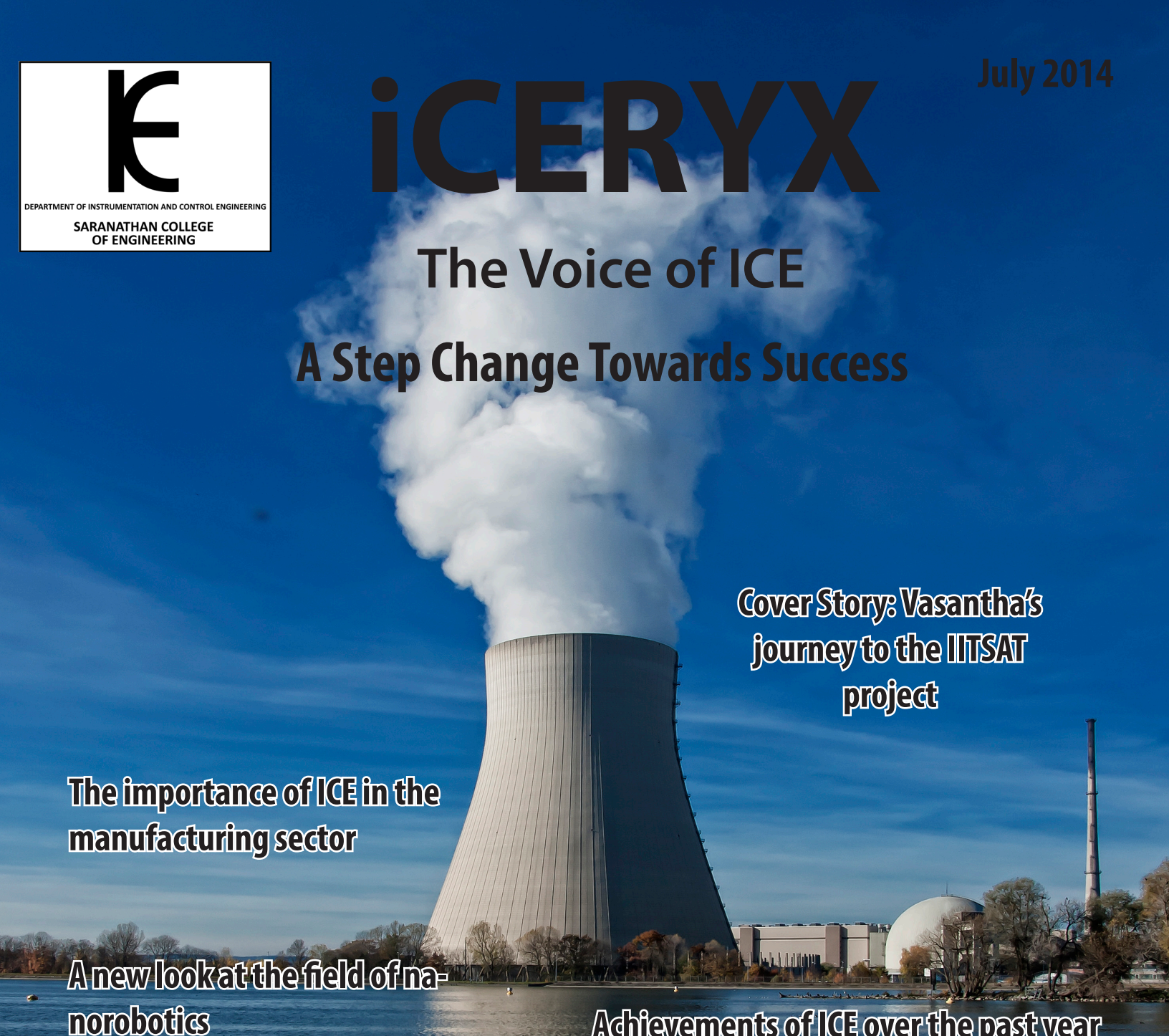
DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING
SARANATHAN COLLEGE OF ENGINEERING

iCERYX

July 2014

The Voice of ICE

A Step Change Towards Success



Cover Story: Vasantha's journey to the IITSAT project

The importance of ICE in the manufacturing sector

A new look at the field of nanorobotics

Achievements of ICE over the past year

LabVIEW and Scilab training

Instrumentation engineers: Most wanted in the Cement Plant

The link between Imaging and Instrumentation

Bionic eyes - Looking into the future

Foreword

The Department of Instrumentation and Control Engineering appreciates and encourages this effort put in by the students in creating the it's very own eMagazine – iCERYX. The department always seeks to engage its students in all growth oriented activities by facilitating arenas to develop and portray their various skills. We, as a department, believe that if the students are given the right input and motivation, the students will deliver their full potential. We wish to see more outcomes in the future and we hope that this eMagazine will be carried on for the future generations of students of ICE and we look forward to more such outcomes.

Dr.S.M.GiriRajkumar

HoD/ICE

From the Team

Our department, as we all know, is one of the most active and engaging departments in our prestigious college. We have been subjected to a lot of changes in recent times and this has resulted in its inevitable growth. Every good thing that happens to us is supposed to be shared with the world around us because we as social beings should share the drops of joy that we experience. Hence, we have initiated this platform – iCERYX, for broadcasting and showcasing the myriad colors of the students of ICE. This is truly a student-run, student magazine exclusively for ICE where we collect, collaborate and share the creations and achievements of the students of our department. We hope someday that when this humble first issue is being reviewed by our future juniors, they feel proud of all the way they have come up from this seed we plant now.

Let's keep being awesome ICEians!

PR Team

Ben-Hur S. Christopher, Final year

Anuroopa Devi S., Final year

Nazreen Banu A., Final year

Shuprajhaa T., Third year

Nishanth D., Third year

The IIT dream-come-true

P.N. Vasantha, Final year

Every student aspires to study at Indian Institute of Technology (IIT's). Through the Summer Fellowship programme, IIT opens their gates of knowledge, and research experiences every year to all the Non-IITians.

This is a two month stipend internship programme, which gives a hands on work - experience to learn, explore and implement the theory understood in the classrooms, under the guidance and support of the IIT Professors. To be a part of this programme, we need to submit an abstract of project of our choice, along with the university mark sheets and bonafide certificate from the institution.

