Volume 3, Issue 1

June 2008

IEEE

THE BI-ANNUAL TECHNICAL NEWSLETTER OF IEEE - NSIT

YUGMA

About IEEE—NSIT

IEEE-NSIT Student Branch **works to create an atmosphere for students**, helping them to learn new technical knowledge and implement this through various projects. We also promote students to inculcate better managerial skills and all round development, by giving them opportunity to organize and manage events & represent the institution at various events and conferences.

Our vision is to:

- Foster technical initiatives and innovation among students.
- Serve as a forum for collaboration in technical projects.
- Equip engineers in the making with the right kind of leadership and interpersonal skills.

Our motto "*Fostering technical initiatives and innovation*" suites our vision very well.

We have regular events ranging from technical workshops and seminars, to tutorials and lectures, discussions and meetings to fun filled recreational events.

Last year amazingly we had **63 events** (including meetings and rendezvous) **with 141 activity days**.

Our ex-Chairman Divyabh Budhiraja won the J K Pal Memorial award and Chairman Ayush Jain, won the outstanding volunteer award amongst others. Our branch counselor Mrs Prerna Gaur is serving as SAC, IEEE Delhi Section.

- Abhimanyu Sanghi (Vice Chairman 2007-08)

IEEE Members along with the guest of honor Prof Ranjit Singh (Director), Prof A P Mittal (DSW) and a team from Jamboree at the IEEE Certification Day.

Year In Review

The year started early as usual at the **Counseling desk during CEE**, helping parents with their queries. The session got of to start with events like **Video conferencing and virtual tour of MIT**, six hour workshop on website development (from scratch) and a **trip to the STPI, NOIDA** all being held in the first fortnight itself. Then started an array of lectures, seminars and workshops some including **RFIDs, image processing**, programming, **microcontrollers**, **MatLab and dSPACE**. We attended two huge rendezvous in **R-10 SC** and **AISC** and other various Delhi section events . Lastly, we had fun filled activities like trebuchet wars, GD, puff n gush, **annual trip to Shimla**, and much more.

- Adesh Midha (Vice Chairman2007-08)

Inside this issue:

Facts about IEEE NSIT:

- *The branch was started back in 2001.*
- *The first ever Innovision (then Ditech) was completely organized by IEEE NSIT.*
- *Eureka was started back in 2004, when Innovision became a college fest. (We still play a major role in Innovision).*
- *Our students conduct amongst the best research in the college.*
- *We are the biggest spending society on student welfare activities.*

Region 10 Students Congress, SSNCE - Chennai

The R10SC-2008 was held from 28th-30th January, 2008 in SSNCE, Chennai, India. The **conference was held in India for the first time**. It was **attended by over 230 delegates from 18 countries**. The conference was made special by the dignitaries from across the globe.

A team of **7 IEEE NSIT members** (four were first year students) **accompanied by Mrs. Prerna Gaur** (Branch Counselor) attended the meet.

What was so good about this event was that we exchanged ideas with people from vastly different cultural and political backgrounds, yet we all jelled so well making friends for lifetime.

The dignitaries included big names like Lewis Terman (IEEE President 2008), John Vig (IEEE President Elect 2008), Janina Mazeirska (R-10 Director). They as usual enlightened us with their technical knowledge and experiences of life (as the technical leaders of the world). With amazing presentations and great speaking skills they mesmerized the whole audience and were interrupted by huge round of applauses. We also had various fun filled team building activities and industrial workshops.

We were there not only to listen, but participate and duly **Ayush Jain (Chairman), presented an outstanding branch case study**. We also participated in the cultural exhibition and got applauded from all. All in all it was an amazing experience. **The best part about it was we had all our expenses paid (travel and stay) by IEEE to attend it, really amazing!**

- Ankur Gupta (delegate at the conference)

IEEE NSIT Members and Mrs Prerna Gaur with Lewis Terman (IEEE President 2008) and other dignitaries and delegates at SSNCE, Chennai

Delhi Section Quarterly Meet - BVCOE & MAIT

The first Quarterly Meet (previously Bi-Annual) of the Delhi Section was held at BVCOE on 22nd January '08. A **total of 10 student branches** attended the meet. Six members of IEEE NSIT were delegates at the meet.

Students at 1st Quarterly Meet

The second Quarterly Meet was held at MAIT on 29th March '08. A **total of 6 student branches attended the meet**. Five members of IEEE NSIT were delegates at the meet.

The meets were **marked by a new beginning to the bilateral relationships** amongst the student branches, where the student branches vowed to activate dormant branches and open by new branches elsewhere.

The next meet will be held at **IGIT, New Delhi**.

- Nehul Malhotra (delegate at the meets)

IEEE NSIT members and other delegates with Mrs Prerna Gaur at 2nd Quarterly Meet

Annual General Meeting, IEEE Delhi Section

The AGM of the IEEE Delhi Section was held on 5th April '08 at the IIC, New Delhi. The meeting was presided over by Dr R G Gupta (Chairperson) and other executive committee members. Other senior members were present to grace the occasion along with student members from various institutes.

The meet started with the review of last year events and activities by the Chairperson. Then the financial budget was discussed upon and Dr S Dharmaraja (Treasurer) clarified all doubts.

