



SSN COLLEGE OF ENGINEERING

DEPARTMENT OF BIOMEDICAL ENGINEERING

SYNERGY

VOLUME- 5
ISSUE - 2

Synergy

From Highlights

- **Volunteer Training Camp**
- **National Biomedical Lecture Series**
- **Bionic Limbs—transcending disability**
- **Bringing the Brain Dead back to Life**

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From the Editorial Desk

As always, Synergy mirrors our Department's vision and mission.

This issue highlights the events, activities academic progress and achievements of the past three months from April'16 to June'16. It includes the highlights of the department for the given period. We do hope that our newsletter encourages many more students to use it as a platform to express their creativity and sincere involvement in the successful growth of the Department.



Welcome you all to the new academic year 2016-2017. Our special greeting to the first year students (UG & PG)- enjoy, educate and expand your horizons by making the best use of the facilities available in our department.

Best wishes,

Editorial Team

FACULTY ACTIVITIES

External Funding:

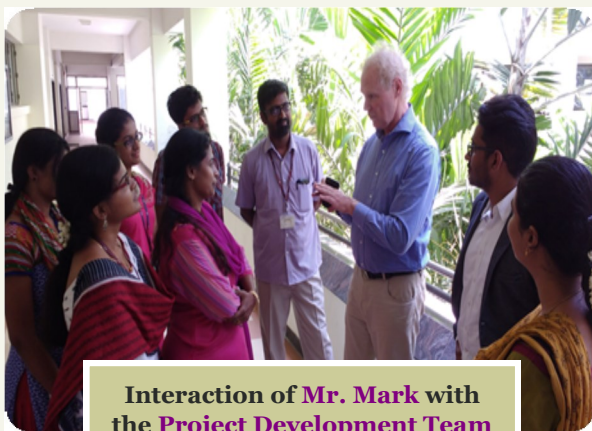
Mr. Mark Whaley, Deputy Mayor from the city of Waterloo and the **president of Horizon Engineering Solutions, Waterloo, Canada** and **Mr. Hariharan Krithivasan** from **Horizon Engineering Solutions (HES), Waterloo, Canada** had a meeting with **Dr. A. Kavitha HOD/BME** and project members of the “**Design and Development of Prosthetic hand project**” in the BME Conference room.



The team also had a discussion with the **President Ms. Kala Vijayakumar** and the **Principal Dr. Salivahanan**.

Interaction of **Mr Mark**, **President HES** and **Mr Hari, CEO HES** with the **President/SSNCE**, **Principal/SSNCE**, **Dean Academics SSNCE** and **Dr.A.Kavitha HoD BME**

A presentation on **Centre for Healthcare Technologies** and ongoing research projects in the department was presented by **Dr. A. Kavitha HOD/BME**. **Mr. Mark Whaley** and **Mr. Hariharan Krithivasan** along with **Dr. A. Kavitha HOD/BME** had a meeting with **President Ms. Kala Vijayakumar** and discussed about the future collaborations with **HES, Canada**



Interaction of **Mr. Mark** with the **Project Development Team** @ **BME Dept/SSNCE**



Mr. Mark and **Mr. Hariharan** with **Dr. A. Kavitha** @**SSNCE**

FACULTY ACTIVITIES

Publication Details:

- ◆ **Sivaramakrishnan R, Mallika J, and Gnanaprakash D** published the paper “**Ocimum Basilicum L. Essential oil coated biomaterial surfaces prevent bacterial adhesion and biofilm growth**” in the **Asian Journal of Pharmaceutical and Clinical Research**, vol. 9, no. 3, May-June 2016.

Other Activities:

- ◆ **Dr. R. Sivaramakrishnan Asso. Prof/BME** has been recognized as a supervisor (Ref. No. 2740041) for guiding Ph.D. and M.S. (By Research) scholars of Anna University under the Faculty of Information and Communication Engineering.
- ◆ **Dr. R. Sivaramakrishnan Asso. Prof/BME** has been selected as Technical Program/Steering Committee member for the International Conference on Signal Image Processing Communication & Automation (ICSIPCA 2016), to be organized in **JSS Academy of Technical Education (JSSATE)** in December 8-10, 2016.
- ◆ **Dr. R. Sivaramakrishnan Asso. Prof/BME** has been selected as Technical Program/Steering Committee member for the 2nd IEEE International Conference on Contemporary Computing and Informatics (IC3I 2016) to be organized in **AMITY University, Noida, India, in December 14-17, 2016.**
- ◆ **Dr. R. Sivaramakrishnan Asso. Prof/BME** reviews articles for some of the best journals including **Elsevier Journal of Visual Image Communication and Representation, International Journal of Applied Mathematics and Computer Sciences, Asian Journal of Pharmaceutical and Clinical Research and Journal of Medicinal Herbs and Ethnomedicine.**
- ◆ **Ms. Kanchana D. AP/BME** presented a guest lecture on “**Real time applications of digital signal processing**” at **SMK Fomra College of Engineering and Technology** on April 18, 2016.
- ◆ **Dr. V. Mahesh Asso. Prof/BME** and **Mrs. B. Geethanjali AP/BME** visited **Chettinad College of nursing, Chettinad Academy of Research and Education, Kelambakkam** and discussed with **Dr. Lakshmi, Principal** regarding EEG related projects and possibility of data sharing for the same on June 5, 2016.

