engmednews

NEWSLETTER OF BIO-MEDICAL ENGINEERING SOCIETY OF INDIA

August, 2009

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Members	Dr. V M Joshi, (L- 115) BARC, Mumbai. vmjuis@barc.gov.in

Editor- in- Chief Medical and Life Science Engineering Journal of Biomedical Engineering Society of India	Dr. Ramesh R Galigekere, (L - 818) MIT, Manipal. ramesh.galigekere@manipal.edu The new Executive Council will be operational from 1 January, 2009.

Call for Papers for Journal of Biomedical Engineering Society of India

All Researchers interested in submitting papers for publication in the journals of Biomedical Engineering Society of India are requested submit papers to Secretary, BMESI or any of the Editorial Board members.

Objectives

- To encourage, promote and advance interdisciplinary co-operation amongst scientists, engineers, and medical doctors for the growth of teaching, research and practices of Biomedical Engineering.
- To disseminate knowledge in Biomedical Engineering.
- To stimulate and aid research and development in all aspects of Biomedical Engineering.
- To help the improvement of standards, terminology, equipment, methods and safety practices.

Subject Coverage

Suitable topics for submission include to the following areas.

- Hospital Information System
- Disease modeling and analysis
- Computer based patient and Disease management System
- Clinical studies and outcome analysis
- Electronic patient monitoring systems
- Nanotechnology in medicine and medical applications
- Electronic hospital and patient medical record system
- Healthcare standards and service standardization
- Controlled medical terminology and medical vocabularies
- System integration
- Human genome studies and analysis
- Telemedicine
- Healthcare economics
- Nursing informatics
- Data protection and privacy
- Clinical studies
- Evidence based clinical modeling and studies
- Healthcare and hospital management
- Outcome based studies analysis
- Medical technology and intelligent instrumentation
- Medical database
- Medical Imaging and image analysis

- Bio-ontology and data mining
- DNA assembly, clustering and mapping
- Biomechanics
- Gene expression and micro arrays
- Molecular modeling and simulation
- Protein structure modeling and prediction
- Biomedical signal processing
- Computation techniques in Biomedical engineering
- Clinical Data management
- Organ Modeling and simulation
- Health informatics and medical education
- Neural network and fuzzy logic based applications
- Public health information network, education and training
- Multimedia, virtual reality, visualization, advanced imaging and robotics in medicine
- Information technology issues: standards security and ethical and legal issues
- Digital libraries, data mining and distributed computing
- Internet data security
- Natural language understanding in medical systems
- Biological models and system
- Biomedical Knowledge processing
- Cell analysis and tissue engineering
- Cardiovascular biomechanics
- Digital human
- Biomaterials

Submission of papers

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ICBMSP'09 REPORT

The centre for Biomedical Informatics & signal Processing of Biomedical Engineering Dept of SSN College of Engineering, Chennai in association with Sai's Bio Science Research Institute (SBRI) and University of Medicine and Dentistry of New Jersey (UMDMJ) have Organized the 2nd International Conference on Bio Medical informatics & Signal processing (ICBMSP '09) on 13th & 14th March,2009 at our campus.

This conference was an important event that provided a unique opportunity for disseminating the latest advances, applications, future trends and market for successful commercialization in the field of Biomedical Informatics.

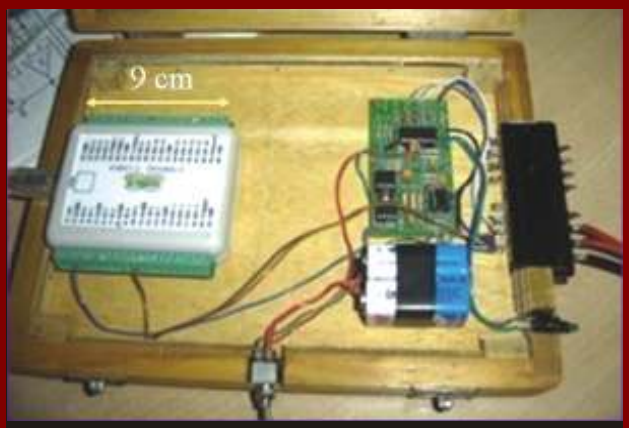
It brought together the industries, practitioners, researchers and academicians in the field of Biological, Medical, Health care, Pharmaceutical, Biotechnotogy, BioInformatics, Computer Science, Information Technology and Communication for creating synergy and supporting interdisciplinary research, development and commercialization.