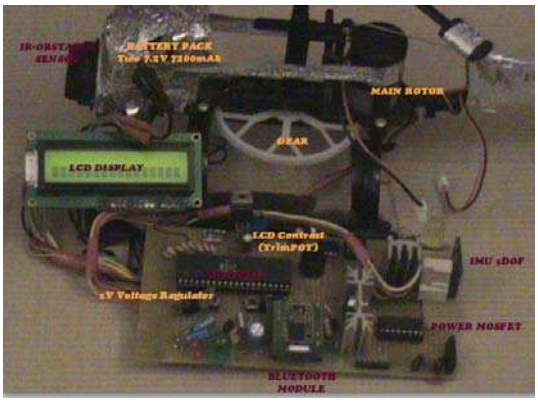
There was even a technical lecture on online security threat. Lastly, student and senior members were given away the annual awards and certificates.-
Aniket Jain (attended the AGM)

Above: Divyabh Budhiraja receiving J K Pal memorial award.
Left: Ayush Jain receiving outstanding student certificate award.

Prototype A³I (Autonomous Aerial Artificial Intelligence) Robot

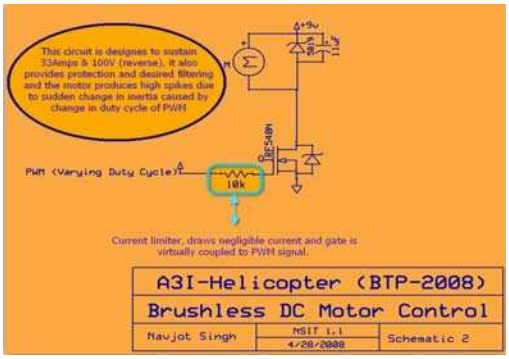
AIM: To develop a behavioral based A³I robot (Helicopter) with most easily available components and instruments which will bring a feel of affordable aerial based autonomous vehicle to anyone and will give one composite image of fusing various technical fields in single project, categorized globally under UAV (Unmanned Aerial Vehicle) which can autonomously as well as manually carry out the following goal missions in any undefined architecture of zone to be navigated and by using only on-board intelligence while interfacing with instruments developed with popular technologies and computing power of Microcontrollers.

- Hovering & Maneuvering.
- Obstacle Detection.
- Visual Display of Important Information after flight via LCD.



Even as robots become more autonomous, most used in space, military, or rescue operations still require a human in the loop for vital decision making. The prototype A³I-ROBOT project focuses on developing an aerial robot which is intelligent enough to work autonomously in danger zones for many purposes or where human life is at great risk. Along with this an immersive interface that allows for a rapid, thorough assessment and control of remote robot's situation or while A³I-ROBOT find itself in position of getting help from human assistant to carry further actions during emergency which is beyond the intelligence of knowledge based system in A³I-ROBOT. Manual control is via Bluetooth interface of Microcontroller and Bluetooth dongle on Laptop acting as ground station (GS). Switching from autonomous mode to manual mode is manually in former case, whereas automatically in latter case with real time performance. The physical model of helicopter has been taken from RC helicopter and most of its mechanical parts have been utilized with minor modifications for providing stable motion which is not available within the original system. Details about the said modifications needs long explanation, thus restricting us to talk about it.

The GSCS (Ground Station Controlling Software) interface puts the operator virtually in the A³I-ROBOT's place that allows the user to look around within the observable area to free the robot from status of emergency and then switching it back to autonomous mode to further carry out its pending operation. Additionally, real time functionalities in both manual and autonomous modes are available in case of hovering and safe landing due to running off of power system or any other critical situations which need to be updated with time and further testing depending upon external environment.



3.3V ↔ 5V INTERFACE: One way is to run each and every device on 3.3 volts which are communicating. As to get better and desired performance from 5V device by running it over 5V, then a circuit in fig 4 has been used.

Schottky diode switching speed should be more than the baud rate at which two devices are communicating (9600bps). When T_x of 5V goes high, diode will not conduct and thus 3.3V appears on R_x of 3.3V. When T_x of 5V goes low, diode conducts result in very low voltage due to drop across 10K resistance thus logic low (~0.3V) will appear on R_x of 3.3V device. R_x of 5V can be connected directly to 3.3V device as 3.3Volts act as logic high for R_x of 5V based AVR Microcontroller.

PWM- CONTROL OF THRUST: Controlling thrust via duty cycle of PWM from low power side of Microcontroller to high power side of DC brushless motor was major problem during project. First, of all it should be noticed carefully that PWM is not perfect DC supply across the motor, it is filtered with diode, capacitor, inertia and inductance of motor. Thrust of main rotor is dependent on the speed of flanks, which need to be smooth for providing efficient thrust. Filtering can never be 100%, it still consist of variable slopes which needs to be minimized by carefully considering filters, diodes and inductance of DC motor. Extremely higher value of filter may results in constant DC supply across DC motor and extremely low value may results in poor averaging out of PWM duty cycle. Furthermore, one crucial point was needed to

Prototype A³I (Autonomous Aerial Artificial Intelligence) Robot

be taken into account is that current (I_{req}) corresponding to speed at which desired thrust is needed has to be minimum, so that $I_{req} \leq I_{min}$ of current following in DC motor at particular duty cycle of PWM signal. Along with this I_{max}, maximum current flowing at the maximum thrust corresponding to maximum duty cycle (100%) should well below the maximum rated value of DC motor for optimum performance. Well, we experienced that even after so many filtering is done, smooth flow of rotor is not an ideal one and thrust thus produced was not the same as produced by constant supply of dc value.

