KONGUNADU COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

(Approved By AICTE, New Delhi & Affiliated To Anna University, Chennai)

(Accredited By NBA (CSE, ECE, EEE & MECH) & NAAC, An ISO 9001:2015 Certified Institution)

Namakkal-Trichy Main Road, Thottiam, Trichy -621 215

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BIOACTIVE MAGAZINE

DEPARTMENT OF BIOMEDICAL ENGINEERING

Contents

About the Department

The department was established in the year 2020 with a vision to address the prevailing health sector challenges. This four year degree programme on Biomedical engineering will nurture the young minds with fundamental knowledge of Biological sciences such as Human Anatomy, Physiology, Pathology and Microbiology. With this the student would also gain knowledge about Electronics, Measurements and Instrumentation to Design, Analyze, Synthesize and Evaluate the Diagnostic and Therapeutic equipments such as X-ray, CT, MRI, PET, Ventilators, Pacemakers, Dialyzer to serve the Medical community. The students will be guided to have periodical visits to the hospitals for bridging the gap between the class room learning and the real time issues.

Prosthetic devices for the physically challenged, Therapeutic equipments to replace the conventional medicines will also be part of the learning to this stream of engineers. This department has a well established relationship with industrial experts and physicians of different expertise to keep itself updated and live up to the expectations of the contemporary world. Through "ZYGOTE" association, the department organizes Guest Lectures, Workshops and Seminars on recent trends to enhance the technical knowledge and equip the skills of students. A committee on Anti-Drugs arranges awareness programs at regular intervals to address the adverse effects.

Department Vision, Mission, PEOs, PSOs & Pos

VISION

» To create biomedical engineering graduates through value based education and research with high ethical standards and ensuring professionalism in the health care industry.

MISSION

» Educating the learner to understand the principle, operation, design and application of biomedical instrumentation, electronics and measuring of biomedical signals in human being.

» Creating an interdisciplinary learning environment to conceive new ideas.

» Developing competency for employability and entrepreneurship in core and inter disciplinary areas.

PROGRAM EDUCATIONAL OBJECTIVES(PEOs)

PEO1: Graduates shall be leaders in generating innovative knowledge at the interface of Biology and Engineering.

» **PEO2:** Graduates will show excellence in leadership skills, design, and model new equipments needed for health care and serve the society.

» **PEO3:** Graduates will demonstrate ethical standards, leadership skills, attitude, professional responsibilities, contribute positively to team building and keep themselves engaged in lifelong learning.

PROGRAM SPECIFIC OUTCOMES (PSO's)

» **PSO1: Professional Skills:** Students shall be able to measure, model, manipulate, and make biological

systems for powerful new biological technologies.

» **PSO2: Competency:** Students shall be able to apply the concepts of signal and image processing techniques to address the problems of healthcare.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

» **PO1: Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

» **PO2: Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

» **PO3: Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

» **PO4: Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

» **PO5: Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

» **PO6: The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

» **PO7: Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

» **PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

» **PO9:Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

» **PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

» **PO10:Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

» **PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage

projects and in multidisciplinary environments.

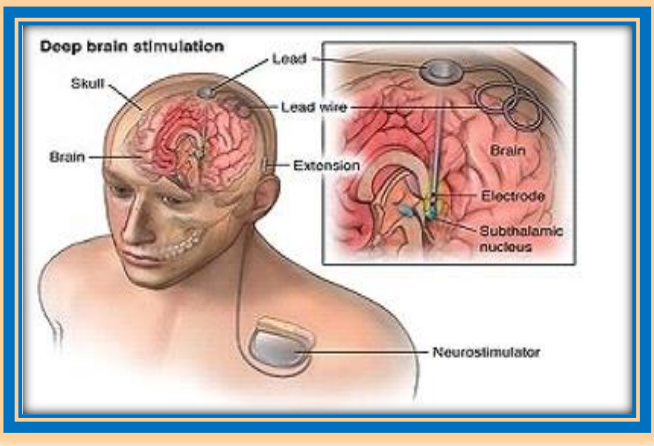
» **PO12: Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

TECHNICAL ARTICLES

DEEP BRAIN STIMULATION

» The deep brain stimulation (DBS) therapy is a new treatment technique for a number of neurologic disorders. The technique in select brain regions has provided remarkable therapeutic benefits for otherwise treatment-resistant movement disorders such as Parkinson's disease, tremor and dystonia.

» The system consists of three components: the implanted pulse generator (neurostimulator), the electrode and the extension. The electrode or lead is a thin, insulated wire which is inserted through a small opening in the skull and implanted in the brain.



