

engmednews



NEWSLETTER OF BIOMEDICAL ENGINEERING SOCIETY OF INDIA

Contents

An Eye for Eyesight	1
Brain? Now can provide secure levels of identity access!	2
UG project:	
A professional approach	3
TMMI	4
Forthcoming events	4

Editorial



Bheemsain Rao

Handheld devices especially mobile phones have great accessibility, utility and wide medical applications. These gadgets allow acquisition of vital data and monitor patients remotely by the practitioner.

This issue covers an innovative, low cost device that affixes to mobile phones named "NETRA" or Near-Eye Tool for Refractive Assessment.

In addition, young engineering minds at MSRIT have developed generic software using brain wave pattern to get secure access to computer.

Though prime focus of this issue is on the innovative technology and projects. I hope article on "UG projects: A professional approach" & Theme meeting on Medical Instrumentation report would be interesting to the readers especially for faculty from the students-projects standpoint!

Happy reading!!!

An Eye for Eyesight

Simple, low-cost device that affixes to a cell phone could provide quick eye tests throughout the developing

THE HUMBLE mobile phone is soon going to be your ophthalmologist. You will be able to self-test your eyesight just as you check your body temperature, blood pressure or blood glucose using digital devices. All you will need to do is run a simple application on your phone, look at the screen through a tiny attachment and press a few keys. And within seconds, you will have the status of your eyesight on your phone's screen. This is an innovative piece of technology developed by a group of researchers led by India-born Ramesh Raskar at the media lab of the Massachusetts Institute of Technology (MIT). It has yielded encouraging results and will soon be field-tested in India in collaboration with the Hyderabad-based L. V. Prasad Eye Institute.

The device has been named NETRA or Near-Eye Tool for Refractive Assessment. The device has the potential to make routine eye-testing simpler, cheaper and accessible to millions of people. It takes advantage of the huge improvements in the resolution of digital displays and their widespread proliferation on mobile phones, which have become ubiquitous in developing countries. NETRA currently works with phones having high-resolution displays. But researchers are expanding the range of phones that it can work on and are also developing pattern designs that can work with low-resolution phones. "You can think of it as a thermometer for visual performance. Just as a thermometer measures corporal temperature and does not prescribe medicine, NETRA measures the refractive error and does not necessarily prescribe glasses," says Raskar, who heads the Camera Culture group at the media lab. "It allows a user to self-assess the performance of his or her eyes over time. The goal is to empower people, not replace optometrists."

Apart from the software to run on the phone, all that's needed is a snap-on plastic device, which, researchers say, can be produced for about \$2 (about Rs 93).



An Eye for Eyesight Reproduced from yahoo news, technology Thu, Jun 24

But it would cost much lesser if produced in large quantities. The plastic device can be clipped on to the front of a cell phone's screen. The micro-lens array in front of the LCD essentially creates a 4D display. The user looks into a small lens and presses the phone's navigation keys until sets of parallel green and red lines overlap. This is repeated eight times, with the lines at different angles, for each eye. The whole process takes less than two minutes, at which point the software loaded on to the phone provides the prescription data. The prototype developed by Raskar's team has an array of tiny lenses and a grid of pinholes that, combined with the software on the phone, forces the user to focus at different depths.

This enables the eye's focusing ability to be measured. The test works by transforming any blurriness produced by aberrations in the eye into an array of separate lines or dots instead of a fuzzy blob, which makes it easier for the user to identify the discrepancy clearly. Rather than estimating which of the two views looks sharper, as in conventional eye tests, the user adjusts the display to make the separate lines or dots come together and overlap, which corresponds to bringing the view into sharp focus. Earlier, people have tried all kinds of things as possible replacements for the heavy and expensive conventional eye testing systems. "The key thing that differentiates ours is it doesn't require any moving parts," says Ankit Mohan, a member of the research team.

Article Two



Biometrics as known to all comprises methods for uniquely recognizing humans based on one or more intrinsic physical or behavioral traits, as defined in Wikipedia. It also gives list of well known biometric data from age old finger prints to newly developed iris recognition, but guess what? some of the researchers came up with the idea of utilizing the ultimate of nature's creation "brain", to be precise brain waves as biometric stimulus, researches have shown that certain percentage of brain waves can be uniquely identified with an individual for instance during a thought and because of its repeatability it could be used in 'user access management'. Well, great minds Rakshath, Vinay and Dharani who are 8th semester students at

Brain? Now Can Provide Secure Levels of Identity Access!