The performance and above said problem was reduced by providing high frequency PWM signal (8MHz) and its further increasing will hence improves performance towards high value of duty cycle. Much improvement needs to be done in such cases as we were able to get rid of it because our operation basically lies in the region of high duty cycle corresponding to high speed & thrust of rotors during the flight (Hovering, Take-Off & Landing).

Made by:
- Navjot Singh (IEEE NSIT Member, 4th Year ICE Dept)

Mentors:
- Prof A P Mittal (HOD, ICE Dept)
- Mrs Prerna Gaur (Senior Lecturer, ICE Dept)

ENEREFF Engineers Pvt Ltd

Consultants and engineers in the field of:
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QUIZINES

www.quizines.co.in

The IEEE NSIT Entrepreneurship SIG (Special Interest Group) made history this year by launching its first venture, **QUIZINES** (Quizzing by IEEE NSIT Entrepreneurship SIG). It is a venture that offers quizzing solutions to schools, colleges and organizations. It launched its own website at **www.quizines.co.in** and offers various schemes and packages to its customers. It hosts simple quizzes and puzzles on a daily basis and awards small prizes and incentives to students to come and play these quizzes. It organized its first major event at Moksha '08 (the annual cultural fest of NSIT). The event was an online quiz and it was really well received by the audience. The website received an amazing 50,000+ hits during the four day bonanza showing the popularity of the event. The company plans to diversify its offerings and make the services available to a more general audience it the future. It plans to become a profitable commodity by the fourth quarter of the current fiscal year.

- Siddharth Goyal
(member, QUIZINES)

An Emerging Technology: dSPACE

Introduction: dSPACE is the world's leading producer of solutions for developing and testing fast mechatronic control system. Its main application field is automotive industry but it may also be employed in drives, aerospace and industrial automation.

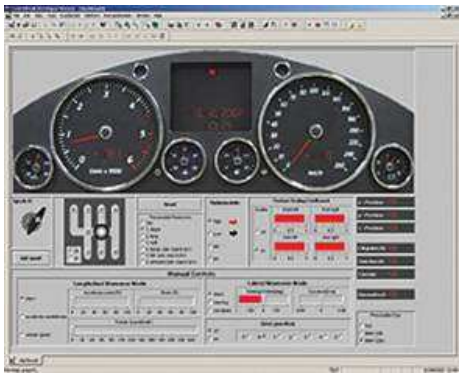
The dSPACE embedded systems are data acquisition systems combined with an independent processing system to implement digital control models. The dSPACE system consists of the following components:

The DS1104 R&D controller board connected to a personal computer,

A breakout panel for connecting signal lines to the DS1104 controller board,

Software tools for operating the DS1104 board through the MATLAB block diagram environment.

The dSPACE DS1104 R&D Controller Board is a piece of hardware that upgrades a PC to a powerful development system for rapid control prototyping. The real-time hardware based on PowerPC technology and its set of I/O interfaces makes the board an ideal solution for developing controllers in various industrial fields.



Control Panel

The Control Desk software in dSPACE is used to design the system implementation and to interface the DS1104 PCI dSPACE board. Control Desk in conjunction with MATLAB/Simulink provides Interactive control and monitoring of Simulink and real-time simulations.

Real-Time Interface (RTI), is the link between dSPACE hardware and the development software. It aids in automatic implementation of MATLAB/Simulink models on dSPACE hardware as it provides graphically supported I/O configuration via comprehensive Simulink block libraries.

Tools and Key features of dSPACE: dSPACE allows block diagram-based modeling and provides complete compatibility with MATLAB from Mathwork. Using block diagram-based modeling tools such as MATLAB/Simulink, lets us design our functions and perform initial validation in offline simulation. These models form the basis for all subsequent development stages.

An excellent feature provided by dSPACE is construction of control desk for experiment management. It is a graphical user interface which facilitates the generation of virtual instrument panels. It allows us to design user-specific layout. Control Desk is a graphical front-end tool that forms the interactive experiment and visualization interface of dSPACE Simulator. It gives you complete control of your experiments running on dSPACE Simulator. With the integrated experiment and test environment and Control Desk's Simulink interface, we can monitor our experiments in Simulink and later in real-time simulation, using the same tools and the same user interfaces. The dSPACE board being used processes the digital data with the help of DSP's to give analog output across its 8 DAC channels which can be viewed with the help of DSO/CRO. It also provides 8 ADC channels which can accept analog signals. It has a 37 pin, female sub-D connector which contains 12 PWM channels. All these ADC,DAC and PWM channels give us flexibility to control large number of applications simultaneously on one board.

Servo control using dSPACE: To control the speed of the servo motor position of the motor is obtained with the help of resolver. This analog signals is sent to dSPACE with the help of ADC channels provided in dSPACE. and are used by SIMULINK models in order to generate appropriate PWM signals which run the motor at desired speed.

In a similar manner the signals may also be generated at DAC channels of dSPACE board to run a stepper motors or DC motors which are the parts of robotics.