The process of selection for the Summer Fellowship Programme 2014 is very competitive. After the initial screening and approval, mail confirming my selection was received, from the summer internship coordinator. The induction program was held on the 16th May 2014, where the objectives of the internship were mentioned. Of the selected candidates, 18 interns have reported for the internship and are working on the project assigned by their guides. I started my work as an intern on 6th June 2014, after the completion of 6th Semester Anna university examination.

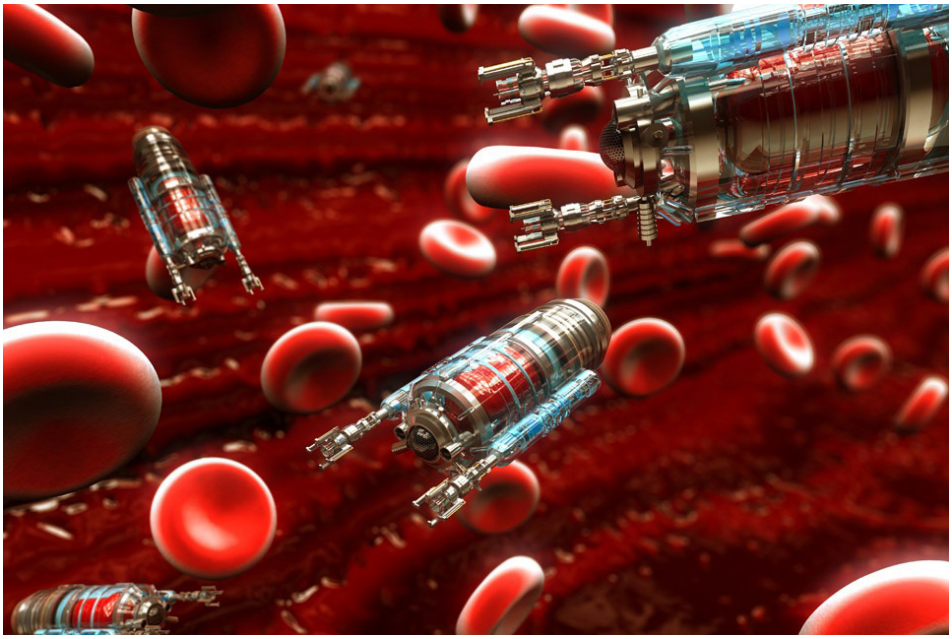
As a part of my summer internship at IIT Madras, I am working on a very significant, ongoing research project called - IIT Madras Student Satellite Project (IITMSAT). It is an IIT Madras' student initiative to build and launch the satellite with socially relevant scientific objective. The mission of this project is to provide an earthquake prediction model based on the ionospheric changes before seismic activities. The total project cost is estimated to be about 3 Crores INR. Recently, ISRO after reviewing the ongoing work, has announced IITMSAT as its official project. I am the only intern among the selected interns to work under IITMSAT.

My internship project is to establish - Inter Processor Communication using I2C Bus in IITMSAT. The proper functioning of the satellite involves the effective coordination of various sub-systems. I am interning under the Command and Data Management System(CDMS) called the Software team of IITMSAT. My project involves the use of Mbed microcontrollers to establish I2C Bus Communication using C language. In IITMSAT, we have review meetings every week for all the subsystems. In this session, we have to present the past weeks development in the project and the plan for the next week. My team has its meeting on every friday.

Being a part of the Summer Fellowship Programme, I also attend seminars conducted every Tuesdays and Fridays by the IIT Professors and the Phd Students, on their topics of specialization. The seminars are usually an hour long starting from 3pm. I have attended talks on Power systems by Prof. Shanthi Swarup, MEMS by Prof. Enakshi Bhattacharya, Analog Circuits by Prof.Nagendra Krishnapura and many more.

As a part of the Summer Fellowship Programme 2014 agenda, a presentation session was organised on 8th July 2014. Each intern was given 5 minutes to present their internship work. It was an amazing platform for all the interns to present their project to the professors of Electrical Engineering (EE) Department. It was an awesome experience.

My internship at IITM is for six days a week from 9 am to 6 pm. As you are all aware, IITM is such a huge campus, more often I find it to be a maze. There are innumerous fauna, flora inside the campus and uncountable Banayan trees, whose aerial prop roots have grown into thick woody trunks making everyone believe that they are here since ages and they truly are. Being beside the Guindy National Park, IITM campus also habitats a lot of deers, monkeys and snakes tooo (hisss..). IIT M campus filled with trees and many species makes us feel fresh compared to the traffic and pollution outside the campus. During the lunch breaks, I set off to explore the nature and diversity in the campus. My days in IITM continues to be exiting, challenging and highly enriching. My sincere thanks to the college and the HOD of ICE Department, Dr.S.M.Girirajkumar to help me avail such an unique opportunity.



Nanobots

R.Jamuna 3rd year

A Milestone in Instrumentation

An emerging branch of technological research, designing and constructing nanobots will have incalculable implications in science and industry. Also known as nanorobots, nanites, or nanomachines, these devices are in the development phase and only primitive nanomachines have been tested.

The term nano describes a length of measurement equal to one-billionth of one meter which is approximately the width of 10 atoms. The resulting miniature robotic machines may be as small as a few molecules in length or width.

A nanorobot is a device, synthetic or biological, that is able to function on a near atomic level and perform a preprogrammed task.

A less restrictive description would be a device that facilitates interaction on a nanoscale level. Rather than only describing an infinitesimally small machine, this characterization would include a scanning tunneling microscope and other similar microscopes that can be used to manipulate nanoscale structures.

The two principle manufacturing conventions are top down or bottom up.

The former process involves the extreme miniaturization of existing robotic devices while the latter describes a process of building starting at the atomic level and constructing any object one atom at a time.

Specialized nanorobots known as assembler nanobots will be required to create more sophisticated units. Theoretically, the assemblers would use the bottom up approach and stack atoms upon each other in layers to form the desired nanomachine. However these assembler units have yet to be developed. Current technology has employed atomic force microscopes and scanning tunneling microscopes to arrange atoms. These microscopes are also to move atoms and molecules apart from resolving the small structures.