» The tip of the electrode is positioned within the targeted brain area. The extension is an insulated wire that is passed under the skin of the head, neck, and shoulder, connecting the lead to the neurostimulator which is usually implanted under the skin near the collarbone. The stimulator delivers a constant fast-frequency stimulus which interrupts a specific circuit in the brain that is overactive in the disease state. This interruption of the diseased overactive circuit can significantly improve the symptoms of the disease.

» It has two modes of operation. In the voltage mode, it delivers pulses with a rate of 2 to 250 Hz and voltage level of 0 to 10.5 volts. In the current mode, the pulse frequency is 30 to 250 Hz and current range of 0 to 25.5 mA. In both the modes, the pulse width is kept between 60 to 450 µs Each lead carries upto 4 electrodes. The device contains a non-rechargeable battery and microelectronic circuitry to deliver a controlled electrical pulse to precisely targeted areas of the brain.

Vijayshakthi G
IV Year - Biomedical Engineering.

NANOCOMPOSITE SEAWEED SENSOR FOR ACUTE HEALTH MONITORING

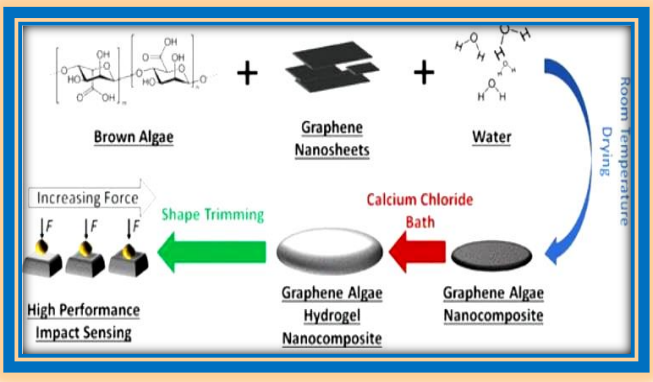
» Generating real-time data to better understand state of health can help deliver higher quality and more tailored care. Healthcare technologies that deliver high precision and operate with minimal invasiveness are vital to enable this to happen.

» Nano composites are soft, stretchy, elastic polymer-based materials with a nano material mixed into them. Nano composites have proven to be extremely sensitive. This makes the technology potentially very valuable for measuring joint or muscular movements, speech, breathing, pulse, and blood pressure in real time and more efficiently than current sensors used in healthcare and the healthcare sector.

» Seaweed is first and foremost an insulator, but by adding a critical

amount of graphene to a seaweed mixture the scientists were able to create an electrically conductive film. When soaked in a salt bath, the film rapidly spongy, electrically conductive hydrogel.

» The researchers discovered that their sustainable seaweed-based sensors outperformed existing synthetic hydrogels and nanoparticles used in wearable health monitoring in terms of sensitivity. As a result, accuracy improves since a more sensitive sensor records a person's vital signs more correctly.



» The breakthrough has the potential to revolutionize health monitoring technology, as future uses of clinical grade wearable sensors might resemble a second skin or a temporary tattoo: lightweight, easy to apply, and safe because they are built entirely of natural substances. This would greatly improve the entire patient experience by eliminating the need for more regularly used and potentially intrusive hospital tools, wires, and leads.

» Sensitive technologies with extreme precision to monitor blood pressure, respiration, heart rate, and muscle movements are composed of a sustainable substance, competes and performs better than other expensive and sophisticated technologies that are being developed created with a high degree of accuracy in mind for tracking physiology, enjoyment especially designed to be a wearable device, adaptable enough to be used in linked technologies.

Ramani S
IV Year Biomedical Engineering

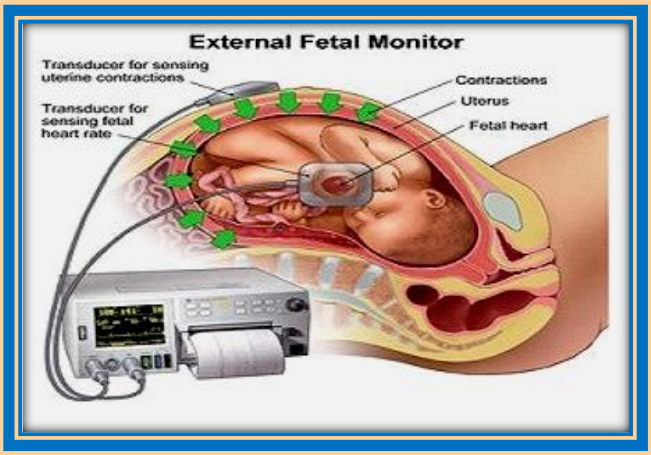
CARDIOTOCOGRAPH

» An assessment of the condition of the foetus can be made during labour from the foetal heart action. Simultaneously, recording beat-to-beat foetal heart rate and uterine activity provides basic information for assessing the compensatory potential of the foetal circulatory system. The instrument which carries out a continuous and simultaneous recording of the instantaneous foetal heart rate and labour activity is called cardiotocograph.