Advantages of dSPACE systems: Although dSPACE provides us numerous advantages, the most basic of them being:

- Easy-to-use real-time hardware.
- I/O interfaces conveniently connected via Real-Time Interface blocks.
- Seamless integration into MATLAB/Simulink.
- Graphical programming.
- Highly cost efficient and time saving.

dSPACE's hardware can be linked with the software by implementing models made in MATLAB/Simulink on a dSPACE prototyping system automatically with the help of Real-Time Interface - without any programming. Real-Time Workshop and State flow Coder automatically generate C code from Simulink block diagrams and State flow systems. C coded models can also be implemented without any hassles.

Recent Advances in dSPACE: Automation, Aerospace, Robotics, Information Technology, Drives or be it Medicine, dSPACE offers us a seamless tool chain for control development.

dSPACE can be used to develop control strategies for a magnetic railway system or to develop a bipedal robot for maneuvering across rough and inaccessible terrain.

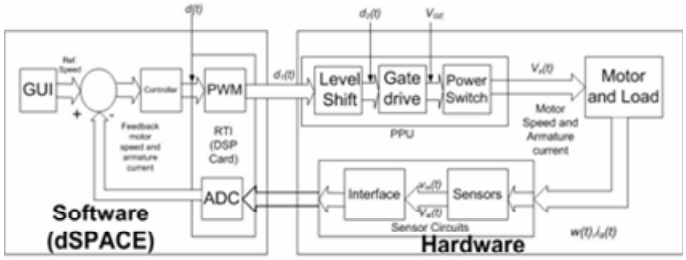
The simulation systems of BMW's highly dynamic test benches include powerful dSPACE real-time hardware and software for performing calibration tasks on a real test vehicle fleet .

It has been put to use in aerospace applications by Airbus to monitor the structural loads during flight by developing an

An Emerging Technology: dSPACE

"observer" – a parallel model of the aircraft – which was tested onboard an A340. It can also be used for motion control, power quality, renewable power generation, Robotics and electrical automation.

In connection with MATLAB/Simulink, the dSPACE environment provides all the tools you need for automatic code generation, intelligent instrumentation and real-time simulation.



Functional Block Diagram of the complete rapid control prototype system m of the

A birth simulator called BirthSIM. is used by Obstetricians all over the world to control and visualize simulated birth complications using dSPACE's Control Desk and Motion Desk.

Other areas of application are Hardware-in-the-loop simulation of gyroscope stabilization systems, actuator modeling and testing, Hardware-in-the-loop simulation of gas-turbine engines and active noise and vibration control.

Made by:
- Anant Sharma (3rd Year IEEE NSIT Member)
- Ashish Batra (3rd Year IEEE NSIT Member)
- Chirag Gandhi (3rd Year IEEE NSIT Member)
- Juhi Taneja (3rd Year IEEE NSIT Member)

Mentor:
- Prerna Gaur (Branch Counselor, IEEE NSIT)

Genesis Technologies

About Us: We were formed with the motto to impart professional training with quality and perfection. We are sailing to our way efficiently.

We need not to give any proof in this regard as our works are self-explanatory and milestones. We believe in action instead of saying.

We also impart industrial training to students through various live industry projects, and based on their performance students can even be offered PPO's (Pre Placement Offers) from various companies such as TCS.

We are a promoter at the IEEE NSIT Student Branch. We organize lectures and seminars on a regular basis. We recently organized a seminar on .NET on 13th Feb '08.

Some of the trainings imparted in last year :-
- IBM Daksh
- Indian Army
- TATA Motors

BarCamp

We at IEEE NSIT organized the **first ever BarCamp to be held at NSIT**. The BarCamp was organized in association with the Entrepreneurship Cell, IIT-KGP and RouteGuru (our routing partner).

"BarCamp is an ad-hoc gathering born from the desire for people to share and learn in an open environment. It is an intense event with discussions, demos and interaction from participants."

The event was held on 16th April '08 in the Auditorium. **Students from all over Delhi came** to be part of the event.

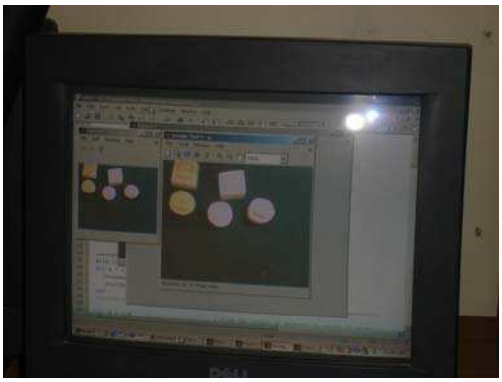
At the BarCamp we had Mr Vishesh Bajaj (MD, Geobeats) and Mr Piyush Gupta (Co-Founder, RouteGuru) to talk to students about entrepreneurship and how it is coming of age. Piyush also gave a live demo of the product he has been working on back at his company.

BarCamp participants along with Piyush Gupta and Vishesh Bajaj

- Ankit Anand (organizer, BarCamp)

Vision-Enabled Intelligent Robotic Transportation System

A basic problem in robotics is planning motions to solve some pre-specified tasks, and then controlling the robot as it executes the commands necessary to achieve those actions. Robotic systems are employed in applications where costly manpower has to be done away with. The need of skilled labor at such places can be obviated only if the employed system has some intelligence and can chose its own series of operations depending upon the need and present state of surroundings. Presented here, is a prototype transportation system that employs a robotic arm for transportation of objects from one place to another. It senses the feed of objects that need to be transported from their present location to desired location. It is provided with a primary sensing system in the form of vision which enables the system to sense the presence of objects, locate their position, identify their shape and choose the remaining course of action of picking and placing the objects through predefined via points such that laws of robotics are maintained. At the place where objects are placed, visual inspection is carried out to eliminate defective objects from a batch. This type of system can be used for transport of various materials in industries where automation is desired. It can also be used for reliable and safe handling of food products, material handling at radioactive sites where human approach is not possible and palletizing operations.