It is required to be maintained at low temperatures and approaching 4degrees in Kelvin to inhibit electron excitation caused by temperature drifts. These constraints illuminate the limit of the efficacy of this technology to construct nanobots.

Regardless of the design method, a nanorobot will ideally perform its task and then dissolve so the body can absorb and excrete it.

For several reasons silicon is a good choice for the construction of nanobots. It is durable, flexible, and conducts electricity; however it will not dissolve in body fluids. Since these devices are so small, swarms of them will be necessary to perform more tasks.

For medical applications, biodegradability will be a significant problem due to so many foreign particles inside the body.

To perform certain tasks, especially in medical applications, controlled mobility is an another issue.

An inherent drawback to producing these devices is their size.

Building atom by atom and molecule by molecule is tedious and doesn't lend itself to mass production. At the other end of the manufacturing spectrum, miniaturization of synthetic devices will require advances in metallurgy since the building materials will need to be reduced to a nanoscale.

By consensus, nanobots will find their first applications in medical science.

The nanomedibots will be able to repair damaged or diseased tissues at the molecular level. The circulatory system is a natural highway for these devices and the nanomedibots will cruise through the blood stream to the area of distress.

They may be used to attach themselves to specific cells, such as cancer cells, and report the position and structure of these tissues.

Light in the 700-1000 nanometer range will pass through tissue with minimal absorption. And hence, it can easily detect the cancer tissues.

When this near infrared light strikes this particular type of nanomedibot, the device gets hot due to the oscillation of the metal's electrons in response to the light.

Using an MRI to precisely place the nanomedibots in the cancerous region, the light causes the devices

to heat to 131 degrees Fahrenheit which destroys the cancerous cells but doesn't damage surrounding tissues.

In addition to removing plaque from arterial walls, they could also be used to find areas of arterial weakness. They are employed in detecting certain toxic chemicals and provide early warning of the failure problem of the organ.Also it is used to monitor the general health of an individual.

These devices may find application in a variety of industrial applications.

Research is ongoing into using them in the oil industry.

In addition, current research is investigating their application in nanophotonics to produce light more efficiently. Computer circuits may be produced by these tiny devices. They could create circuits on a smaller scale than current etching techniques and would allow for the manufacture of extremely small processors and chips.

The use of nanobiotechnology should be established as a human heritage for the coming generations, and developed as an open technology based on ethical practices for peaceful purposes. Open technology is the fundamental key for such an aim.

Brain Teasers

1. The below is a number puzzle. it should be read left to right, top to bottom.

1

1 1

2 1

1 2 1 1

1 1 1 2 2 1

? ? ? ? ? ?

? ? ? ? ? ? ? ?

Q1 What is the next 2 rows of numbers??

Q2 How was this reached??

INSTRUMENTATION FOR THE MANUFACTURING WORLD

Ranjani, 3rd year

Today we cannot imagine a world without instruments. They have become a part and parcel of the life. Instrumentation and control is a common field across all manufacturing industries that are likely to demand the highest amount of investment and improvement in the upcoming decades. In scientific terms, instrumentation is defined as the art and science of measurement and control of process variables within a production, or manufacturing area. The science has further opened up the realm of instrumentation engineering. Nature of work of an instrumentation engineer ranges from designing, developing, installing, managing equipments that are used to monitor and control machinery. "It is a multi-disciplinary stream and covers subjects from various branches such as chemical, mechanical, electrical, electronics and computers," says Prof. A. Bhujanga Rao, from the department of Instrumentation Engineering, Andhra University. The growth in the avionics, aeronautical and space science sectors has also increased the scope for instrumentation engineers. Instrumentation engineers can also fit in both software and hardware sectors. More than production, safety of processes & plants is being awarded the utmost importance & is also closely monitored by the government. The only way to achieve safety is through integration of safety device & controls – in which instrumentation plays a major role.

Apart from covering core subjects such as system dynamics, industrial instrumentation and process control, analytical and bio-medical instrumentation and robotics, the students deal with software and hardware topics such as microprocessor and micro controller based instrumentation, VLSI and embedded system designs, computer architecture and organization and computer control of processes. Computer languages such as 'C' and FORTRAN are also part of the curriculum. This makes an instrumentation engineer fit for both the hardware and the software industry. Moreover, since instrumentation engineers are presumed to be good in phys-

ics, the logical ability is expected to be on the higher side, which is a basic quality needed to excel in the software industry.

The shift towards core sector is not only due to the opportunity to showcase ones creative talent and knowledge, but also because of the long term stability and quick growth. Bio-medical is another area that is fast catching up and there is huge requirement for instrumentation professionals. The demand is so high that every student finds at least two jobs waiting in the wings, by the time he or she completes her course, says Dr. Bhujanga Rao,Distinguished Scientist, and DRDO.

India's manufacturing industry, which is spurring the country's GDP growth, is undergoing a major transformation. This sector is scaling up and beginning to seek global competitiveness through a wider application of instruments. This trend is contributing to the robust growth of instrumentation and control market.

Sparkle with the knowledge of:

Though this varies from company to company & profile to profile, the broad job responsibilities for instrumentation engineers is as given below.

1. Design and develop control systems

2. Maintain the existing control systems

3. Manage the control systems

4. Collaborate with design engineers, purchasers and other staff members involved in the production processes

5. Manage projects within the given restraints including cost and time

6.Troubleshoot

7. Ensure that the instruments comply with health and safety regulations

8. Ensure that quality standards are maintained

9. Provide consultancy support

PG specialization in:

- Robotics
- Mechatronics
- Industrial Engineering
- Control Systems
- Metrology & Measurement Systems
- Instrumentation
- Bio-Medical

Role as instrumentation engineer:

An instrumentation engineer can find a wide range of career opportunities in all sectors of industries such as

- Instrumentation Engineer / Process Engineer in heavy industries such as thermal power stations, steel plants, refineries, cement and fertilizer plants etc.
- Design and product development Engineer in companies that manufactures specialized instruments such as actuators, measuring gauges, etc [Electronic Design & Manufacturing]
- Industrial automation / Robotic Engineer in any manufacturing or food processing industry which run in an automated setup.
- Maintenance & Repair Engineer for Bio-Medical instruments
- Software Engineer [specializes on creating customized software for the specific instruments].