FACULTY ACTIVITIES

- ◆ **Ms. D. Kanchana, AP/BME** attended one week STTP on “**Learning and Teaching Robotics: Modelling, Simulation, and Practice**” at **Indian Institute of Information Technology, Design and Manufacturing**, Chennai from June 20, 2016 to June 25, 2016.
- ◆ **Ms. D. Kanchana, AP/BME** attended one week TEQIP sponsored STTP on “**Bio Signal Processing for Telemedicine Application**”, at **Pondicherry Engineering College**, Puducherry from June 27 - July 02, 2016.
- ◆ **Dr. R. Sivarama Krishnan, Asso. Prof. /BME** was appointed as the **chairman for the Biomedical Board paper evaluation** at Zone II Anna University.

ADIEU...

Dr. Mallika Jainu has joined as Biological Instructor in **Texas University, Dallas, USA** and **Dr. Yuvaraj** will be joining Post-Doctoral Fellowship at **University of Kentucky, Lexington**. On the same note, a farewell was arranged in the Department of Biomedical Engineering on May 31, 2016.



Dr . A. Kavitha felicitating Dr. Yuvaraj



Faculty and staff bidding Farewell

From the Department of Biomedical Engineering , we wish them all the very best in their careers. We believe ‘Good-byes’ are neither the end nor are forever. We hope to join hands with both of them again in the near future and enhance our research activities.

ALL THE BEST DR. PRAVIN KUMAR ...

We would like wish all success to **Dr. S. Pravin Kumar** for his research career. A small write-up of his work is also given below to enlighten the budding Biomedical Engineers.

Dr. S. Pravin Kumar has joined with the **Voice Research lab, Department of Biophysics, Faculty of Sciences, Palacký University in Olomouc, Czech Republic**, to do his post-doctoral work on **“Human voice and vocal fold function”**. Voice research lab is one of the leading basic voice science facilities in the world, led by the inventor of the videokymographic imaging system, **Dr. Jan G. Švec**.

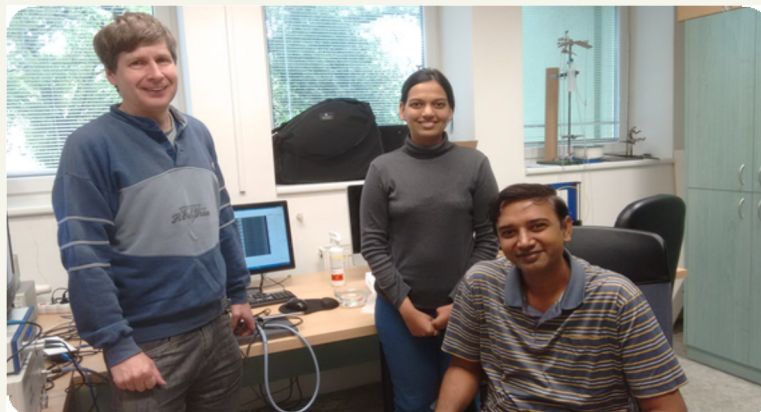
The Voice Research lab has a special experimental setup for studying the vibration of vocal folds in excised larynges and also has access to a large number of recordings of videostroboscopic and videokymographic examinations of patients obtained at the Voice Centre Prague, Medical Healthcom, Ltd. It also has a strong collaboration with the Institute of Information Theory and Automation of the Academy of Sciences of the Czech Republic which performs research in image processing and analysis, Czech Technical University Prague, Czech Academy of Sciences and Technical University Brno, and with prominent research teams in voice science all over the world.



Dr. S. Pravin Kumar with his team @University in Olomouc, Czech Republic.

The lab currently focuses on improving methods of voice measurement to aid diagnosis and therapy of voice disorders. The aim of this research work is to improve the diagnostic potential of videokymography and high-speed video endoscopy for voice disorders and to improvise the models of vocal folds. He will design and apply methods for measurements and analyses of high-speed videoendoscopic and videokymographic recordings of the vocal fold vibrations obtained from in vitro experiments with excised larynges and from in vivo examinations of patients and singers.

The analyzed vibratory features of the vocal folds will be compared to the results from mathematical modelling and from the experiments on vocal fold replicas (obtained in collaboration with the Czech Technical University Prague, Institute of Thermomechanics at the Czech Academy of Sciences and Technical University Brno).



