The Participants And Best Paper Award Also Given To The Two Batches.

FIESTAA' 23

DEPARTMENT OF BIOMEDICAL ENGINEERING

The Department of Biomedical Engineering, KPR Institute of Engineering and Technology, Arasur, Coimbatore conducted its one day National level Techno cultural fest **FIESTAA'23** on 16.02.2023(Thursday) and 17.02.2023(Friday).

The event was conducted successfully with a total of 132 participations. The students from various engineering institutions actively participated and exhibited their technical skills through the events listed below.

The event was a huge success in encouraging proactive technology use and knowledge sharing among college students.

POSTER PRESENTATION:

The Department of Biomedical Engineering organized a "Poster Presentation" event on the theme **"Current Emerging Trends in Biomedical Applications"** on 17th February 2023 from 9 am to 11 am at the S & H Block, First floor, F 103 during the FIESTAA '23. After scrutinizing, we have shortlisted only 05 teams that participated in this event from the colleges across Tamil Nadu. A maximum of two members per team was allowed. The faculty event coordinator **Dr. S. Logesh Kumar, AP (SI.G)** and Student Co-Ordinators **Ms. N. Soniya, IV BME** and **Mr. P. Vytheeshwar, III BME** initiated the event with necessary requirements for the smooth conduction of the event. Students presented in various different biomedical applications like Wearable devices, Therapeutic equipment design, Rehabilitation engineering, 3D printing in health care, and Additive Manufacturing. It was a great opportunity for knowledge-sharing between external and internal students community.

PROJECT EXPO:

The Department of Biomedical Engineering has organized Project Expo in association with Fiestaa' 23 on the topic **"Current emerging trends in Biomedical Applications"** on 16.02.2023. A total of 12 student participants from various colleges has participated in the event and presented their projects related to current emerging trends in Biomedical Applications. The projects were validated based on the innovation, novelty, techniques and

tools employed, scientific justification and feasibility. Two best projects were chosen and awarded with memento, cash prize and certificates.

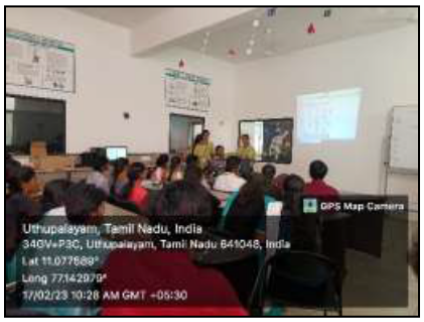
The event was coordinated by **Dr. P. Arunkumar, AP (Sr.G), BME/KPRIET, Mr. Jasper Jesu Jacob, III BME**, and **Mr. Vijayasarathy S, III BME**. The projects were evaluated by **Dr. A. Allwyn Gnanadas, AP (Sl.G), BME/KPRIET**.

WORKSHOP 1: Graphical System Design using LabVIEW

On 17/02/23, the department of Biomedical Engineering organized a workshop on " Graphical system design using LabVIEW" as a part of FIESTAA' 23. The main objective of the session was to understand the basic concepts of virtual instrumentation and to learn about the function of sensors, actuators with embedded controllers and to analyze real time biosignals

using myDAQ. The event was coordinated by **Ms. B. Priya Darshini, AP, BME/KPRIET** along with **Ms. K. S. Gayathri, III BME**, **Mr. Jasper Jesu Jacob, III BME** and **Ms. S. Bhuvaneshwari, III BME.**

External participants from various institutions participated in the workshop and gained fundamental knowledge in LabVIEW programming, data acquisition and analysis. Hands-on training was conducted for all the participants. Basic concepts of virtual instrumentation were explained. Real time applications of LabVIEW were stated. The industries using LabVIEW and the tools they majorly work upon projects were stated. Few real time projects were explained.



WORKSHOP 2: Electronic System Design for Biomedical Engineers

On 17/02/23, the department of Biomedical Engineering organized a workshop on "Electronic system design for Biomedical Engineers" as a part of FIESTAA' 23. The participants were restricted to 20. The event began at 9.00 AM in the morning in the Medical Data Analytics laboratory. The event started with an introduction to microcontrollers and microprocessors. **Ms. Joselyne Sneka I T, III BME** explained the concepts. Then **Ms Kowshika R, III BME** demonstrated an experiment using Arduino, Servo motor and PIR sensor. **Mr. Saalih Sulthan S, II BME** and **Ms. Varnika M, II BME** simulated the same experiment using TinkerCAD. Then **Mr. Vishnu K, III BME** and **Ms. Joselyne Sneka, III BME** demonstrated another experiment using ESP32 on board and on the simulator Wokwi as well. After the demonstrations, the participants were given space to simulate their own models. The participants were given small tasks and the student

coordinators guided them through the practice session in completing their tasks. The doubts were cleared then and there.