Around 12 parallel sessions on bioinformatics, biomedical modeling bio signal processing, health information systems were held. A special session on women in bioengineering enlightened the importance of the role of women and their accomplishment as potential entrepreneur in health informatics. Around 160 papers have been received and out of which 80% papers got accepted for presentation. Several invitees from health care sector and defense aviation medical division delivered keynote address.

Pre conference tutorials on Medical Image and Signal Processing, understanding safety standards and Labview based Biomedical Applications was held on 12 March 2009. The following were the resource persons:

1. **Image Processing by**
   Dr. Dinesh P. Mital
   Program Chair, ICBMSP 09
   Professor, Department of Health Informatics,
   University of Medicine and Dentistry of New Jersey - School of Health
   Related Professions, New Jersey, USA.
2. **Bio signal processing**
   Dr. U. C. Niranjan,
   Adjunct Professor,
   MIT Manipal &
   Dr. Ramesh Galigekere,
   Professor and Head,
   MIT , Manipal
3. **Application of Lab View**
   Sanjeev Kubakaddi,
   Managing Director,
   Itie Knowledge solutions, Bangalore.
4. **Understanding Safety standards**
   Vinod Narayanan,
   Phoenix Medical Systems, Chennai.

USB Port based Biomedical System design



USB PORT BASED ECG SYSTEM

Digital data acquisition systems play an important role in the design of bio-medical gadgets used in medical diagnosis. A data acquisition system consists of an Analogue to Digital Converter (ADC) and the associated software for saving this data into a file for further analysis. Three such gadgets which are versatile and cost effective are presented here.

A USB port based data acquisition system iUSBDAQ marketed by the HYTEKAUTOMATION INC, Canada is used in all our applications. It is a compact and powerful device, consisting of a 12-bit analogue to digital converter (with a 1 mV step size) connected to a USB controller which can be interfaced to a PC. The following systems were designed and fabricated employing the above device. Digital data of the biomedical signals of interest is acquired and saved into a spread sheet using iDAQTest & Log software for further analysis.

1. A USB Port based ECG System:

We have designed and fabricated an instrumentation amplifier (gain about 500) followed by a low pass filter to limit the bandwidth to about 150 Hz and a notch filter to minimize the 50 Hz pick up. ECG signals of several healthy persons were acquired and saved into a file in spread sheet, using the above device. A MATLAB program was developed and ECG features were extracted for medical diagnosis. We have also recorded the electrocardiograms of some typical heart patients and analyzed. Our results are comparable to those obtained by commercially available electrocardiographs used by the cardiologists. This system is energized by two 9 V batteries (which lasted for more than a month) and is absolutely safe to use.

2. A USB Port based Bed side Monitor:

A two channel amplifier was fabricated and connected to two inputs of the multiplexed 8-input ADC of the iUSBDAQ to monitor the heart rate and respiration rate of a person simultaneously. A MATLAB program developed, computes and displays both the rates on a continuous basis. Since the ADC has 8 inputs, one can monitor these rates for 4 patients in the ICU using a single lap top and is absolutely safe to use as it is energized by two 9 V batteries.

3. A USB Port based 12-lead ECG System:

We have further designed and fabricated a multichannel instrumentation amplifier to implement the standard 12- lead ECG. This is used with iUSBDAQ gadget to record electro- cardiograms and to extract ECG features for medical diagnosis. This system also uses two 9 V batteries and is absolutely safe to use in the hospital environment.

For further details visit 'http:\\puvvadar.webs.com', go to photo gallery and see album No.8.

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Vignan University,
Vadlamudi - 522 213,
Guntur, AP, India.