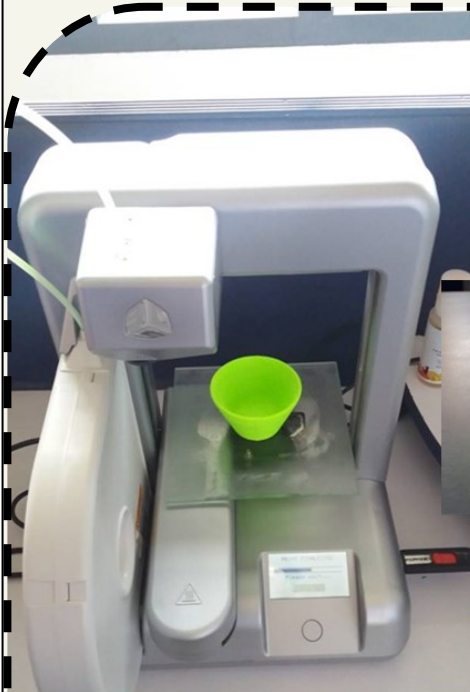
Dr. S. Pravin Kumar and his team in their work station

Furthermore the data from the mathematical and physical models of the vocal folds will be compared to the behavior of the real human vocal folds and of the excised larynges (red deer, porcine and bovine). The goal will be to extract and describe the crucial vibratory characteristics of the vocal folds, so that they can be used in mathematical models for adjusting the properties of simulated vocal fold structures, in order to make their behavior as realistic as possible.

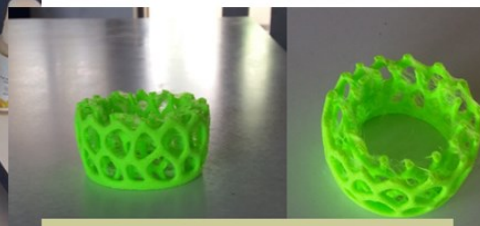
RESEARCH FACILITY ENHANCED

CUBE 3 D PRINTER

The Department of Biomedical Engineering has got its own 3D Printer installed in the Medical Software Lab. It benchmarks the research activities of the department and sets a standard in Biomaterial and prosthetic research. Find more details in the link given <http://www.3dsystems.com/3d-printers/personal/cube>



Cube 3D printer installed in Medical Software Lab-



3D printed design using Cube 3D printer.

EMOTIV – Wireless EEG

A new equipment named “Emotiv” was added to DTE Lab. **Emotiv Epoc+** is a revolutionary Neuroheadset and Scientific Contextual EEG offering high resolution and full spatial resolution, it is a **14 channel wireless EEG**, designed for contextualized research and **advanced brain computer interface (BCI) applications**. More about this can be found in the link given below - <http://emotiv.com/epoc/>



Dr. Yuvaraj and Dr. V. Mahesh exploring the GUI of Emotiv



Student wearing Emotiv headset

WELCOME ABOARD...

•**Ms Divya** has completed her B.Tech Biomedical Engineering from Rajiv Gandhi College of engineering and technology, Pondicherry in 2009 and M.Tech Biomedical Engineering from Amrita School of Engineering, Coimbatore in 2011. She was a university rank holder in UG and secured second place in overall performance during her PG. She has worked as an Assistant professor for a period of 3.8 years in one of pioneer institute in Kerala. She has done projects like "Classification of neuromuscular disorders using EMG", "A fuzzy based approach for heart attack prediction", "Use of Quantum dot- Gold Nano particle for cancer treatment". She has participated in International Conference and National Conferences. Her areas of interest includes Diagnostic Techniques, Soft Computing Techniques, And Biomaterials.

Ms Divya,
AP/BME



We Extend a warm welcome to the new faculties of our Department...

•**Ms. N. Laxmi**, Assistant Professor in the Department of Biomedical Engineering has 4 years of teaching experience. She received her B.E - Biomedical Engineering (Distinction) from Anna University, Chennai and M.Tech. (Distinction) Biomedical Engineering from MIT- Manipal (Manipal University). She has worked in the area of Optical Biosensors (SPR Biosensor). Her current research interests include biosensors, rehabilitation engineering, biomaterials and biomedical equipment.

Ms N. Laxmi
AP/BME



•**Ms. Richa Malviya**, has completed her B.E- Biomedical Engineering from RGTU, Bhopal in 2008 and M.S (By research) in Medical Imaging and Image Analysis in 2014 from IIT Kharagpur . She has 4+ years of work & multi-disciplinary research experience in the domain of Digital Pathology with focus on development of computer assisted techniques for early detection of cervical cancer and in Ophthalmology with primary focus on Glaucoma detection in IIT Kharagpur, IIT Bombay and Ngee Ann Polytechnic, Singapore. She has participated in various IEEE, UGC, DBT & AICTE sponsored National and International events and published good number of research papers. Her areas of interest includes Digital Image Processing, Image Analysis, Medical Imaging, Pattern Recognition