Home for instrumentation and control engineers:

- National Instruments
- ABB
- Larsen & Toubro(L&T)
- Bosch
- Texas instruments
- BHEL
- saint-gobain
- Invensys
- GE
- Suzlon
- Honeywell
- Pricol, etc.

Thus,Instrumentation engineering is a course which is different from all other courses of engineering and provides us a challenging environment where we can exhibit our innovative ideas.

PUBLICATIONS AT A GLANCE

S.No	Faculty Name	No. of Publications in Journal / Conference
1.	Dr.S.M.Girirajkumar	9
2.	Mr.Saju	4
3.	Ms.Suganthini	1
4.	Ms.Vijayalakshmi	1
5.	Ms.RathnaPrabha	1
6.	Ms. Kala	1
7.	Ms.NithyaRani	4
8.	Mr.P.Aravind	4
9.	Ms.Abirami	1

Spoken Tutorial

PR Team

A spoken tutorial was conducted for the final year students of our department on the 26th and 27th of June, 2014. It was conducted in 2 batches, one on each of those days with a batch of 29 students on the first day and 32 students on the second day. Each tutorial batch lasted for 90 minutes.

The spoken tutorial session was conducted in connection with the department's decision to host the Ministry of Human Resource Development's initiative, in association with IIT, Bombay, to technically equip and certify students on the usage of Open Source scientific tools under the FOSSEE project. The tutorials are created by the students of IIT, Bombay They were downloaded from http://www.spoken-tutorials.org. The faculty incharge for this program are Ms. Nithyarani, Mr. Gopalakrishnan and Mr. Aravind.

The tutorial module that was chosen for this session was on Scilab, an open source scientific and mathematical computational tool developed by Scilab Enterprises, France.

32 PCs were equipped with the Scilab package, spoken tutorials, and the necessary audio-video rendering tools and hardware. A transcript of the spoken tutorials was also handed out to each student for ease of understanding. The students can practice with a set of 15 optional assignments developed by IIT, Bombay to supplement their learning.

The next step towards the certification is an online examination hosted by IIT, Bombay, that the students must appear for on a date specified by the students. Being successful at that examination, the students will be issued a certificate from the Ministry of Human Resource Development, Government of India.

The general opinion of the students who part took in this tutorial session was that the tutorials were easy to understand, simple and appropriately paced.

LabVIEW Training

PR Team

Four days (15-04-2014 to 18-04-2014) training session was conducted by National Instruments to the students of second year, Instrumentation and Control Engineering department, Saranathan College of Engineering on Multisim. Trainer Mr. Sriram trained the students.

The training was an enlightened approach to the entirely new useful software. These students had already undergone a six days training on Multisim and Ultiboard. This 4 days training was in continuation with the previously learnt concepts.

First day started with the revision of the basic concepts of Multisim which the students were already aware of. In the morning session the students were given simple electrical circuits and were asked to solve those in Multisim. It was a kind of brush up for the students so that they would be able to be in line for the next four days of training. In the afternoon session, the students were taught to design circuits for real time problems. They were taught how to implement the concepts which they had already known into electrical circuits. Nearly four to five example problems, which were all application oriented were solved by using circuits in Multisim and then the results were monitored.

The afternoon session also comprised of an introduction to an entirely new hardware device known as "myDAQ". It is a hardware which comprises 8 instruments. This is specifically meant for the usage of students.

The second day of the training started with myDAQ. The students were split into 9 groups, each group comprising of 4 students. One hardware device was given to each group. They were given a practical oriented training to the usage of myDAQ. The students were able to understand the multiefficient usage of this device. The latter session was concentrated in solving the same real time examples with myDAQ which they had already solved the previous day with Multisim. They were asked to solve the circuits both in Multisim and with myDAQ. The students were able to compare the results of both simulated and real time approach. They were given training on the usage of two to three instruments of myDAQ on the second day.

The students were given an individual test for 40 marks which included 1 real time problem, 2 Multisim problems and one to be solved both in real time and simulation on the final day. 50% was kept as the pass percentage and almost all the students were able to clear it off with good score.

The concluding session was spent in giving an introduction about the NIYANTRA 2014 conducted by the National Instruments. The students were encouraged to prepare abstracts for their budding new concepts.

The students were also split into 11 groups, each group with 3 students. The groups were assigned assignment problems and they were also told the way to solve them.

This four day training session was really useful to the students as it was not only a theoretical one but also a practical oriented one.

UPCOMING EVENTS

SI.NO.	START DATE	FEST NAME	FEST TYPE	COLLEGE NAME	CITY	STATE
1.	17th-18th July.	Workshop on Advanced Embedded controllers and hands training on ARM 7 processor .	Workshop, technical events.	Jeppiaar engineering college.	Chennai.	Tamil Nadu.
2.	24th-26th July.	Last date for registration-17th July.	ANORAY.	Cultural fest.	Hindustan Institute of Technology and Science.	Tamil Nadu.
3.	10th-13th September.	AARUUSH 14.	Technical event,workshop.	S.R.M University.	Chennai.	Tamil Nadu.
4.	19th-22nd September.	DHANAK.	Cultural fest.	Indian Institute Of Space Technology.	Valimala.	Kerala.
5.	21st-22nd August.	Inter Disciplinary Research in Eng. And Tech. 2014.	International Conference.	Pondicherry Engineering college.	Pondicherry.	Pondicherry.
6.	25th July.	Last date for registration-23rd July.	Real Time Implementation of Respberry Pi.	Karpagam college of engineering.	Coimbatore.	Tamil Nadu.
7.	18th-20th December.	MEMS and SENSORS.	International Conference.	IIT-Madras.	Chennai.	Tamil Nadu.
8.	27th July.	ISEE 2014.	International symposium,Workshop, Conference.	Amrita college of Engineering.	Kollam.	Kerala.
9.	4th-7th September.	Techniche 2014.	Techno Management Festival.	IIT-Guwahati.	Guwahati.	Assam.
10.	5th-7th September.	Makers Fete.	Technical fest.	VIT University.	Vellore.	Tamil Nadu.
11.	11th September.	UMO:BOYCOTT Bad designs.	Online event.	IIT-Hyderabad.	Hyderabad.	Andhra Pradesh.
12.	11th September.	AKSHITI 2K14.	Technical event.	Adamas Institute of Technology.	Kolkata.	West Bengal.