» In addition to detecting long-term bradycardia or tachycardia, this instrument helps in the evaluation of foetal heart rate response of the undisturbed circulatory system and response stimulated by uterine contractions. In the undisturbed, healthy foetus, oscillation of the FHR is normal whereas, absence of FHR oscillation is considered a sign of potential foetal distress (Gentner and Winkler, 1973). Uterine contraction may or may not cause a response in the FHR. To determine the prognostic significance of a response, the shape

and time relationship of the change in FHR, with respect to the contraction is usually studied.

» Cardiotocographs are designed to measure and record foetal heart rate on a beat-to-beat basis rather than on an average basis. Normally, an accuracy of measurement may be 2-3% for classification of responses.



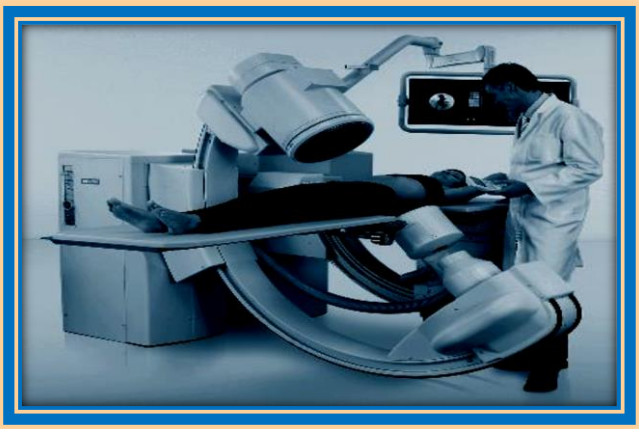
» Sensitivity of 20 bpm/cm of recording chart allows adequate reading of the recorded FHR. Labour activity and FHR traces are usually recorded simultaneously on the same time scale. Chart speed of 1-2 cm/min is adequate to provide sufficient resolution of the stimulus- response relationship.

Nandhini S
IV Year Biomedical Engineering

LITHOTRIPTORS DEVICE

» Lithotriptors are special medical machines used to treat kidney stones without surgery through a method called extracorporeal shock wave lithotripsy (ESWL). This technique uses powerful shock waves to break kidney stones into smaller pieces, which can then be easily passed out of the body through the urinary tract. This method is very helpful for patients who suffer from the pain and issues caused by larger stones.

» During the ESWL procedure, the patient lies on a special table, often in water or gel to help the shock waves work better. Doctors use imaging tools like ultrasound or fluoroscopy to guide the lithotriptor, focusing shock waves directly on the kidney stones. These waves create quick pressure changes that cause the stones to break into smaller bits. The pieces can be as tiny as sand grains or larger fragments, making it easier for the body to remove them naturally.



» Lithotripsy is especially useful for people with kidney stones that are too large to pass on their own. It works well for stones in the kidney and upper ureter, particularly those that cause pain, blockages, or infections. However, not all types of stones are good candidates for lithotripsy. For example, cystine stones or stones in hard-to-reach areas may not break down as well with this treatment, sometimes requiring different approaches. One of the main benefits of lithotripsy is that it is non-invasive, meaning no surgical cuts are needed. Most patients can go home on the same day and quickly return to their normal activities.

» The procedure is generally safe with a low rate of complications. Common side effects are usually mild, such as bruising and discomfort, making

recovery easier. Even with its many benefits, lithotripsy may not be right for everyone. Factors like the size, type, and location of the stones, as well as the patient's overall health, can affect how well the treatment works. Some patients may need several sessions to completely clear the stones, which can make the overall treatment process longer.

Kayalvizhi J
IV Year Biomedical Engineering

PLETHYSMOGRAPH

» A plethysmograph is a device used to measure changes in volume within an organ or the whole body, often by recording variations in blood flow or air displacement. This instrument plays a crucial role in various medical and physiological research areas, providing valuable data on the functioning of the cardiovascular and respiratory systems. There are different types of plethysmographs, each designed for specific applications, such as body plethysmographs, impedance plethysmographs, and photoelectric plethysmographs.