Ms Richa Malviya
AP/BME



STUDENT ACHIEVEMENTS

- ◆ **V. Sugan Raj and S. Gayathri Devi** of II year BME successfully completed training in “**Cardio Pulmonary Resuscitation**” at Saveetha University as a part of “**Save a Life Movement**” held on April 7, 2016.
- ◆ **Yaser Ali and Vinod Kumar V.** of final year presented their project titled “**Design and Development of Hand Gesture Controlled Robotic Upper Limb Prosthesis**” at **Indian Medical Device Expo (IMDE) 2016** at College of Engineering, Pune on April 8–10, 2016, guided by **Ms Kanchana.D**
- ◆ **Vinod Kumar V.** of final year presented their project titled “**Design and Development of Hand Gesture Controlled Robotic Upper Limb Prosthesis**” at **NLPC National Level Project Competition 2016** at JAYA Engineering College, Chennai on May 6, 2016, guided by **Ms Kanchana.D**
- ◆ The following papers were presented in an International Conference on April 25, 2016 & April 26, 2016:
 - ◆ **M. Diwakar and R. Nithya AP/BME** "Design of exoskeleton for lower extremities".
 - ◆ **N. Roshini, S. Nivethitha and R. Nithya AP/BME** “Assistive Device for Locomotion of Visually Impaired and Physically Challenged people”.
 - ◆ **T. Devishree and Mahesh Veezhinathan Asso.Prof/BME** “Design of Temperature, Pressure and Flow Controller Modules for Dialysis Machine”.
 - ◆ **Sneha Nair, Shraddha Suresh Menon, Geethanjali B AP/BME, Guhan Seshadri N P, Pravin Kumar S Asso.Prof/BME** “Evaluating the Perceived and Induced Emotions on Physiological Response”.
 - ◆ **Bhavana V, Muthumeenakshi S, Vijayalakshmi, Geethanjali B AP/BME, Guhan Seshadri N P** “Analysis of attention based task performance using EEG”.



- ◆ **Imaiyan C.R of Final year** was awarded at the college day function as the **best outgoing student** for his exemplary contribution to the Institute in Sports, Academics and other activities.



- ◆ **Saravana Prakash** was awarded the **best student at the Department Association Valedictory function** for his outstanding contribution in Academics, Departmental Activities, Publications, Patent filing etc.



I G H E R S T U D I E S D E T A I L S



- ◆ **Saravana Prakash** has joined **Albert Ludwigs university of Freiburg in Germany** with **complete scholarship** for pursuing Masters of science in Microsystems engineering

- ◆ **Gayathri Mohankumar, P A Shilpa, Shradha Srinivasan and Varsha Mohan** has joined **Carnegie Mellon University, Pittsburgh** to pursue MS in Biomedical Engineering



- ◆ **Sneha Nair** has joined **Arizona State University** for pursuing MS in Biomedical Engineering



- ◆ **Akshaya Kirithy.B** has joined **New Jersey Institute of technology, Newark** to pursue MS in Biomedical Engineering



- ◆ **Pallem Naveen Manikya** joined **University of Leeds, England** to pursue MS in Medical Engineering



INTERNSHIP DETAILS

- ◆ **Diana Chris A, Thamizhvani T.R, Vardhini P** of **M.E II Year** attended **Matlab Internship - Image Processing** at **KaaShiv Infotech, Anna Nagar, Chennai** from **June 23-24, 2016**.

B.E Students Summer Internship Details:

Name	Name of the Company	Dates
Atul Taneja	Kalasalingam University	17th June - 2nd July
Chandramouli Ramesh	Veritas Finance Pvt Ltd	4th July-22nd July
Deepika.R	Dreamware Technologies	24th June-31st July
Keerthana.M	IISC Bangalore	20 th June- 14th August
Krishna Bairavi	DEBEL,DRDO	20th July-5th August May 11th-25th, July 1st-31st
Krriti Ravikumar	E21 Designs	May 11th-25th, July 1st-31st
Lavanya Krishna	IIT	20th June- 25th July
Monica Ashokumar	Metarvrse Technologies	24th June-31st July
Prathyusha	ZoomRX Healthcare Technologies Pvt Ltd	20th June- 3rd August
Rosheema Bala	Metarvrse Technologies	24th June-31st July
T.Sathiyapriya	Apollo Spectra Hospital	2nd May-9th May
Suryaprakash.D	Uniq Technologies	17th June - 1st July
Sushmitha.S	IIT, Ropar	17th June-16th July
B.Tanushree Devi	Kalasalingam University	17th June-2nd July
S.B.Vishal	Kalasalingam University	17th June-2nd July

PROJECT EXHIBITION

Project Exhibition for final years was held on 6th April 2016 in BMI Lab. **Dr. C.M. Sujatha Asso. Prof., Department of ECE, CEG, Anna University, Guindy, Chennai** was the chief guest for the event. All projects were exhibited in poster format and the prize winners were appreciated with cash awards



Dr V.Mahesh handing over the memento to the chief guest Dr C.M Sujatha

First Prize:

Title: **Stress analysis of adjacent vertebrae post Vertebroplasty**

Members: **Deepak.V, Pavithra.M, Vallabhi Venkatesh.** Guided by **Dr. A. Kavitha**

Second Prize:

Title: **Analysis of Brain activation during task performance**

Members: **Bhavana. V, Muthumeenakshi. S, Vijayalakshmi.** R Guided by **Ms. B. Geethanjali**

Third Prize:

Title: **Wearable Health Monitoring System**

Member: **Saravana Prakash S,** Guided by Dr. S. Pravin kumar
&

Title: **Performance of silver coated 316 L Stainless Steel by Thermal Evaporation Method**

Members: **Loganathan V, Mohammed Ikram A, Namasivaya Naveen S,** Guided by **Dr. R. Subashini**



I PRIZE



II PRIZE



III PRIZE



III PRIZE



NEW OFFICE BEARERS:

Our department along with IEEE has formed a student chapter and several programmes have been organized by them. The new office bearers of IEEE EMBS for the year 2016-17 are:

1. SSN IEEE STUDENT BRANCH CHAIRPERSON – **Vishal S.B.**
2. SSN IEEE EMB STUDENT SOCIETY CHAIRPERSON – **Tanushree Devi B.**
3. SSN IEEE EMB STUDENT SOCIETY VICE-CHAIRPERSON – **Monica A.**
4. SSN IEEE EMB STUDENT SOCIETY SECRETARY – **Keerthana M.**
5. SSN IEEE EMB STUDENT SOCIETY TREASURER – **Keerthana Priya S.**
6. SSN IEEE EMB STUDENT SOCIETY SCRIBE – **Vishnu Priya K.**



The new office bearers of IEEE EMBS along with HOD, Dr. A. Kavitha & Asso. Prof Dr. V. Mahesh.
From Left to Right:- Monica A., Vishnu Priya, Keerthana, Tanushree, Vishal, Aathira Haridas and Keerthana Priya

ASSOCIATION VALEDICTION:

The **Valediction of the Association of Biomedical Engineers** was held on 6th April 2016. The new office bearers took up their official positions on the association Valedictory Function for the upcoming academic year 2016-2017. We wish them all the Best, expecting more events as they are all geared up to go ...



Old office bearers with the newly elected team.



President



**Vice
president**



Secretary



Treasurer



**Event
Coordinator**



Mr. Saravana Prakash of Final year was given a special award for his outstanding achievements and contributions to the department.

VOLUNTEER TRAINING CAMP:

SSN's IEEE Student Branch's chapter, EMBS, conducted a **Volunteer training camp on 9th May, 2016** at the BME Seminar hall. About 30 students from various colleges participated in the camp.

The following speakers spoke on various aspects of the student branch in an IEEE society and volunteering-

1. **MR. CHELLIAH RAJENDIRAN** (Section Student Representative during 2015-2016)
2. **MR. DEEPAK YELESHETTY** (Active volunteer and winner of Richard E Merwin Award)
3. **MR. SOLOMON SAGAR** (Former Chairman of Student Branch, Jeppiar College and active Madras section Volunteer)

A SUMMARY OF THE CAMP:

Mr. Chelliah Rajendiran delved into the hierarchy of a student branch and described in brief the roles and duties of the student branch committee members (Chairperson, Secretary, Vice-Chairperson and the treasurer). Also, he spoke about the various types of events that could be conducted which fall under four broad categories- administrative, humanitarian, technical and managerial.

He proceeded to explain the need for a constitution in a student branch. Finally, he concluded the talk by discussing the importance of funds and the various awards given away by the IEEE community. Some of the awards are Larry K Wilson award (for extraordinary accomplishment in the region), Darrel Chong award (for the exemplary event) and WIE best volunteer award and so on.



A delineation of the day's proceedings

Mr. Deepak Yeleshetty, then took to stage, and stressed the importance of creating a mail ID with the ieee.org tag known as the IEEE alias. Using apposite steps, he explained the protocol for the same.

Mr. Solomon Sagar expounded the reporting of events to the IEEE website and spoke on the procedure for the same. He also conveyed the necessity of a common account which is managed by the treasurer.

Finally a panel discussion was held and the students interacted with the speakers and clarified their queries ranging from attracting new members to the involvement in IEEE after graduation.



NATIONAL BIOMEDICAL LECTURE SERIES — Contd... —

BRIEF NOTE ON THE SPEAKER:

Dr. Raj Kanna, MBBS, M.S Orthopaedics, D.N.B Orthopaedic Surgery, Joint Replacement Fellowship, Clinical knee fellow.

- **Invention:** He has designed two femur re-cutting blocks useful for primary and revision total knee arthroplasty and have developed a simple technique for re-cutting the femur. This was funded by Deputy and is submitted to Journal of Arthroplasty.
- **Books:** He has co - authored a chapter titled "*Unicompartmental Knee Arthroplasty*" for the 2nd edition of the book titled "Textbook of Orthopaedics and Trauma" published by Indian Orthopaedic Association.
- **Current Positions:**
 - 1) Consultant Knee Surgeon, Apollo Hospitals, Vanagaram, Chennai.
 - 2) Consultant Knee Surgeon, Prashanth Hospitals, Chetpet & Velachery, Chennai.
 - 3) Consultant Knee Surgeon, Dr Kanna's Knee & Ortho Clinic, Anna Nagar Chennai.
 - 4) Assistant Professor, SRM Medical College, Kattankulathur, Chennai.