INDUSTRY CONNECT

This report briefly outlines some of the important accomplishments that ICE Department faculty and students have achieved over the current academic year. For the first time, Instrumentation and control engineering department had applied for National Board of Accreditation in the year 2013. The feedback given stressed the following points.

- Success rate of the student's performance in the programme is good
- Constant improvement in academic performance index of the students
- Structure of the curriculum is fine
- Teachers students ratio is perfect

In the field of Instrumentation and Control Engineering department at University level, the department is proud that 3 of our students have received University ranks.

We are glad to inform that ICE department has made 17 publications in International journals. In addition 2 papers have been accepted for publication in IEEE explorer, International conferences and the remaining are expected to make their contributions in the months to come.

To promote the technical activities by other means, the department has signed two MOU's with reputed core multinational companies

The MoU with National Instruments was signed on 22nd August 2013 by the Principal, and S.Dhanapal Academic Manager of NI. The MoU aims to strengthen the core competency skills of the students and staff, in the area of Virtual Instrumentation, through Labview. It also focuses in producing Certified Labview Academy Developers (CLAD), who would have International validity, and recognition.

Another MoU was signed with M/s. YOKOGAWA, on 24th October 2013 by Principal and Mr. S.Senthil, Assistant Manager Customer Service Division, YIL. This MoU basic aims for providing exclusive training with hands on experience in core control engineering applications using real time Distributed Control System, and Programmable Logic Controller.

The outcome of the MoUs are the effective organization of the training sessions, and workshops for the students and staff of the department, by the resource persons from National Instruments and YOKOGAWA

The department till date has organized 7 guest lecture, from eminent resource persons. The topics even included sessions on "Happiness", Computers for Instrumentation Applications, Motivational talks, Industrial significances, etc.

- Department has conducted in-house value added training program to students during winter vacation.A scheduled and phased training for 40 interested students of IIIrd year ICE is in progress. This training would be for 10 days in a semester, upto their 8th semester.
- The students are currently trained in a module of Labview called as Core 1 and Core 2, and are certified. The certified training benefited 6 staff members also. Now, they are working on mini projects, and are trained for CLAD certification.
- It is expected, that these students would have projects from small and medium scale enterprises for their final year projects, and hence it could improve consultancy, and placements in the future.
- As for the second years are concerned, 36 ICE, and 6 EEE students began training for, awareness and utility in MULTISIM, ULTIBOARD. The initial training was for 2 days in the month of Dec'2013 .For the next phase of training, the number of participants increased from 42 to 54. Now the overall registered students has gone upto 81. This includes students from EEE, and ECE. It is henceforth planned to conduct the future trainings as two parallel sessions.

ACCREDITATION

For the first time, Instrumentation and control engineering department had applied for National Board of Accreditation in the year 2013. An expert committee conducted an on-site evaluation of the ICE Department during 8th-10th February 2013. The executive committee of the NBA considered the recommendations of sub-committee at its meeting held on 18th Sep 2013 and gave a report about accreditation status. In that they appreciated about the following

- Success rate of the student's performance in the programme is good
- Improvement in academic performance index of the students is good
- Structure of the curriculum is good
- Teachers students ratio is good
- Core engineering subjects and their relevance to PEOs is good
- We met the programme educational objectives with 100 out of 150

* 606 marks was awarded by expert team, and later was reduced to 556 due to programme outcomes and assessment performance in PEO & PO, which could not be met with the marks scored under, faculty head. (we had only 35%).Due to this we are not accredited.

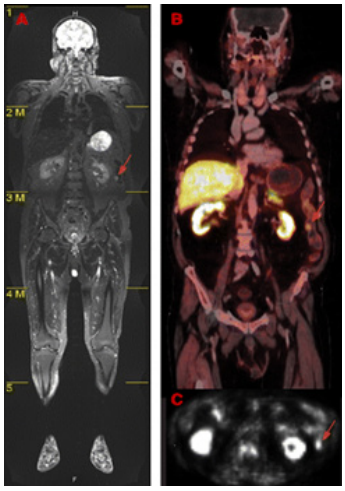
For the current year 2014, some of the criterion are calculated as per the NBA and compared with the previous year statistics. This shows that we are in the process of improvement.

Core engineering subjects

MOLECULAR IMAGING INSTRUMENTATION

PROF. S. ABIRAMI AP/ICE

Molecular imaging is an emerging field that is transforming clinical in vivo diagnostics from the anatomic to the functional domain. This article concentrates on the latest advances in molecular imaging technology, including PET (Positron Emission Tomography), MRI, and optical imaging. In PET, significant improvements in tumor detection and image resolution have been achieved by introducing new scintillation materials, iterative image reconstruction, and correction methods. In the field of MRI, the most important developments in recent years have mainly been MRI systems with higher field strengths and improved radiofrequency coil technology. A special focus of this review article is multimodality imaging and, in particular, the emerging field of combined PET/MRI.



The latest developments in PET detector technology and PET reconstruction algorithms have resulted in high-resolution images that reveal small tumors and allow accurate quantification of biologic processes. Though optical imaging has great potential to be developed as a functional imaging modality, it might not reach the usefulness of PET or MRI in whole-body imaging because of restricted penetration and limited quantification accuracy. Preclinical and clinical MRI applications have expanded beyond simple anatomic imaging into the domain of molecular imaging. New contrast agents and hyper polarization techniques enhance the sensitivity of the MRI experiments, paving the way for more clinically oriented molecular imaging.

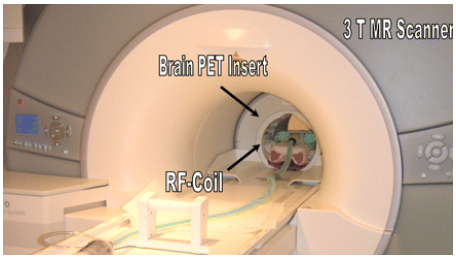
The trend has clearly gone towards functional and multimodality imaging for detecting diseases, because earlier diagnosis positively affects disease progression. A milestone in PET was the introduction of combined PET/CT. The studies proved that PET/MRI has enormous potential as an integrated molecular imaging tool. Because of its high cost, it is unlikely to replace PET/CT in the clinical environment. However, molecular imaging research will benefit highly from the new opportunities offered by this combination. In general, the combination of different modalities such as PET, SPECT (Single Photon-Emission Computed Tomography), optical imaging, ultrasound, magneto encephalography, and CT with MRI may lead to new insights in research and novel clinical applications.