» In pulmonary studies, a body plethysmograph is commonly used to assess lung volumes and airway resistance. The subject is enclosed in an airtight chamber, and as they breathe, changes in pressure within the chamber are measured to calculate the volume of air in the lungs. This method offers precise measurements of lung capacities and can help diagnose and monitor respiratory conditions like asthma, chronic obstructive pulmonary disease (COPD), and restrictive lung disease.

» Impedance plethysmography is often employed to measure blood flow and volume changes in limbs. By placing electrodes on the skin, the device detects electrical impedance variations caused by blood volume changes with each heartbeat. This non-invasive technique is useful for evaluating venous function, detecting deep vein thrombosis, and assessing peripheral vascular diseases.

» Despite their specific applications, plethysmographs are not as widely utilized as other diagnostic tools in general biomedical engineering practice.

» Their use is typically confined to research settings or specialized medical assessments due to the complexity of the measurements and the need for precise calibration and interpretation of data. However, when applied correctly, plethysmographs offer invaluable insights into the dynamic processes of the human body, aiding in the diagnosis, monitoring, and treatment of various medical conditions. Their ability to provide detailed physiological measurements makes them a valuable tool in both clinical and research environments.

Shobana B
II Year Biomedical Engineering

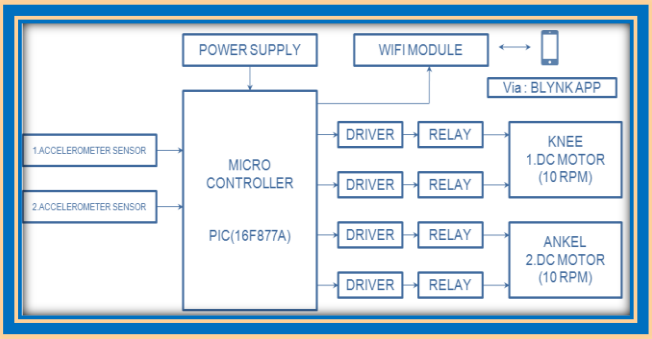
KNEE ANKLE RECOVERY SYSTEM

» In the real time of orthopedic rehabilitation, advancements in technology have proved the way for innovative solutions aimed at enhancing the recovery process and improving patient outcomes. One such development is the motor-based orthopedic leg brace, a sophisticated medical device designed to assist individuals recovering from lower limb injuries or undergoing rehabilitation therapy.

» Traditional rehabilitation methods often lack the ability to tailor treatment plans to each patient's unique needs and progress, resulting in suboptimal outcomes and prolonged recovery times. Motor-based leg rehabilitation braces lies in their ability to provide dynamic, personalized, and interactive (in respect of physiotherapist knowledge) support during the rehabilitation process, with a focus on targeting knee and ankle movements. By controlling the braces via Mobile Applications.

» The motor-based orthopedic leg brace for rehabilitation is a cutting-edge medical device engineered to aid individuals recovering from lower limb injuries or undergoing rehabilitation therapy.

» By providing customizable support and assistance, the motor-based leg brace enhances the effectiveness and efficiency of rehabilitation therapy. It promotes proper alignment, muscle activation, and joint mobility, accelerating recovery and improving functional outcomes for individuals with lower limb injuries or conditions.



» The orthopedic leg brace for rehabilitation integrates components such as a power source, ESP8266 microcontroller for IoT connectivity, a drive system, and relay-controlled DC motors for knee and ankle movements. The power source supplies electrical energy, while the ESP8266 facilitates communication with an IoT Blynk application for remote monitoring and control. The drive system receives commands from the microcontroller and activates relay switches to regulate the DC motors, enabling precise movement at the knee and ankle joints. This compact system enables remote monitoring and adjustment, enhancing the user's rehabilitation experience.

» Motor-based orthopedic leg braces represent a significant advancement in the field of rehabilitation medicine, offering patients a more dynamic and interactive approach to recovery.

Indhumathi M
II Year Biomedical Engineering

NON TECHNICAL ARTICLES FORM OF KALARCHIKAI

» Many herbal remedies have been employed in various medical systems for the treatment and management of different diseases. The plant Caesalpinia bonducella has been used in different system of traditional medication for the treatment of diseases and ailments of human beings.

» The phytochemical screening of seeds of Caesalpinia bonducella revealed the presence of bioactive compounds such as Triterpenoids, Flavonoids, glycosides, saponins, tannins, alkaloids and amino acids. C. bonducella has been reported to have antidiabetic, anti-inflammatory, anti-filarial, anxiolytic, analgesic, antipyretic, immunomodulatory, hypoglycemic,antidiuretic,antiestrogenic,antimicrobial,antifungal,anticonvulsant activity.