GLIMPSE OF THE SESSION:

SESSION DETAILS:

The following are the topics covered in the speech:

- Brief description of the Anatomy of Bone, Abnormal conditions and complications in bone anatomy
- Corrective knee surgery for Knock Knees and Bow Legs (*videos were included*).
- Planning of surgery using computer's assistance
- Comparison between traditional surgery and computer based corrective surgery and the advantages of the latter, Various Case studies
- Hamstring tear surgical treatment and its outcomes (*videos were included*).



Dr. Raj Kanna interacting with the audience



Mrs. Delpha J. felicitating Dr. Raj Kanna.

NATIONAL BIOMEDICAL LECTURE SERIES — contd...

BRIEF NOTE ON THE SPEAKER:

Dr. Kumar Rajamani, Architect at Robert Bosch Engineering and Business Solutions Ltd.

- He is currently **Architect at Robert Bosch** and part of New Business Team exploring healthcare technologies for emerging markets.
- He has **9 patents** to his credit.
- He was a **Research Engineer at GE Global Research**. He has worked on Oncology Quantification, Quantitative Magnetic Resonance Imaging (DCE-MRI), Medical Image Registration.
- He was the **Senior Scientist at Philips**. During his tenure at Philips Research, He was actively involved with a project requiring signal processing and pattern classification.
- He was also the **Chairperson and Head of Department of Information Technology at Amrita Vishwa Vidyapeetam, Bangalore**.
- **Professional Expertise:** Oncology Quantification, Fundus Image Analysis, Statistical Shape Models.
- **Academia Expertise:** Medical Image Analysis, Medical Image Segmentation and Registration, Statistical Model Construction, Market Research, Pattern Recognition and Signal Processing.



**Dr Kumar Rajamani
addressing the students**

GLIMPSE OF THE SESSION:

SESSION DETAILS:

Part – I

- ◆ Biomedical Engineering Careers opportunities, Various Scholarship facilities, Details on Competitive events for aspiring students in India, Establishment of Biomedical Engineering in India, Biomedical Companies in India.

Part – II

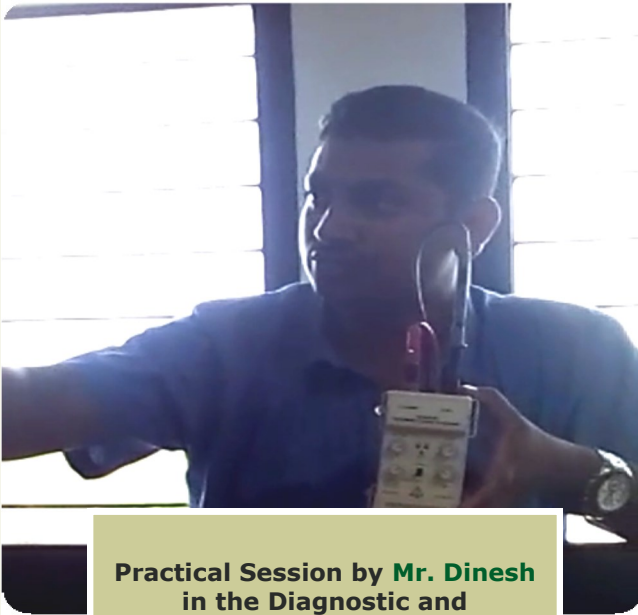
- ◆ Definition & Types, Frame Work of registration, Tools available & Formats of Medical data, Practical demonstration of medical image registration with axial brain images, Detailed explanation of ITK- SNAP software.

STUDENT FEEDBACK:

- Very useful and informative.
- Concepts were presented in a way that was very easy to understanding.
- Practical session made it more understandable. • Overall, it was a fulfilling session.

ONE DAY WORKSHOP ON ELECTRICAL SAFETY ANALYSER (ESA)

A workshop on Electrical Safety Analyser was held on Wednesday, the 13th of April 2016. It was conducted by **Mr. Dinesh**, a professional from **Fluke Instruments, an American Biomedical Company**.



Practical Session by Mr. Dinesh in the Diagnostic and Therapeutic Instruments Lab

The workshop commenced with a three hour long theory session in the Seminar Hall. The theory session was conducted with the intention of giving a clear idea of what was to be expected of the practical session. The session was brilliant. It answered every question people had about the safety basics of Biomedical Instrumentation. It covered all the possible errors and the reasons for errors in instrumentation. It was an interactive and an extremely entertaining session that made sure the audiences' attention spans remained intact.

Following a short break, was a session that focussed on the theory of the instrument and the tests that could be conducted with it. The essence of the instrument was made crystal clear and the audience ended up with proper understanding of the discussion. This marked the end of the first session.