Base of the Pyramid (BoP) Program @ Manipal University

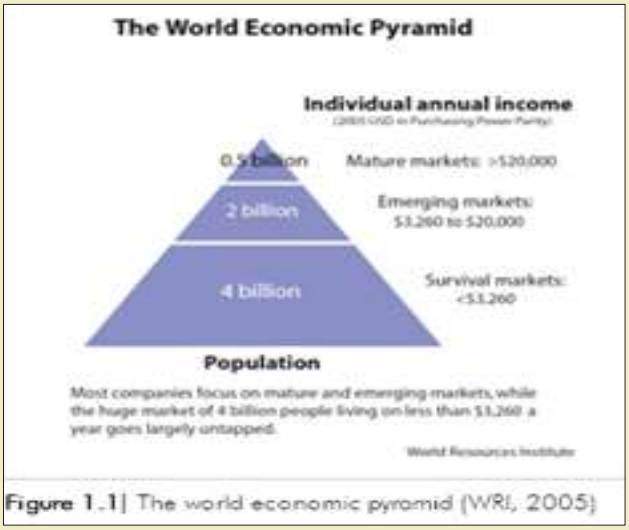


Figure 1.1| The world economic pyramid (WRI, 2005)

Over the past four years, Manipal University (MU) and Philips having been working together to acquire a greater understanding of the challenges and opportunities in addressing the needs of the "Emerging Consumer" or the "Base of the Pyramid". The ambition is to create an ecosystem built around "Open Innovation" that will ultimately meet the aspirations of the emerging consumers. The program mainly aims at promoting Idea generation, Concept development, Research, Community development, rural linkages and Student exchange programs.

This program is coordinated by the BoP Chair setup at Manipal University along with representatives from the partner industries.

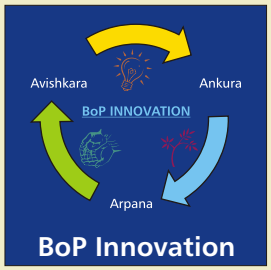
Philips has deputed a program manager to coordinate this activity along with BoP Chair at Manipal. Manipal BoP Chair has a team consisting of coordinators from each institution of the Manipal University. The respective institutional coordinators carry out the activities as per the BoP guidelines in their institutions in coordination with the BoP Chair at Manipal University.

The main activities in the BoP program are:

1. Idea Generation
2. Concept Development
3. Market Analysis and BoP Knowledge Development

1. Idea Generation (Avishkara)

Over a period of time, the BoP team at Manipal University has developed a platform which helps people for Idea submission electronically so that people can submit their ideas at ease & a BoP Server automatically provides them an authentication by generating an number so that, these ideas can always be referred by this number in future. The evaluation and short listing of the ideas is done by group of experts in their chosen field of domain, technology, business potential & relevance. This program has a cross disciplinary team consisting of students and staff from various disciplines such as health science, engineering and management. So far more than 220 ideas in the areas of healthcare, lifestyle, education, energy, nutrition, community development etc. have been generated under this program; the good ideas will be supported for the development for “proof of the concept” by the BoP.



2. Concept Development / proof of concept (Ankura)

Development of "proof of concept" projects involves knowledge integration through "multi-disciplinary customer centric innovation" by resources supported by industry. The tasks center around concept enrichment based on user needs analysis, design, technology development and patent. More than 20 concepts have been developed through multidisciplinary teams comprising medical, technology and management students during the year 2008.

3. Market Analysis and BoP Knowledge Development (Arpana)

This activity helps to develop an understanding of the needs of the BoP community and providing solutions at the grassroots level. It involves carrying out user research study for designing solutions for the BoP, and market survey & analysis to understand the felt needs at the grass root level.

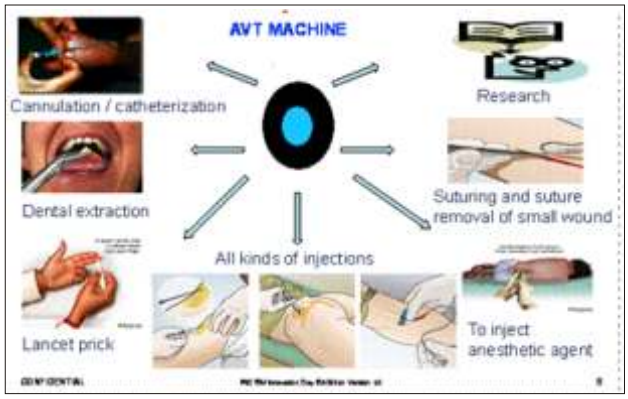
Some of the market survey & analysis conducted….