M S R I T, information science & engineering did consider this idea and have developed generic software that in reality utilizes the user's brain wave pattern to get him access to his personal computer.

During demonstration of their work to "Deccan Chronicle" news paper, Rakshath said "the software kit which we bought along with the emotive headset was designed exclusively for gaming applications. We had to design our own generic software which can now be used for access management by establishing one's identity through one's unique brain wave pattern." the software can also be used in developing a wheel chair that could be moved by using mere thoughts, etc. He also added that the headset must be trained to recognize what kind of thought pattern equates to a certain action. Once it is trained, it can measure four categories of inputs or stimulus such as conscious thoughts, facial expressions, emotions and head rotations. Rakshath demonstrated the model by putting

on the head set, closed his eyes and thought about his password, a unique brain wave pattern generated due to this thought was authenticated by his PC after 20-40 seconds. He added that, if the silence in the room was broken the brain signals would differ from the original used for training and hence it is mandatory to maintain silence in the room^[1]. It took them 12 months to research this emerging science of using brain signals to control computers and 2 months to develop the generic software said Dr. Lingaraju G. M., Professor-Dept. of Information Science and Engineering. As this technology is in its infancy, it is one of the potential fields for researchers to contribute.

[1] Excerpts from Deccan Chronicle (Pg. 12), 22 June 2010

For more details contact
Dr. Lingaraju G. M.
Dept. of Information Science and
Engineering-M S R I T
gmlraju@yahoo.com

Author

Supriya Babu

Lecturer

Dept. of medical electronics

MSRIT

supriya@msrit.edu

^[1] Course notes from DESIGN FOR BIOMEDICAL ENGINEERS at the University of Wisconsin Madison

The way Undergraduate (BE) projects are carried in most of the Indian Universities do not include a professional approach, which is a methodical step-wise process that includes logical reasoning, decision making, analytical thinking among other skills. In this article I elucidate a very well known professional approach in handling UG projects. This approach is used in all the American and European Universities and is a part of the Engineering Design Courses.

The entire process begins with the institute/department collecting problems from various sources like hospitals, industries, clinics, dental clinics, health science personnel that biomedical engineers might solve. These problems/ problem areas are put in front of the students and they are asked to choose problem(s) of their interest and strengths. The next step would be to form teams in which individual members are interested in particular problem(s). The team-building also should take into consideration the necessary skills required to complete a project in the area chosen. For example if a problem involves building circuits for data acquisition and analyzing it later using different softwares, the team should consist of

UG Projects: A Professional Approach

students good at building signal acquisition and analog to digital conversion circuits, students good at interfacing these circuits to the different signal processing softwares, students good at processing and analysing the data obtained using various software techniques and also one student who is good at coordinating and communicating (both verbal and written). The students begin to maintain a design notebook to catalogue all the details/information that they gain during their project. This also helps the students later, if their project is patentable and need to establish that the idea/ solution first occurred to them.

Once a problem is chosen and the team is built, the team then meets the client (the person from whom the problem was acquired) and acquire specific information to clearly define the problem. "The student team should develop questions prior to meeting the client. Search the literature to gain an understanding of the problem. Typical questions might include (1) 'What is the end goal to be solved?' (2) 'What are the medical constraints? Should we be concerned with patient confidentiality?' (3) 'What are the technical constraints? Can we use metals and plastics? Must it be splash-proof?' Acquire information to define the problem." ^[1]

Based on various constraints expressed by the client, the students then develop "Product Design Specification" (PDS) which is a comprehensive document containing all the facts relating to the product outcome, and should contain all the realistic constraints

to be imposed upon the design by the client. The problem, goal, function, constraints are written in engineering / technical terms.

Once the PDS is developed, the students start to brainstorm on various solutions to the problem in-view of all the constraints. Brainstorming session should include coming-up with as many alternative solutions as possible, rather than pursuing the first idea that comes to mind. This stage is formally called as Conceptual Design, which includes searching for information, brainstorming, evaluating and weighting requirements to achieve best solutions.