The second session happened in the Diagnostic and Therapeutic Instruments Lab. The students were split into three batches and were offered hands-on experience. The Safety Analyser was interfaced with a Defibrillator, a pacemaker and a Ventilator in no particular order and the crux of the 'Device Under Test (DUT)' and the safety analyser was explained from a pragmatic perspective.

In conclusion, the session was absolutely brilliant and productive in the sense that it produced a level of intrigue that is quite hard to achieve. It was wonderfully put together, organised and conducted.

- write up by

Tanushree -Final year

GRADUATION DAY

The **16th Graduation day** for the students of batch 2015 was held recently at our college on April 2, 2016. The Chief Guest for the function is **Prof. Anil Sahasrabudhe, Chairman, AICTE, New Delhi.**



“Graduation, is not only a time to reflect on the past while planning ahead for the future, it’s a time to celebrate accomplishments and find inspiration for life beyond the big day.”

BIONIC LIMBS - transcending Disability

Source: TED talk by Mr HUGH HERR during March, 2014.

Looking deeply inside nature, through the magnifying glass of science, designers extract principles, processes and materials that are forming the very basis of design methodology. From synthetic constructs that resemble biological materials, to computational methods that emulate neural processes, nature is driving design. Design is also driving nature. In realms of genetics, regenerative medicine and synthetic biology, designers are growing novel technologies, not foreseen or anticipated by nature.



Bionics explores the interplay between biology and design. Electromechanics attached and implanted inside the body begin to bridge the gap between disability and ability, between human limitation and human potential. Bionics has defined his physicality. The artificial part of our body is malleable; able to take on any form, any function - a blank slate for which to create, perhaps, structures that could extend beyond biological capability. At the **MIT Media Lab**, they have established the **Center for Extreme Bionics**. The mission of the center is to put forth fundamental science and technological capability that will allow the biomechatronic and regenerative repair of humans, across a broad range of brain and body disabilities.

Bionics entails the engineering of extreme interfaces. There's three extreme interfaces in any bionic limbs: **mechanical**, How the limbs are attached to my biological body; **dynamic**, how they move like flesh and bone; and **electrical**, how they communicate with the nervous system.

B I O N I C L I M B S - c o n t i n u e d . . .

MECHANICAL INTERFACE:

In the area of design, we still do not understand how to attach devices to the body mechanically. The bionic limbs are attached to biological body via synthetic skins with stiffness variations, that mirror the persons underlying tissue biomechanics. To achieve that mirroring,



they first developed a mathematical model of his biological limb. To that end, they used imaging tools such as MRI, to figure out the geometries and locations of various tissues. They also took robotic tools -- here's a 14-actuator circle that goes around the biological

limb. The actuators come in, find the surface of the limb, measure its unloaded shape, and then they push on the tissues to measure tissue compliances at each anatomical point.

They combine these imaging and robotic data to build a mathematical description of his biological limb. Then do a mathematical transformation to the design of the synthetic skin, shown on the right. And they've discovered optimality is: where the body is stiff, the synthetic skin should be soft, where the body is soft, the synthetic skin is stiff, and this mirroring occurs across all tissue compliances. With this framework, they have produced bionic limbs that are the most comfortable limbs. they're also embedding sensing and smart materials into the synthetic skins. This is a material developed by SRI International, California. Under electrostatic effect, it changes stiffness. So under zero voltage, the material is compliant, it's floppy like paper. Then the button's pushed, a voltage is applied, and it becomes stiff as a board. They embed this material into the synthetic skin that attaches the bionic limb to my biological body. When walking, it's no voltage. The interface is soft and compliant. The button's pushed, voltage is applied, and it stiffens, offering a greater maneuverability over the bionic limb .

BIONIC LIMBS - ctd...

DYNAMIC INTERFACE:

How do bionic limbs move like flesh and bone? At MIT lab, they studied how humans with normal physiologies stand, walk and run. What are the muscles doing, and how are they controlled by the spinal cord? This basic science motivates what we build. They're building body parts from the ground up. The bionic limbs are called BiOMs.

At heel strike, **under computer control, the system controls stiffness**, to attenuate the shock of the limb hitting the ground. Then at mid-stance, the bionic limb outputs **high torques and powers to lift the person into the walking stride**, comparable to how muscles work in the calf region. This bionic propulsion is very important clinically to patients. So a passive device fails to emulate normal muscle function. Bionics also allows for extraordinary athletic feats. They're also building exoskeletal structures using these same principles, that wrap around the biological limb.

ELECTRICAL INTERFACE:

How do bionic limbs communicate with the nervous system? Across the residual limb **are electrodes that measure the electrical pulse of my muscles**. That's communicated to the bionic limb, so when people think about moving their phantom limb, the robot tracks those movement desires. So they model the missing biological limb, and they've discovered what reflexes occurred, how the reflexes of the spinal cord are controlling the muscles. And that capability is embedded in the chips of the bionic limb. they modulate the sensitivity of the reflex, the modeled spinal reflex, with the neural signal, so when relaxed muscles in the residual limb, gets very little torque and power, but the more he fire my muscles, the more torque he get, and hence can even run. In the motor channels, we can sense how the person wishes to move. That can be sent out wirelessly to the bionic limb, then [sensory information] on the bionic limb can be converted to stimulations in adjacent channels, sensory channels. So when this is fully developed and for human use, people will not only have synthetic limbs that move like flesh and bone, but actually feel like flesh and bone.