The faculty Coordinator **Dr. A Allwyn Gnanadas, Assistant Professor (SI.G), BME/KPRIET** addressed the participants sharing the importance of electronic system design. He showed them various microcontroller boards starting from 16MHz fast controllers to 1.4GHz fast controllers. All the possible single core, dual-core processing capabilities and their need were discussed. The professor also shared the options and various protocols that are available with the respective boards and shared how these features enable IoT in medical field. Finally, the session ended with a Question answer session followed by a feedback session.

Mr. & Ms. MEDICO SAPIENS

The Department of Biomedical Engineering organized a technical quiz event "Mr. & Ms. Medico sapiens" on the theme "Current emerging trends in Biomedical Applications" on 17th February, 2023 from 9 am to 11 am at the S & H Block, First floor, F 104 during the FIESTAA '23. The event was coordinated by **Dr. T. Gayathri AP(SI.G), BME/KPRIET, Ms. Lavanya Shree N, II BME** and **Ms. Shruthi K K, II BME**.

Around 11 teams participated in this event from the colleges across Tamil Nadu. Maximum of two members per team were allowed. Three rounds were conducted for this event. Round 1 had 25 MCQ type questions. The theme was related to basic science. One mark was given for the correct answer. No negative marks were awarded. Round 2 was a picture-based quiz and the theme was current trends in biomedical engineering. Seven questions were

with pictures and questions and eight questions were without any questions. Two marks were awarded for each question. Top 5 teams were selected at the end of this round. Round 3 was disease prediction based on pictures.

CIRUFIX:

On 17th February 2023 (11:00 am to 01:30pm) at Medical Data Analytics Laboratory, Department of Biomedical Engineering organized the competition of fixing a circuit depending on the specific issue or problem named as "Circufix " that needs to be addressed and identifying errors or faults in an electronic circuit.

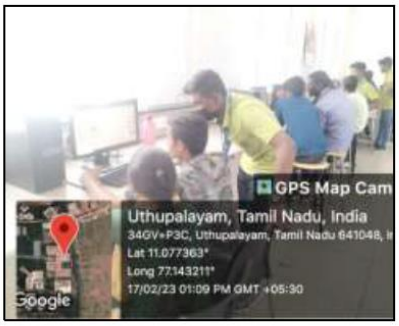
The competition focused on the following points

1. Basics of electronic circuit configurations
2. Online simulation tools to design circuits virtually
3. Circuit debugging to identifying and correcting errors in an electronic circuit to ensure that it functions properly

A heart-warming welcome remark was delivered by **Dr. D. Ganesh Kumar, Professor and Head / BME/KPRIET**. **Dr. N. Rajasingam, Assistant Professor (SL.G), BME/KPRIET** coordinates the event. Students are participated from various institutions. The event was highly motivating and inspired all the participants. The winners were finally awarded with Certificates, Memento and Cash Prize following which by **Ms. A. Rifath Jameela**, II BME proposed the vote of thanks.

Department of Biomedical Engineering
KPR Institute of Engineering and Technology

KPRIET
Learn Beyond



PRO – THE MEDICO DATA:

Department of Biomedical Engineering had conducted a Technical Quiz competition "Pro- The Medico Data" for the External students through Fiesta'22 event on 17th February, 2023. The event was coordinated by **Mr. R. Krishna Kumar AP, BME/KPRIET, Mr. Rishikesh Ragunath M P, II BME** and **Mr. Ram Kamal S, II BME**.

The Students from External colleges have attended the Competition. The Competition comprises of three rounds with the difficulty of consecutive round daunting than the previous one. The first round starts with 11 participants. The Round 1 quiz consists of 25 Multiple Choice Questions. The duration of the round is 25 minutes. The Students have completed the round and the Papers were evaluated. Second round was started with 10 Multiple Choice Questions for all the participants and the duration was 15 minutes. The third or the Final round consists of two Analytic questions. The Shortlisting was done for the third round, based on the scores obtained in first and second round together. Five students were shortlisted from the participants and given the Questions. The Third round consists of Two Analytical questions. The Questions consists of ECG and EEG image and the students were asked to find the Disease, based on understanding of Medical image and asked to justify the reason for their answer. The Questions were Multiple Choice based Questions. After completion of Round 3, the Event Volunteers and Coordinator evaluated the answers and had given the score. The top two scorers of all the three Rounds are considered for First and Second place and announced the Winners in the presence of **Dr. D. Ganesh kumar, Professor & Head, BME/KPRIET**. The HOD had

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congratulated the Winners with Cash prize, Memento and the Certificate and encouraged them to participate in future events. The Participants gave very positive and motivational feedback in about the Events voluntarily and thanked the Department for their Hospitality throughout the Event.

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