» This review attempts to encompass the available literature on seeds of Caesalpinia bonducella with respect to its pharmacognostic characters, chemical constituents, summary of its various pharmacological activities and traditional uses. Therefore, this information will be helpful to create interest towards the plant and may be useful in developing new formulations.

» KEYWORDS: Caesalpinia bonducella, Phytoconstituents, Pharmacological activities, Traditional uses.

Deepika V
II Year Biomedical Engineering

BENEFITS AND IMPACTS OF INTERNET

» You can access the latest news from any part of the world without depending on the TV or newspaper. Education has received a huge boost as uncountable books and journals are available online from libraries across the world. This has made research easier. Students can now opt for online courses using the internet.

» Students can easily search for the relevant information they require on the internet. Before the spread of the internet, students had to go through many books to find the information they needed, which was a time taking process. Things are now faster and easier because there are numerous websites that provide important information that can help students with their academic work and assignments. This also helps students remain up to date with the latest information.

» Almost every student is now aware of the terms online education and distance learning, both of which have been the most significant benefits of the internet during the pandemic. They can learn a wide variety of things from the internet while at home, in a comfortable atmosphere.

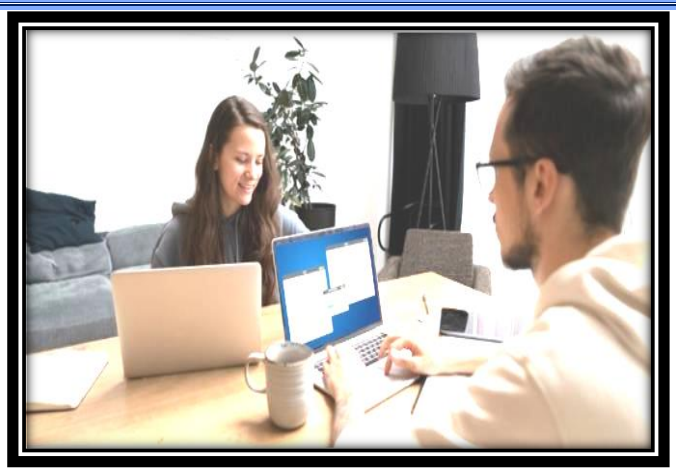
» Students can easily access lectures or classes on various academic subjects to clear all of their doubts. Different institutions, such as colleges, universities, and schools, have started to offer online programmes and courses to anyone in any part of the world.

» Having good communication and connectivity with others has proven to be beneficial. The internet has made it easy for students to connect with their classmates and teachers using different mediums from any part of the world. They can easily discuss study material and clear doubts with

the teacher in order to fully understand any topic. This can also help students in coming up with new ideas and enhancing their knowledge.

» From there onwards, its use has diffused rapidly throughout the world with there being around 7 billion users of wireless devices currently that employ internet technology. With about 7.7 billion people in this world and with limited use among those under 5 years of age, it's almost safe to say that the entire humanity is now connected to the internet!

» The Internet is the most unlimited source of information for everyone who can access it. Be it communicating with people sitting at another corner of the world or addressing thousands of people together, the internet has made it possible for all of us within seconds.



Devika S
II Year Biomedical Engineering

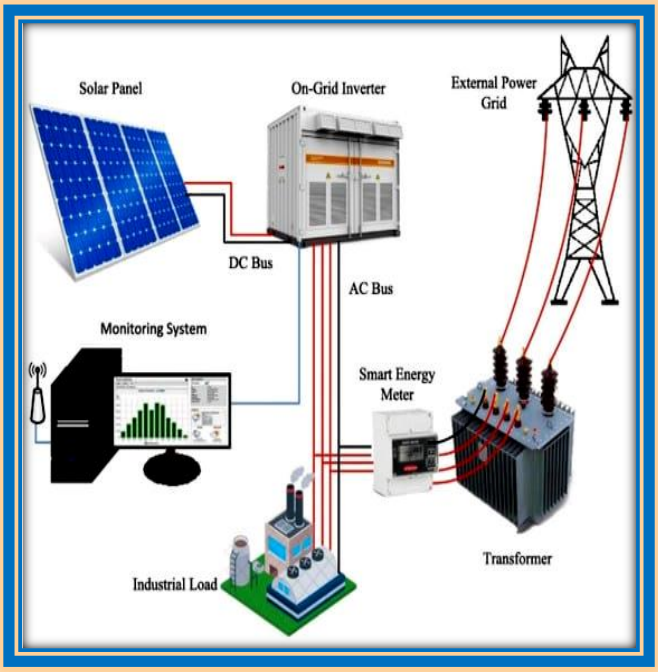
ADVANCE AND RECENT DEVELOPMENTS IN SOLAR PANELS

» Solar panels, devices that convert sunlight into electricity, have long been a cornerstone of renewable energy solutions. As the world grapples with climate change and seeks sustainable energy sources, recent advancements in solar technology are propelling the industry forward, making solar power more efficient, affordable, and accessible.