The project is an extension to *"Intelligent conveyor Belt System with Defective Object Elimination Capability"* by Tarun Kumar, Sandeep Gupta and Rajesh Vishwakarma, ICE Dept., from 2007 batch, which was guided by Mr. Yogesh V. Hote, that had certain limitations like location of objects from where they were picked was pre-defined and programming of robotic arm in an obsolete DOS based language, *QBASIC*. This kind of application is modified to a more close-to-practical application where objects, anywhere in the workspace are intelligently picked by the employed robotic arm and the programming of robotic arm is done in MATLAB, which has better features like interface with external devices like webcam and tools like image processing etc.

System Components: The project can be easily described as amalgamation of concepts from a gamut of engineering disciplines *viz*. Image Processing, Robotics, Sensors, Electric motors and Microcontroller Architecture. This complete system can be broadly divided into three sub-systems.

Image Processing: An image of the workspace is captured using a commonly available Logitech web camera which was available in the Robotic laboratory. The image is captured using *MATLAB 7.0*'s *Image processing toolbox 5.0.2*. The captured image is processed to give location of object present in it. The developed program gives the image pixel co-ordinates of centre of gravity of each object and also its shape.

Robotics: An RV-M1 MovemasterEX from Mitsubishi is used as robotic arm for the system. Some of the drive unit settings like establishing communication parameters for serial port communication are done to successfully interface robotic arm with *MATLAB 7.0*. The robotic arm picks each object from their respective place and places then on conveyor belt via fixed via points.

Conveyor Assembly: A continuously running conveyor has a visual inspection assembly that eliminates any defective objects placed on the conveyor. This is done with the help of infrared sensor receiver assembly and AT89C51 interfaced with a single DOF robotic arm to sweep a defective object off the conveyor.

Some initial results of the project were communicated to ICAI'08 in Romania, a WSEAS conference, where it was adjudged one of the **best technical papers** received and was also selected for **journal publication**. The complete details of the project are planned to be communicated to ***IEEE Transactions on Education*** soon.

Made by:
- Ritu Shrivastava (4th Year ICE Dept)
- Sachit Bakshi (4th Year ICE Dept)
- Shrey Khanna (4th Year ICE Dept)
- Shruti Bansal (4th Year ICE Dept)

Mentor:
- Mr Yogesh V Hote (Senior Lecturer, ICE Dept)

Annual trip to Shimla

We are not just about technology and workshops. Once every while we like to enjoy and explore the mystical beauty of mother nature. For this very purpose each year in the month of Spring, we organize our annual trip.

This year we organized **a trip to the Queen of the hills, Shimla**. **77 student members accompanied by 4 faculty members**, went on the four day bonanza between 28th March '08 to 01st April '08. The erstwhile summer capital in the British Raj is full of exotic scenery and thick pine forests. But, in the midst of all this beauty lie various industries and educational institutions, and as part of our **aim to impart industrial exposure to members** we took students to various industries for interaction and know-how. The students were taken to STPI (Shimla) and HFCL's research center.

Apart from all this students did what they went for, i.e. thorough enjoyment and relaxation away from the running around of college life. They were **taken for local site seeing** to Kufri (the winter sports capital), Naldhera (the miniature golf course) and Chel (home to 120 rare species of birds)**.**

Within Shimla students had fun roaming around at the Mall and enjoying the view at the Ridge. They even **went on the toy train ride** (the Kalka-Shimla track is registered in the Guinness book of world record for its scenic beauty).

All in all it was a great experience and it wasn't hard to say that the students were not looking forward to going back to the polluted, noisy environment of Delhi. What was also good was that the IEEE members were taken to trip with heavy discounts as compared to regular students.

- Abhishek Verma (IEEE NSIT Member)

Students ecstatic after the toy train ride. They went on ride from Shimla to Tara Devi, enjoying the mystical mountains in the way.

Meetings

We introduced a new concept of regular weekly meeting for all our members this year. These meetings were planned to be **an interface for student interaction and exchange of ideas**. This was specially planned to make sure there is **interaction between the fresh intakes into the college and senior students**.

"In life there are meetings which seem like a fate. "

- Lord Lytton

It proved to be a huge success as not only did it mean regular involvement of all students it also provided a platform for **discussions on various technical topics and projects**. With this scheme we were able to **start four modular projects given specifically to first year students**.

In future, we plan to make these meetings more technical and discussion oriented, where senior members will come and speak on one topic every week and there will be active discussion and questionnaire rounds in between. The topic will be disclosed in advance so that members can come prepared with basic knowledge. Also, since only IEEE members will be allowed to attend it, it will be a real value for the membership cost.

- A V Rahul (regularly attended meetings, Member - IEEE NSIT)

Projects

With the invent of meetings we came up with ideas to start modular projects. These **were awarded to a team of three to four first years along with a mentor and a faculty incharge**. These projects were the biggest success of the branch. They opened an array of technical knowledge to students and created an aptitude towards research related discussion and thinking.