The next stage would be the development of the prototype based on the best solution chosen. At this point it is useful to build simple models. This aids in understanding spatial relationships of the design—how different parts fit together, etc. There should be continual evaluation of the solutions against the constraints throughout the entire process.

Prototype development is followed by testing the prototype *in vitro* and *in vivo* testing. But *in vivo* testing is a complicated & expensive process, hence generally only *in vitro* testing is carried out. The last stage of the project is presenting the results both orally and through a report.

This approach would help the students in leaning design skills, project management skills, the ability to manage the product development process, the ability to work effectively in teams, oral, written, and graphical communication skills.

Theme Meeting on Medical Instrumentation (DAE-BRNS) Mangalore

A two day theme meeting on medical instrumentation was organized on 28th and 29th may at Father Muller Medical College, Mangalore. This conference was sponsored by the Department of Atomic Energy (DAE), Board of Research in Nuclear Science (BRNS), BARC Mumbai. The electronic division of BARC, Mumbai had developed, impedance plethysmograph and a photo-rheograph for studying the central and peripheral blood circulation by noninvasive methods, they had undertaken the project to study these instruments for disease characterization at their facility for past two years. The theme meeting was organized to review the work they had done, to analyze the technical merits and demerits of those instruments. Some of the studies taken up are:

1. **Anu-Photorheography in Normal Neonates**
2. **Anu-Photorheography in Sick Neonates**
3. **Performance Evaluation of Non Invasive Imaging Modalities in Vascular Disorders**
4. **Using Impedance Plethysmography for Characterizing and Validation of Myocardial Infarction, Bronchial Asthma, Pulmonary Tuberculosis and Cirrhosis of the Liver**
5. **Evaluation of action of homoeopathic medicines using impedance plethysmography**

For more details on TMMI contact
Dr. Sanjeev Rai B
Convener of the event
raibs11@gmail.com

Forth Coming Events

Hands-on Workshop on Molecular Biotechnology and Bioinformatics-

Date-23 to 27 August 2010

Place- Pune, India

[Further details](#)

<http://www.eregnow.com/?workshops>

AICTE Sponsored Conference 'Emerging Trends in Wavelet Applications in Medical Image Processing'

Date- 19 to 20 August 2010

Place-CHENNAI,

Organized by: Rajalakshmi

Engineering College

[Further details](#)

<http://www.rajalakshmi.com/NatConfn/NCETWA.pdf>

International Conference on Biological Sciences and Engineering- ICBE-2010

Date-22 to 23 August 2010

Place-HYDERABAD

[Further details](#)

<http://www.cafetinnova.org>

Workshop on Biosimilar Patenting:

Date-23 July 2010

Place-Bangalore, Karnataka, India,

Organized by: ITAG Business

Solutions Ltd.

[Further details](#)

<http://www.iprconference.com/>

The Meeting Place for Medical Device Manufacturers

Date- November 3-4, 2010

Place-The Conference Center at Waltham Woods, Waltham, MA

[Further details](#)

<http://www.mposymposium.com/>

Visit us at:

<http://www.bmesi.org.in/engmed.html>

Send your articles to
Dr. Bheemsain Rao,
Editor, **ENGMEDNEWS,**
Dept. of Medical Electronics,
M S Ramaiah Institute of
Technology,
Bangalore- 560 054,
<bheemsainrao@gmail.com>

Members are requested to update their contact details with email Ids in the format given below to the editor

*(bheemsainrao@yahoo.com)
to enable us to send you the e-version of engmednews and
GO GREEN!!!*

Name: _____

Designation: _____

Institute/Organization: _____

BMESI Membership #: _____

Email ID: _____

Mobile #: _____

Contact Address: _____

Ideas expressed here are of the individuals and not of BMESI. Published by (BMESI) Biomedical Engineering society of India, Department of Biomedical Engineering, Manipal Institute of Technology, Manipal – 576 104.

Edited by: Dr. Bheemsain Rao, Professor & Head, Dept., of Medical Electronics, M S Ramaiah Institute of Technology, Vidya soudha, M S R I T Post, Bangalore- 560054. <bheemsainrao@yahoo.com>

Editorial Support team: Supriya Babu(faculty), Sanjay Naidu B A S, Prasanna Herle, Swathi Makam(students)MSRIT, Bangalore