- Market survey on wood stove
- Low Cost Water Purification System a Market Research Study
- Design of a Malaria Diagnostic Device for India.
- A Study to Find out “The feasibility of Setting up a Marketing and Research Wing at, MAHE”
- A Research Proposal on Changing Lifestyle in Rural Karnataka
- Market Survey on Manipal University Intellectual Capital
- Technical Feasibility Study and Design of Low Cost Handheld Device for use by Field ANMs of RMCWH of JMC Manipal
- Market survey on oral Cancer
- Survey on Life Style, Prevalence of Diseases and Utilization of Health Care Facilities in Selected Villages of Udupi District

BoP Concepts Development Projects.

■ Audio- Visio- Tactile Machine for Pain Reduction

- Team Members:- Dr. Rathna Prakash (MCON) , Saju T P(MCON), Saleem(MCON), Archek Praveen Kumar(MIT), Piyush Agrawal(MIT)
- Description:- The key idea behind the AVT machine is the simultaneous application of three different signals (for audio, visual and tactile sensation) to distract and reduce the acute painful nerve impulses produced during minor invasive medical procedures. This machine contains a central vibrating hand holding area is connected with an oval shaped audio-visual source on either side.

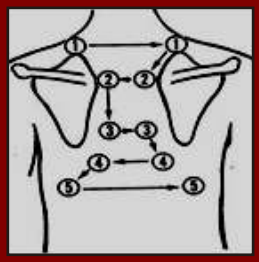


When a patient is planned to undergo any minor invasive procedures like injections, dental extraction, lancet prick, lumbar puncture etc, this machine can be easily used to reduce pain by alone or in adjuvant with other measures. This machine will be operated by nurse or physician just prior to the procedure by a leg controlled switch to distract the patient's sensation towards painful stimuli. The mechanism of action can be explained by using gate control theory and other cognitive-behavioral theories of distraction.

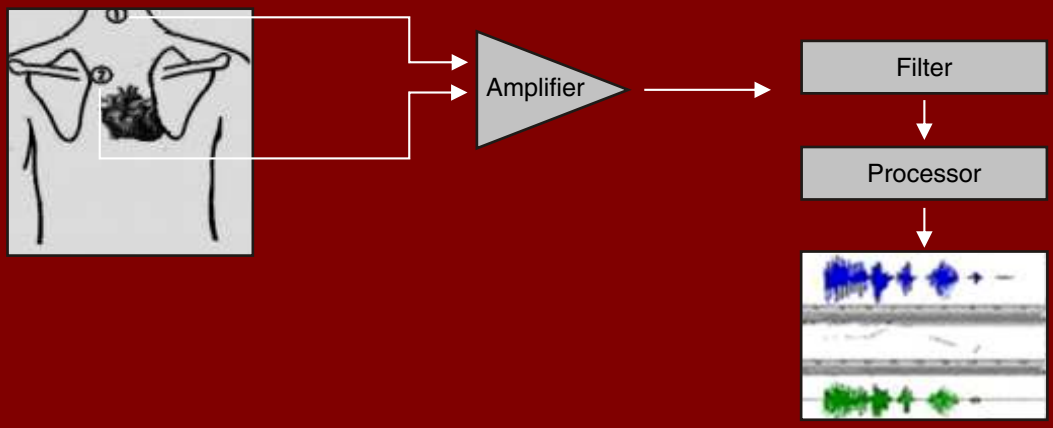
■ Development of speech enabled chest vibrometer

- Team Members: Dr. Kalayan Chakravarthy (MCOAHS), Richa Mishra(MIT), Tinky Mathew (MIT)
- Description:- The key idea is to develop a bedside assessment tool which can emulate the method "Tactile Fremitus." Acoustic transducer will detect the vibration transmitted along the chest wall when vocal sound is made Output is amplified and filtered. The output is then fed to processor Vibration intensity and vibration conduction velocity is displayed.