There were **four projects that were started with the help of ideas generated at the meetings**. The project teams were asked to constantly give reports on the progress in the weekly meetings, so that new ideas may be generated. The projects that came up were **scrolling LED display, grid computing, voice modulated car and phishing prevention.** We hope to start similar projects at inter-college level this year.

Students discussing ideas for new projects in the weekly meeting.

For more information on the projects visit the website.

- Aman Bindal (initiated various projects)

Teleguard System: a GSM based tool for ambient condition detection and alarm

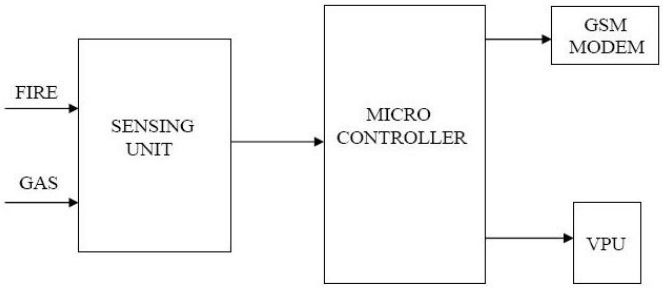
Abstract: An ambient condition detecting system incorporates either a wired or a wireless communication medium wherein the units communicate with one another in case of an emergency. Units can incorporate programmed controllers and ambient condition sensors such as smoke or gas sensors. In response to detected local ambient conditions, the respective units can transmit a warning signal when a particular limit is exceeded i.e. fire breakout or gas leakage. Output devices coupled to the communication medium can provide human discernable audible or visible indicators of the presence of one or more selected conditions. It is such a Network based Fire and Gas Alarm System that has been created in this project.

Introduction: The project can broadly be divided into two modules:

- Sensing and Calling unit
- Voice Processing unit

The sensing unit senses a stimuli i.e. fire or gas leakage and a low signal is sent to one of the respective I/O ports of the microcontroller via a monostable timer. The microcontroller then sends three ON / OFF pulses to actuate the relay which electronically actuates the button of the handsfree three times, henceforth initiating the call process of the GSM (Global System for Mobile Communication) modem.

The voice processing unit plays back recorded sound for fire or gas leakage respectively as and when it is initiated by the microcontroller after a specified delay.



Basic Layout

System Structure and Description: The hardware is essentially an embedded system with various components attached to it. A transformer is used to provide supply to a voltage regulator which provides regulated voltage to the entire circuit. Whenever the fire sensor or the gas sensor sense anything hazardous, they actuate the microcontroller via associated circuitry which is discussed later and the microcontroller in turn activates the relay. The relay is connected to the handsfree of the handset which is connected to the handset itself. This combination acts as a GSM modem. Upon receiving the three ON / OFF pulses at specified intervals, the relay thus acts as an electronic presser pressing the handsfree three times. This initiates a call to the last number dialed in the call list. It is this very feature of the handset that drives the entire project. This call is always made to a rescue team such as the Fire Station so that an efficient and quick response is forthcoming and a major disaster can be averted.

The voice processor is then initiated after a specified delay and the sounds are played back helping in the identification of the emergency situation. The various hardware elements used in the project are described hereunder:

I. Power Supply: The power supply to the circuit is provided by an LM series voltage regulator (LM7805). The input to the regulator is permissible within limits of 7V to 25V and thus a central tap transformer with 9V output provides input to the regulator. LM7805 gives a regulated output of 5V to the circuit. 5V output is required because the microcontroller and the IC555 work on a source voltage of 5V.

II. Fire and Gas Sensors: The fire sensor used is a tube light starter with the outer polymer covering removed. The sensor works on the phenomenon of thermal expansion of metals. When the fire sensor detects fire i.e. when temperature drastically rises over safe measures, the internal wire of the sensor uncoils and the two terminals are short with each other thereby triggering the IC 555 timer.

The gas sensor employed in the circuit is a TGS gas sensor which is traditionally used for the detection of air contaminants. The sensing element is comprised of a metal oxide semiconductor layer formed on an alumina substrate of a sensing chip together with an integrated heater. In the presence of a detectable gas, the sensor's conductivity increases depending on the gas concentration in the air. Its working is similar to that of the fire sensor.

III. Monostable Timer: The LM555 is a highly stable device for generating accurate time delays or oscillation. IC555 is used as an entity which provides pulse width modulation. The microcontroller needs a signal with duration of at least 1ms for it to be acknowledged. Thus, a 555 timer is used as monostable timer so that even the smallest signals should not go unnoticed. The output of the timer remains high for a time given by the formula:

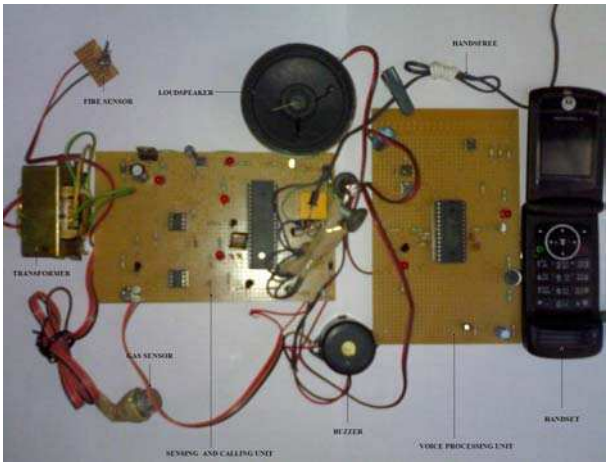
$$t = 1.1 * R * C$$

Thus, no signal would go unnoticed with the presence of the IC555 timer.