MRI:

(A) High soft-tissue contrast of MR image is apparent in whole-body MRI tomogram of human. (B) In contrast, fused PET/CT image shows mainly bone structures. Metabolic PET images (B and C) clearly depict tumor area (arrow) that appears also in MR image. Anatomic information is most prominent in MR image, whereas PET image can help to guide diagnostic focus towards abnormalities in metabolism. These abnormalities can then also be identified as structural malignancies in PET images.

Optical mammography, Optical imaging, which is widely used in field of preclinical imaging, can successfully be applied for mammography applications in which high resolution is desirable but field of view is smaller.

Clinical PET/MRI system is dedicated for



brain applications and features 3-T MRI system with dedicated head coil and PET head insert with 18-cm axial field of view.

THE SIGNIFICANCE OF INSTRUMENTATION IN THE CEMENT INDUSTRY

G. KARPAGAM, FINAL YEAR

We G.KARPAGAM, G.SAVITHRI, E.BHUVANESWARRI belonging to final year ICE had a chance to visit India Cements, Tirunelveli for five days. We came to know about the various industrial aspects in the field of Instrumentation Engineering and we are glad to share our experience.

The India Cements limited at Sankar nagar in Tirunelveli district is one among the 10 cement plants in India. Sri.N.SRINIVASAN took over the post of the vice chairman and the Managing director of India Cements in 1989. It had a turnover of 5.231 billion in the year of 2012-20. The production rate of this plant is about 2.05 million tonnes per annum.

There are 9 stages involved in the production of cement

Stage 1: Crusher

Stage 2: Stacker

Stage 3: Reclaimer

Stage 4: Raw mill

Stage 5: Coal mill

Stage 6: Rotary kiln

Stage 7: Silo

Stage 8: Cement mill

Stage 9: Packing unit

CRUSHER:

In this process, limestone from the mines is crushed in the crusher. They follow a method called “BALL METHOD” for crushing. It consists of an impact plate and a ball inside the impact crusher, which strikes the material and gets reflected back from

impact plate till it gets the pyramid form. The crushed material of size beyond the outlet chute opening are again fed back to the crusher for further grinding. The final crushed material is carried to the next stage through the conveyor belt.

TEMPERATURE SENSOR(RTD):

Bearings are placed at the two fixed ends for holding purpose. Any damage in the bearing causes fiction which increases the temperature. To maintain the temperature, RTD is used for sensing the same.

VIBRATION SENSOR:

It indicates the vibration rate of the process using piezoelectric crystal which gives the voltage by which the crushing status can be determined.

STACKER:

Stacker is where the PILE formation is done along with the additive materials (black clay, blue ash, iron ore..)The quality of the material is checked by radiating the gamma ray of California-252 before it gets into the pile formation.

CAM SWITCH:

Many CAM switches are placed in the horizontal elevation side of the stacker. Each CAM switch is placed at an angle

difference of 10 degree. For every signal from the material rope there is a switch over from one CAM switch to another.

MATERIAL ROPE:

It senses the level of the pile formation for elevating the stacker height for some angle using CAM switch.

SAFETY INSTRUMENTS:

- PULL CHORD SWITCH:

It is a manually operated instrument which is used when there is any problem in the conveyor belt to trip it.

- ZERO PADDING:

A zero speed is set in the instrument if there is any change in the speed of the conveyor i.e. if it is less than the zero speed, it will give an indication to the transmitter which is received in the receiver located in the control room.

RECLAIMER:

In reclaimer, the pile formation is scrapped vertically to achieve the required composition of raw materials for the process using scrapper. It consists of two ac drives in which the carbon brushes are employed to distrib-

PUBLICATIONS AT A GLANCE

S. No.	Student Name	Year	Name of the Journal	Paper Entitle
1.	K.MohamedHussain, R.AllwynRajendranZepherin, M. Shantha Kumar Dr.S.M.GirirajKumar	III	IJERA	Comparison of PID Controller Tuning Method
2.	G,Umamaheshwari, S.Vasugipottramarai, S.Hemamalini S.Saju	IV	IJERT	Real time approach of piezo actuated beam using G-Programming

ute the power supply for the reclaimer.

PROXY:

Proximity sensor is placed in the base of the plate where the iron rods move. If any damage or the absence of an iron rod is encountered the proxy senses and indicates for proper reclaiming.

WEIGH FEEDER:

It is used to get the raw materials in desired proportion by both measuring and controlling . For safety , (to avoid tripping) the weigh feeder is always maintained with some load and it is calibrated using load cell for every 1m of belt length. The output is taken through the weigh belt which only measures the amount of material with its standard weights by providing the cushioning effect.

RAW MILL:

Raw mill is the unit in which grinding process takes place, It has two dampers and two workers. In addition to this it also has ESP and gas analyser. It works on the Feed Forward principle.

ESP:

ESP, works on electrostatic principle. A fan is employed to collect the dust which is made to stick on the high voltage electrode plate. A motor is fixed at the bottom of the ESP with proper earthing. After the particular time a motor hammer strikes and the materials are dropped and recirculated into the mill.

GAS ANALYSER:

Analyser is used to detect the type of gases such as CO,NO2 etc.. present in the dust particles. It is placed in the inlet and outlet of ESP unit. If any hazardous gas like CO is found then the damper closes. In addition to this, it also has the sensor for sensing the oil level as lubricant, temperature , pressure, air supply and for any wire breakup.

COAL MILL:

In this stage, the coal is crushed, stacked and reclaimed (just like limestone) for heating the grinded material from the raw mill to improve the withstanding power of the material. Here the pile formation is in a circular fashion rather than vertical.