Efficiency Improvements

» One of the most significant recent developments in solar panel technology is the increase in efficiency. Traditional silicon-based solar cells have seen gradual improvements, but new materials and technologies are pushing the boundaries further. Perovskite solar cells, for instance, have shown remarkable potential. These cells are cheaper to produce and can achieve efficiencies comparable to traditional silicon cells. Research has demonstrated perovskite solar cells with efficiencies exceeding 25%, and their potential for tandem cells (stacking multiple layers) could push this even higher.

» Another promising technology is bifacial solar panels. Unlike conventional panels that only capture sunlight from one side, bifacial panels absorb light from both sides. This dual-sided absorption can increase overall energy production by up to 30%, especially in reflective environments like snowy areas or deserts.



Advance Development in Solar Panels

» Solar power has been steadily growing in popularity over the years, due in no small part to the continual advancements in solar panel technology. These innovations have resulted in solar energy becoming more efficient, cost-effective, and versatile.

» Bifacial solar power more accessible, efficient and sustainable for the future.

» In 1839, the ability of some materials to create an electrical charge from light exposure was first observed by the French physicist Edmond Becquerel. Though these initial solar panels were too inefficient for even simple electric devices, they were used as an instrument to measure light. The observation by Becquerel was not replicated again until 1873, when the English electrical engineer Willoughby Smith discovered that the charge could be caused by light hitting selenium.

Recent Announcements in Perovskite Solar Cell Research

» LONGI, a Chinese firm, has achieved record-breaking energy efficiency with its tandem solar cells. In November 2023, its tandem solar cells reached an efficiency of 26.81 percent, which was considered a record at that time. Scientists at the University of Colorado Boulder have unveiled a new method for manufacturing Perovskite cells, a potentially critical development for commercializing next-generation solar technology. This innovation in manufacturing techniques could play a crucial role in the progress and wider adoption of Perovskite solar cells.

Rohit Sarathi K
II Year Biomedical Engineering

POEM

Life Is a Question...

That No One Can Answer!

Death Is an Answer...

That One Can Question!

Everything Is Beautiful...

Depending On the Situation!

A School Bell Sound Irritating At 9 Am!

But

.....

.....

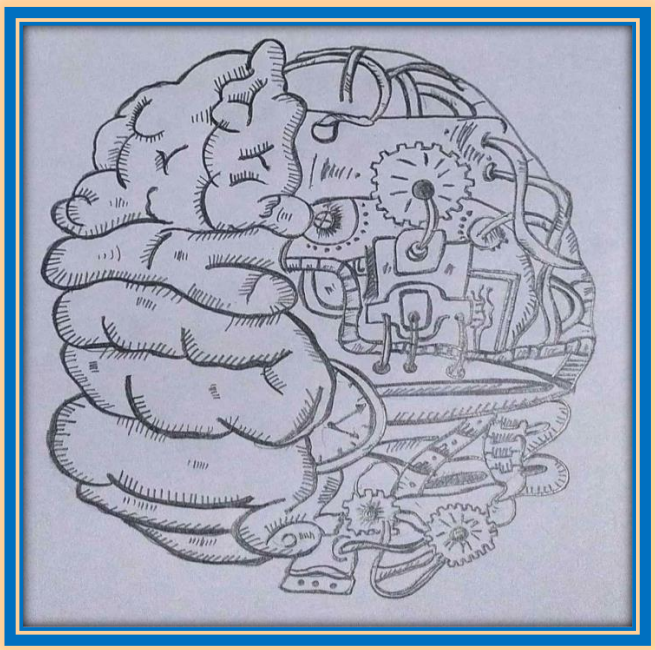
The Same Bell Sound Melodious At 4 Pm!!

Life Is Full Of Blessings...

Sometimes We Don't Value It..!!!!