IV. Microcontroller: The microcontroller used is AT89S51 which is an 8051 microcontroller belonging to the ATMEL family. The code burnt into the microcontroller continuously detects for a low signal at the respective I/O ports connected to the fire sensor and the gas sensor respectively. Upon detection of such a signal the microcontroller activates the buzzer, relay and voice processor with appropriate delays. These devices are connected to I/O ports of the microcontroller.

V. Buzzer and Relay: The buzzer attached to the I/O pin of the microcontroller is activated to inform personnel at the site of the prevailing danger so that they can take action if they are present

Teleguard System: a GSM based tool for ambient condition detection and alarm



Complete hardware assembly

on the spot. Also, this facilitates the elimination of a false alarm in case a wrong stimulus gets fed into the sensors by providing the option of manual reset of the alarm in-situ.

The program written into the microcontroller is such that three ON / OFF pulses are provided at the I/O terminal connected to the relay. Once these pulses reach the relay, it acts as an electronic presser, pressing the handsfree electronically thrice to initiate a call to the last number dialed. This call could be made to a fire station or a fire / gas protection unit close to the designated site and action could be taken to avert a dangerous situation.

VI. The Mobile Phone: For implementation of this module, a GSM based mobile phone to serve the purpose of GSM modem has been used. The mobile phone is a MOTOROLA W220 model. This handset has a special feature that a phone call will be made to the last dialed number automatically if the button in the handsfree is pressed three times. Its handsfree is connected to an electromagnetic relay which operates as discussed above.

VII. Voice Processing Unit: The APR9600 device used in the circuit offers true single-chip voice recording, non-volatile storage, and playback capability for 40 to 60 seconds. Once the call process is initiated, the voice processor is activated after an approximate time interval of 15 seconds. A voice prompt indicating a fire is played back for a period of 20 seconds in case of a fire breakout whereas the prompt is for gas for the same amount of time in case of a gas leakage. Appropriate provisions are made so that the call is automatically picked up at the emergency station and is played back at the in loudspeakers to alert the station for the task at hand.

Results and Conclusions: Mobile phones using the GSM network have become an indispensable part of our life. This system uses a controller and a cellular phone for its operations. The systems can be used as a test bed for any application that requires monitoring of local conditions and communication upon dangerous limits being exceeded. A few suggestions for improving system performance are as follows:

- A GSM modem could be used in place of a mobile phone. This will enhance project performance and add the extra flexibility of being able to send a warning SMS as well to multiple numbers.
- Multiple Sensing Units interfaced with a single Calling and Voice Processing unit could be used at different sensitive spots in the premises of huge industries. This will reduce complex circuitry for big plants and will also drive costs down.
- Other applications could be built upon the general framework of the project by replacing or adding the sensors used. For example, if in place of fire and gas sensors a strain gauge is used then an Anti-Car Theft mechanism could be built.

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Mentor:
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Magnolia

Recently we introduced our latest publication **Magnolia, the quarterly Digital publication**. It was introduced to keep up with our effort to provide technical excellence, encourage knowledge, cooperation, and initiatives among the member students peers.

It was launched on 22nd January '08 at the First Quarterly Meet, IEEE Delhi Section. In only the first edition we managed to distribute more than 300 copies and were soon making more to fulfill the huge demand.

Magnolia **contains articles on latest innovations and technologies from all fields of engineering**. Some field are robotics, embedded systems, programming, motors, machines, image processing and bioengineering. It also contain videos and tutorials on amazing stuff. We try to provide students with useful new open source software in the publication.

Home screen of the interface

We also plan to introduce a lounge section, where **student members send in their personal contributions**.

- Siddharth Malhotra (co-founder, Magnolia)

Robotic Arm Control using dSPACE

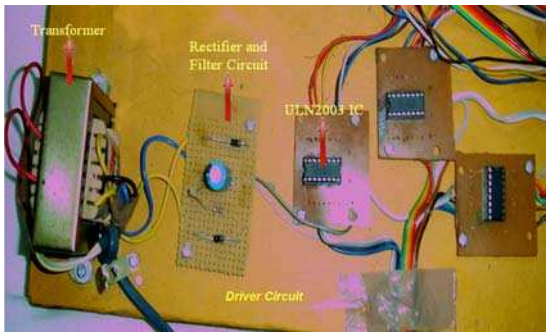
ABSTRACT: This article is concerned with the implementation of a robotic arm using dSPACE control. The concept of developing a robotic arm involves stepper motors to govern the motion of the arm at the joints and hardware shafts connecting the various motors to serve as physical arms. The robotic arm's job is to move an end effector from place to place. To teach a robot how to do its job, the programmer guides the arm through the motions using computer. The robot stores the exact sequence of movements in the form of a program code and does it repeatedly until stopped.

The interfacing has been done through DS1104 Controller Board provided by dSPACE Inc. It enables real-time control through its powerful digital signal processing (DSP) applications. The motors have been controlled using dSPACE compatible software MATLAB/Simulink.