ROTARY KILN:

The material from the raw mill is heated with coal as a source. It consists of rollers which gives the balance for the rotary movement. For each roller,2 RTD's(PT 1000) and thermocouple of type 'k' are placed and each is separately connected to the temperature scanner to avoid any group connection of RTD damage.

PRE HEATER:

Pre heater has many cyclones inside it and the material passes through five stages. Finally it is given to the rotary kiln for firing.

The temperature of the heated material is around 1200o C. It is given to the next stage after cooling it to 200oC using the fan setup. The product from the kiln is called as "CLINKER".

CEMENT MILL:

Generally, cement is of two types-OPC (ordinary Portland cement)and PPC(Portland pozzolona cement). In cement mill, for OPC, the clinker and gypsum are grinded in a given proportion which is setup in a CCR unit. For PPC, flyash is also added with the clinker and gypsum to avoid the cracking.

CCR UNIT:

It consists of 6 panel(CM1-CM6), 2 I/O panel for controlling the proportionality of the ingredients to be grinded. They also have control units for power supply namely MCC(Motor control center) and PCC(process control center) where the 440v is sent to many motor elements.

BUS COUPLER:

It is connected between two units. If one of them is under repair, it transmits the data to the other unit to avoid any interruption in the process as a precautious measure through bus coupler.

PACKAGING UNIT:

It has both coarse feeder and fine feeder for perfect packaging of cement. The cement is filled in the bag with the Automatic 8-Spout Roto-Compact Packer which is set with the required set point. Here for one revolution of packer ,6 packs are filled from the packer unit. The packaging unit conveyor belts are started in a backward approach to avoid the accumulation of packages due to any damage in the conveyor belt.

On the whole we had a wonderful and very informative experience that helped us to get a better understanding of the significance of Instrumentation and Control Engineering in the Cement Manufacturing Industry

Brain Teasers

2. What is the unique characteristics of the following words??
Coughing, thirsty, defiant

3. There is a shop that reads::
Buy 1 for $1.00
10 for $2.00
100 for $3.00
One needed 913 and still only paid $3.00.how could this be financially viable for the shopkeeper?/

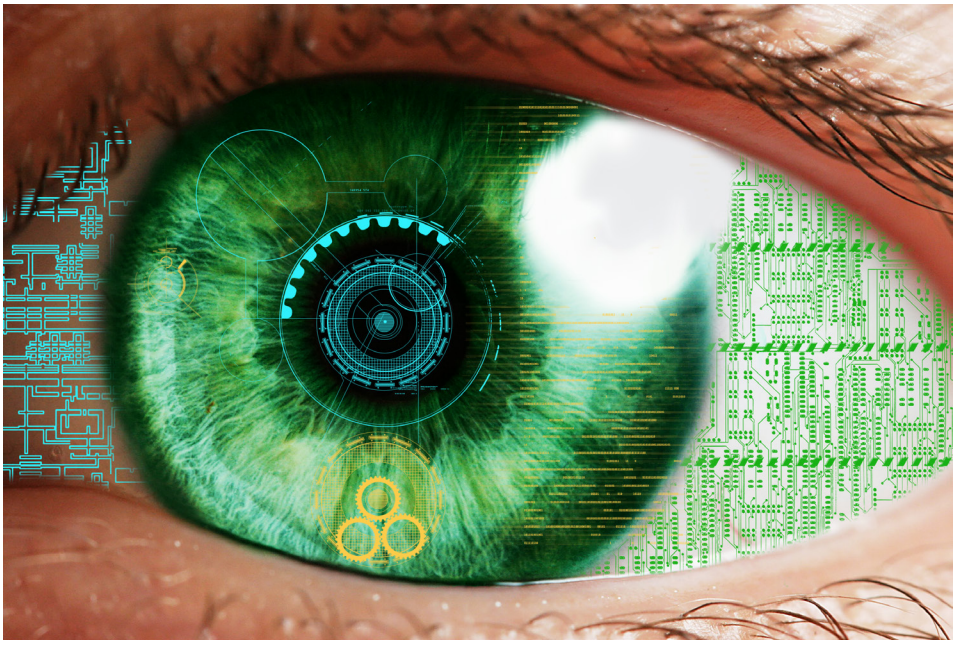
4. If you throw me from the window, I will leave a grieving wife.
Bring me back ,but in the door ,and you'll see someone giving life ! what am I ???

5. One day , Javesh and his friends were playing around. Tarun hit something with a pin and it popped. Javesh's dad came in the room that very moment, but he wasn't mad . Infact , he was smiling. What did Tarun hit?

BIONIC CONTACT LENS – A MAGIC EYE

SHUPRAJHAA. T, THIRD YEAR

The bionic contact lens is a polymer based lens with similar shape and characteristics as an everyday contact lens, although this micro electric lens has components that allow for a led or digital display. This article will look farther into the possibilities associated with this unique Nano technology.



BIONIC Contact lenses or bionic eyes were first brought to people's attention through a common cinematic film, The Terminator. This movie showed people what views through a bionic eye could be like when the audience sees life through the eyes of a terminator. Now people have started making these contact lenses with integrated antennas, micro batteries, and small digital displays seen using a single LED. The more advanced technology becomes, the more possibilities we can imagine with this Lens. Think about a contact lens that can link to your cell phone and show you everything that could be on the internet through a display simply in your eye. Imagine being able to see a translation of a language as someone speaks a different language to you. All of this becomes possible with the work of Babak Parvis out of The University of Washington.

The Bionic contact lens first starts off as a polymer base that is similar in size, shape, and compound, as an everyday contact lens. Then they sprinkle a grayish powder of metal and electrical components into the flexible plastic, and then due to capillary forces, the shape of the tiny component dictates which piece it can attach to. This form of micro fabrication is called self-assembly. Finally an led and antenna is placed using scorching temperatures, and toxic chemicals, and we finally have a finished lens. This process still needs to be perfected and the display needs to become a higher resolution and a more practical display. So far this Lens can only project text and is not yet linked to other wireless devices available on the market. The Bionic lens was tested in a rabbit's eye and showed no signs of agitation or pain associated with the lens. This trial on a Rabbit occurred in 2011 and shows researchers that this may be a possible project to someday be clinically tested on humans. Unfortunately during this animal trial the led was not turned on when the lens was in the eye of the rabbit, so we do not know how the animal will react with a display. The point of the trial was to see if there was agitation or main associated with the polymer the contact lens was made of. The work that has been completed at the University of Washington by Professor Babak Parvis has a lot of technological progress to be made.