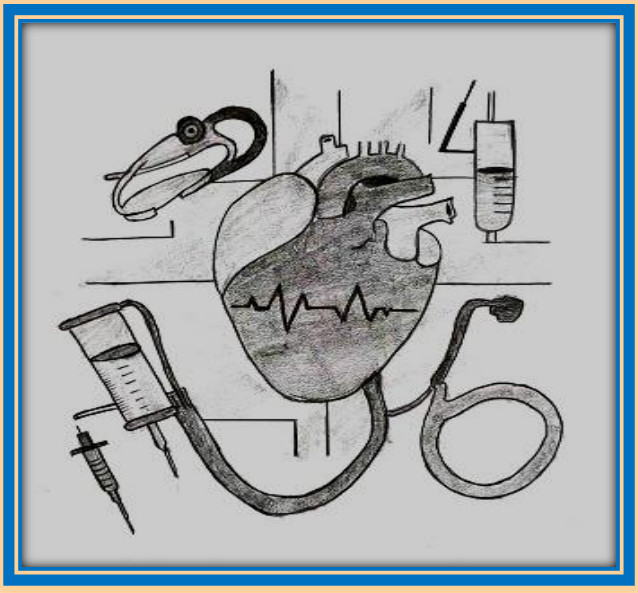
Abinaya S
III Year Biomedical Engineering