Tactile Fremitus



Sequence of Tactile Fremitus



Emulating Tactile Fremitus

■ Medichair- Development a Chair for Quick Non Intrusive Screening

- Team Members:- Dr. Sridhar Aithal, Devdas Bhat (MIT), Alok Verma (MIT), Pranab Purkayastha (MIT), Praful P Pai (MIT), Md Asif Iqbal (MIT), Anjaneyulu I (MCIS), Arun Christopher(MCIS)
- Description:- A simple chair embedded with non intrusive sensors to measure important medical parameters of the person seated in the chair comfortably, to analyze and alert the medical practitioner either locally or remotely and store the data for future reference. Could be used in : Medical practitioners in their busy office, Health conscious organizations, Old age homes, Individual homes, Airports, public places.

SMART SOLE-Effect of auditory feedback device to improve gait parameters in stroke patients

- Team Members:- Dr. Manikandhan (MCOAHS), Rupan Sarkar (MIT), Vasuki Prasad (MIT), Sambhaw Priya (MIT), Alekhya P (MIT), Sahil Singla (MIT), Pranab Purkayastha (MIT), Ravi Shekar (MIT), Razeena B (MCIS)
- Description:- A low cost, high performance "Smart Shoe", with indigenously developed capacitive type pressure sensors is revolutionizing the way stroke affected patients relearn the process of walking after reversible neuron damage. Embedded with 5 pressure sensors, this shoe offers what no product/innovation till date can: A highly detailed, qualitative and quantitative indication of the position of the foot, with the associated pressures applied on the pressure points under observation. Auditory and Visual feedback provide an easy and intuitive means of letting the patient re-learn walking, while expediting the process for the same.

Prototype of a feedback shoe has been developed with the support of Electronic and communication department of Manipal Institute of Technology (MIT), Manipal and it is being pilot tested for its applicability and effectiveness in patients with hemiparesis resulting from stroke



Wireless fetal Heartbeat monitoring system

- Team Members:- Dr. Kumar Shama (MIT), Dr. Manjunatha, Abinash Prusty (MIT), Nikhil Kumar Saraf (MIT), Goutam Motika (MIT), Sonu V Jose (MIT), Neelima M (MCIS)
- Description:- The device monitors the baby's heart for signs of potential danger. It is small and easy to use so that mother's-to-be can keep a regular check on their baby's heart beat without having to go into hospital and be attached to a machine.

Pain Reliving Device

- Team Members:-Dr. Arun Maiya, Prof. Harishchandra Hebbar (MCIS), Milind S. Chunkhare (MIT), Salman Shaikh (MIT)
- Description:- Musculoskeletal pain is one of the most common reasons for patient to contact health care professionals. Due to modernization and mechanization the musculoskeletal pain like neck, low back and shoulder pain are more common in professions like software industries, computer workers, manual labours and sedentary populations

The portable pain relieving device with 3 special features:

1. Combination of low frequency and medium frequency in a single unit.
2. Low-cost model for the use of community.
3. Safe and ease of use.

Above 3 features are not presently available in other devices which are used in electrotherapy.

The faculty interested in participating in this program can contact:
Manipal BoP Office,
IV Floor Innovation Centre, MIT, Manipal for further information.

However the information about BoP activities is also available in the following web Links:
http://www.grassrootinnovations.org
http://in.youtube.com/watch?v=8gEJ3LRPaKs (Bop Chair Manipal University)
http://in.youtube.com/watch?v=I8J3LtSnvWs (Voice of Students)
http://in.youtube.com/watch?v=Lotl8chpKgg (e-RMCWH- Rural Healthcare)

BoP Partenrs

PHILIPS sense and simplicity

Manipal UNIVERSAL LEARNING

KTwo TECHNOLOGY SOLUTIONS

Encore Software

PSG STEP

TEXAS INSTRUMENTS

NRDC

For further information please contact:,
M U BoP Office @ Manipal -0820-2925033 Email ID : bopchair@manipal.edu

Your valuable suggestions for the newsletter are most welcome. Activity reports, articles, product reviews related to the field of BME are invited from the members for inclusion in the newsletter. Members are requested to send e-mail IDs to the editor to enable us to send you the e-version of engmednews.

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