The opportunities for this bionic lens could be amazing because there are many possible uses for virtual displays, whether it be in drivers or pilots to show vehicle speed or altitude projected into the windshield, or for people wanting to surf the internet and have a display that appears to be floating in everyday life without looking at your smart phone display or TV screen, or even to incorporate video games that enhance virtual worlds without restricting their range of motion.

Any application that you may want on a smart phone or computer could someday be integrated into a small bio contact lens. This lens could someday be connect to our brain through nerve impulses, and a computer ship implanted into our eye so when we think of something we want to search or display, the bionic contact lens will just automatically display it. The possibilities are endless, and that is what makes this invention revolutionary.

STUDENT ACHIEVEMENTS

• C.Ishwarya from ICE Final Year Presented two papers in National Conference and in National level symposium on Sept, 2013.

• Monish from ICE Final Year Participated and won 1st place among 350 teams in "Vina-Vidai" competions conducted in the state level, by PudhiyaTamilagam media on 23.9.2013.

• Monish from ICE final year scored 98.53 in MAT Exam.

• Mr.Shobanraj of final ICE was placed second in 'ROBO zest' and he went to IIT, Mumbai for his final selection, by March 2014.

• Prathiba.D, has represented the college team, in Volley ball, and has won prizes in atheletics in zonal level.

She has also represented the University, and she has scored 8 / 10 for best outgoing student category, and was graded by the PD.

• K.Thivakaranwon Men Single in semi final for Table-Tennis, Sponsored by BHEL CC on 17th& 18th August, 2013.

• K.Thivakaran&S.S.Surajwon Open Double for Table-Tennis, Sponsored by BHEL CC on 17th& 18th August, 2013.

• EL.Ramkumarhas secured Runner Position in the Anna University Zonal Tournaments at Cauvery College of Engineering & Technology, Trichy, on 7th August 2013.

• K.Karthik from III year has been selected for Inter Zone Football men's Tournament, held at JJ College of Engineering & Technology, Trichy, from 23rd to 26th August, 2013.

• K.Thivakaran participated international table tennis cultural tournament at Vellore on 24th August2013

• K.Thivakaran and Nishanthwon state level 2 prize in table tennis on 27th August2013.

• K.Thivakaranwon CM Trophy Mens division in Table Tennis at Tanjore, on 4th and 5th December, 2013.

• K.Thivakaranwon CM Trophy Mens division in Table Tennis at BHEL Townnshipon 4th September, 2013.

• K.Thivakaran won prize & medal in Table tennis tournament at SCE on 21st October, 2013.

• K.Thivakaranwon Mens Winner & Double Winner in District Level Table Tennis Tournament. On 25th and 26th January, 2014 at Amritha School

• K.Thivakaranparticipated in international cultural participation Quarters Table Tennis on 4th and 5thFeburary, 2014 at VIT, Vellore

• Nivetha . S, of 2nd year ICE, with other department students, Participated in MANTHAN, National Conference Organized by CAG (Citizen for Accountable Governance), National wide paper presentation, at New Delhi, conducted on 20th September 2013.

• Team1- Sreyash and Sriram, Team2- Shuprajhaa and Srinath had participated in National Level Symposium at NITT on 14.02.2014 & 15.02.2014 and team 1 has won first prize.

• Nishanth of second year has won prizes in district level tournaments for table tennis.

• Shuprajhaa . T of second

VISITORS TO ICE

S.No	Date & Session	Resource Person	Title of the Lecture	Conducted for
1.	24.07.2013	Dr.K.Jayaraman	Evolving technologies and its impact on engg	III & IV Yrs
2.	22.08.2013	Mr.Solaikutty Dhanabal	Recent trends in VI & effective implementation	III & IV yrs
3.	1.10.2013	Mr. Venkatasubramanian	Computers for Instrumentation	3rd and final year ICE Students
4.	7.10.2013	Dr. P. R. Venkateswaran, Senior Engineer,BHEL, Trichy	Role of Control Engineering in Process Industries	Staffs/ Students
5.	11.10.2013	Dr. Sunil Srinivasan	How to Overcome depression and improve self realization	Staff members/ Students ICE
6.	25.10.2013	Dr. Sunil Srinivasan	Happiness Reality	All the Staff Members of SCE
7.	21.11.2013	Dr.Venkatasubramaniyam/HOD/CSE/SCE	Role of computers in instrumentation	Final year and third year students

year ICE won the second prize in the technical symposium conducted by Mookambigai college of engineering.

- Shrinath and Sriram of second year won the first place in national level symposium conducted by the ICE department of NIIT.

LAURELS FROM THE FIELD

S.No	Student name	Year	Event name	Event date from-to	College name	Prize
1.	Thivakaran	III	Table tennis-Single	17.8.13-18.8.13	BHEL	Third
2.	Thivakaran	III	Table tennis-Double	17.8.13-18.8.13	BHEL	First
3.	Thivakaran	III	Table tennis-International	26.8.13	Vellore	Fourth
4.	Thivakaran& Nhisanth	III & II	Table tennis-state level	27.8.13	Abdul akkim college, vellore	second
5.	Thivakaran	III	Table tennis-CM Trophy- division	4.12.13-5.12.13	Tanjore	First
6.	Thivakaran	III	Table tennis-CM Trophy-District	4.9.13	BHEL Township	First
7.	Thivakaran	III	Table tennis	21.10.13	SCE	First
8.	Thivakaran	III	Table tennis-District level	25.1.14-26.1.14	Amirtha School	First
9.	Thivakaran	III	Table tennis-International	4.2.14-5.2		
.14	VIT vellore	Fourth				
10.	EL.Ramkumar	III	Chess Zonal Tournament	07.8.13	Cauvery college of engg & tech	Second
11.	Karthik	III	Football- Zonal	23.8.13-26.8.13	JJCET	Third

Brought to you by The Public Relations Team, Department of Instrumentation and Control Engineering

Send us your feedback and queries to: ice.prteam@gmail.com