DEPICTIONS

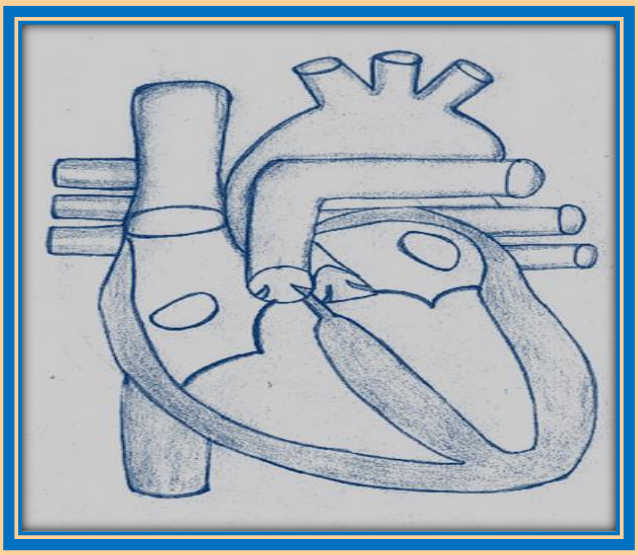


Shambavi T
III Year Biomedical Engineering

Varsha M
III Year Biomedical Engineering

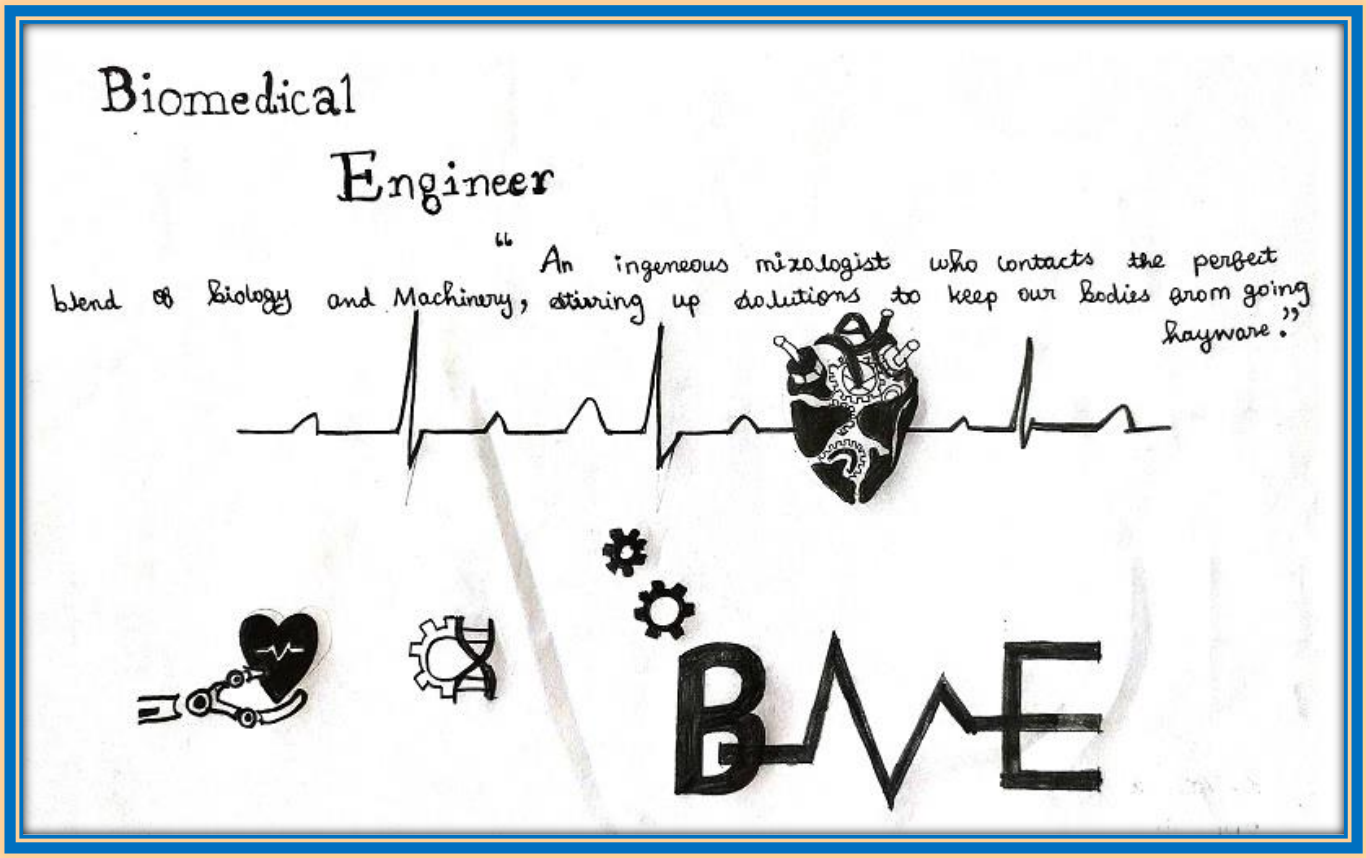


Gangasri A
III Year Biomedical Engineering



Kaviya A
III Year Biomedical Engineering

Sivadharshini R
III Year Biomedical Engineering



Varsha R
III Year Biomedical Engineering

Dharshika A
II Year Biomedical Engineering

Vidhya M
II Year Biomedical Engineering

Monisha M
II Year Biomedical Engineering

Rohini D
II Year Biomedical Engineering

Deepika V
II Year Biomedical Engineering

Vasanth P
II Year Biomedical Engineering.

Left In Darkness

I had a dream, which was not all a dream
The bright days was extinguish'd and the care
Did wander darkling in the eternal space,
Reckless, and shameless, and the icy earth
Swung blind and blackening in pupils heart:
Morn came, and went – and came, and no peace,
And men forgot their limits
Forgot their passion
They are filled with dirty hands
No light in heart brings no peace in soul
People became isolated
were involved in a selfish prayer for light;
And they did live in firewalls and dark holes,
The palaces of crowned kings became a hut
Kings with pure heart became worthless
Faith has been burnt and all became dishonest...

Sri Nidhi.J
BME – III

Sri Nidhi J
III Year Biomedical Engineering

SPORTS ACTIVITIES


BHARATH RATNA C.SUBRAMANIAM HALL


Kongunadu
Zone - 14


WINNER

COLLEGE VISION & MISSION

Vision

» To become an Internationally Renowned Institution in Technical Education, Research and Development by Transforming the Students into Competent Professionals with Leadership Skills and Ethical Values.

Mission

» Providing the Best Resources and Infrastructure.
» Creating Learner-Centric Environment and continuous Learning.
» Promoting Effective Links with Intellectuals and Industries
» Enriching Employability and Entrepreneurial Skills
» Adapting to Changes for Sustainable Development

EDITORIAL BOARD

It is with great pleasure that we, the Editorial Board of **"BIOACTIVE'** JULY 2024"**,** extend our warmest greetings to you. As stewards of this publication, we are dedicated to curating content that informs, inspires, and sparks meaningful conversations.

Our mission is rooted in a commitment to excellence and integrity. Each article, feature, and editorial piece is crafted with meticulous care to provide you with thought-provoking insights and a deeper understanding of the world around us.

We are honored to serve as your guides through the ever-evolving landscape of knowledge and ideas. Our diverse backgrounds and expertise converge to bring you a diverse array of perspectives, ensuring that every issue resonates with relevance and significance.

Thank you for being a part of our community. Together, let us continue to celebrate curiosity, embrace diversity, and elevate the discourse.

Mr T.Ashok, ASP & Head/BME, Mr R.Ragul Kannan, AP/BME

FOR CONTACT

KONGUNADU COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

Namakkal-Trichy Main Road, Tholurpatti Post, Thottiam Taluk,
Trichy DT, Tamil Nadu. India - 621215.
Mobile: 8012505000/11/54/85/86 Phone: 04326-277571 Fax: 04326-277572
E-Mail: admissions@kongunadu.ac.in

BIOMEDICAL ENGINEERING DEPARTMENT

Mr T Ashok M.Tech.,
Associate Professor & Head / BME
Email: hodbme@kongunadu.ac.in Mobile: 8012505054