WRITTEN BY: Bhargavi.K,3rd year

BRINGING THE BRAIN DEAD BACK TO LIFE

An Indian Scientist has been granted permission to bring Brain -Dead to Life.

Indian specialist Dr. Himanshu Bansal, working with Biotech companies Revita Life Sciences and Bioquark Inc, has been granted ethical permission to recruit 20 patients who have been declared clinically dead from a traumatic brain injury, to test whether parts of their central nervous system can be brought back to life. Initially, the study will be carried out in India and thereafter bilaterally.

A combination of therapies, which include injecting the brain with stem cells and a cocktail of peptides, as well as deploying lasers and nerve stimulation techniques which have been shown to bring patients out of comas will be used.

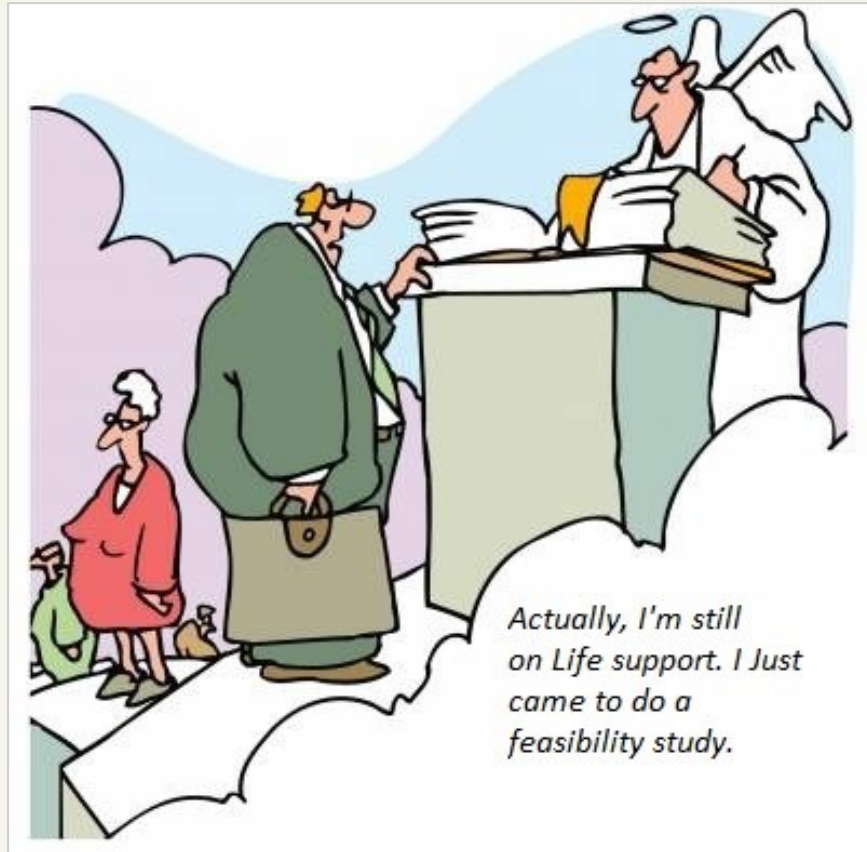
The trial participants will have been certified dead and only kept alive through life support. They will be monitored for several months using brain imaging equipment to look for signs of regeneration, particularly in the upper spinal cord – the lowest region of the brain stem which controls independent breathing and heartbeat.

The team believes that the brain stem cells may be able to erase their history and re-start life again, based on their surrounding tissue – a process seen in the animal kingdom in creatures like salamanders who can regrow entire limbs.

Through their study, they will gain unique insights into the state of human brain death, which will have important connections to future therapeutic development for several disorders of consciousness, such as coma, and vegetative and minimally conscious state, as well as a range of degenerative CNS conditions, including Alzheimer's and Parkinson's disease.



Dr. Bansal is hopeful that his research could give the answers to questions about erasing memory and restarting life. He asserts that although a human mind is complex, memory will be a recoverable commodity over the time.



Reference:

<https://www.biotechnika.org/2016/06/an-indian-scientist-has-been-granted-permission-to-bring-brain-dead-to-life/>

Article by

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UPCOMING EVENTS:

- ♦ **July 23, 2016-** International Conference on Research Methods in Engineering and Technology – ICRMET - 2016. at Chennai.
- ♦ **August 6, 2016**– TEDx at NIT, Trichy.
- ♦ **December 18, 2016**– Tech Fest at IIT Bombay.
- ♦ **February 5, 2017**– QUARK, Technical Fest of BITS, Goa.
- ♦ **February 22, 2017**– ICECCT, A Technical Conference at SVS College of Engineering, Coimbatore.

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