INTRODUCTION: Robots are manufactured in various designs throughout the world. Basically, there are two types of robots-fixed and mobile. A fixed robot is attached to a stationary platform. It is analogous to a human standing or sitting in one fixed location while doing his work with his hands. A mobile robot moves from place to place. The characteristic that robots can be reprogrammed to handle a variety of tasks makes them a flexible device. They are best suited to replace humans in doing hazardous, repetitive and monotonous tasks. The advent of microelectronics and microcomputers has successfully employed robots in industries to perform pick-and-place operations, point-to-point operations, continuous path operations and assembly operations.

A human starting on a new job learns the assigned tasks from generalized definitions and by observing others do the same work. The brain is responsible for learning of the procedures to be followed. It receives vital information such as location and orientation of the object to be picked up and the destination where it is to be placed. The sense organs provide the necessary feedback to ensure that the task is properly completed. Similarly, a robot can be taught to perform an assigned task. Unlike humans, the robot requires that each task is broken down into subunits and possibly even further, until the analysis reaches the level of individual motions. In the majority of industrial applications, the robot controller is where these extremely detailed and explicit commands are made to reside. Robot manufacturers and research workers are developing additional methods with the intention of reducing the amount of time required for the robot to learn new tasks and to simplify the teaching methods.

This work implements the most common manufacturing robotic arm using dSPACE. The robotic arm in the project consists of three stepper motors. Unlike ordinary motors, stepper motors move in exact increments. This allows the computer to move the arm very precisely. Each stepper motor is capable of moving in steps with a deflection of 1.8 degree per step. The different motors are physically interconnected by means of hardware shafts and plates which lend the arm a physical structure. The jaw for the purpose of gripping the object is implemented by a rigid fixture and a second movable one to clutch the object.



Each stepper motor has six wires for interfacing and controlling the motion of the shaft. Out of these, two wires are permanently grounded while the other four are fed with signal voltages to control the deflection. All the wires are connected to the Master PPC Connector (CP17) provided in the CP/CLP1104 connector panel of DS1104 controller board after interfacing them through the driver circuit to get the required torque. Real-Time Interface (RTI) provides Simulink blocks for graphical configuration of various inherent A/D, D/A and digital I/O lines. With Real-Time Interface, one can easily run function models on the DS1104 R&D Controller Board. The user can configure all I/O graphically by simple drag and drop of RTI blocks and it thereby reduces the implementation time to a minimum.

The control of motors is done by the dSPACE compatible software MATLAB/Simulink. The model of the system is constructed in Simulink to be tested for final motion. MATLAB is used for preliminary testing of the robotic arm using parallel port and driving the motors through Data Acquisition Toolbox.

The positioning of robotic arm is manual. Whenever an object is to be lifted, its position is calculated or observed with respect to the robotic arm and an appropriate signal is given to the motors via the computer. This can also be accomplished by moving or driving the motor for a particular period of time i.e. providing for a certain delay in the program code which could serve the purpose for that particular movement.

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- Karan Sachdeva (438/IC/04)
- Nishank Sethi (446/IC/04)

Mentor:
- Prerna Gaur (Senior Lecturer, ICE Dept)

WIE

IEEE NSIT started with its first affinity group, by forming the WIE affinity group.

About WIE:

RECOGNIZES women's outstanding achievements in electrical and electronics engineering through IEEE Awards nominations.

ORGANIZES receptions at major technical conferences to enhance networking and to promote membership in WIE.

ADVOCATES women in leadership roles in IEEE governance and career advancement for women in the profession.

Students participating in the GD competition. The judge was Mr Hanumant Sabharwal from IMS

PROVIDES assistance with the formation of new WIE Affinity Groups and supports ongoing activities.

PROMOTES IEEE Member Grade advancement for women to the grades of Senior Member and Fellow.

FACILITATES the development of programs and activities that promote the entry into and retention of women in engineering programs.

ADMINISTERS the IEEE Student-Teacher and Research Engineer/Scientist (STAR) Program to mentor young women in junior and high schools.

The group was formed on 01st October '08 with the announcement of the new ExeComm. It was decided that WIE must have its separate head and a secretary and be supported by IEEE for its financial and other logistical requirements. Nupur (ECE, 2nd year IEEE member) was made the WIE head, and Shruti (ECE, 1st year IEEE member) was made the WIE secretary. They used to hold regular meetings with other fellow IEEE members and the IEEE ExeComm to decide upon the future plans and activities. Their first activity was the inter college GD competition organized on 16th January'08. It turned out to be a very successful event receiving over 75 participants. From then on there was no stopping and very soon they received the official registration from IEEE HQ. They now organize an event every month and hold general meetings with other IEEE members on a fortnight basis. They have even become financially self sufficient with association with various industries.

Students performing stunts and drills during the self defense workshop by Delhi Police.

It recently held a fifteen day inter branch workshop on self defense organized by the Delhi Police. It has been a part of all the rendezvous at various other branches since it inception. It sure has a bright future ahead.

- Alkesh Chauhan (IEEE WIE member)

Dr M P S Bhatia (Head T&P Dept) and Mrs Prerna Gaur felicitating Delhi Police officials on the successful completion of the self defense workshop held in NSIT between 2nd April '08 to 16th April '08

IEEE NSIT Website

In 2006 we had started the IEEE NSIT website project, in an effort to reach out a large audience and have a place to interact, discuss and share ideas even during non working college days.

Visit us at www.ieeensit.org

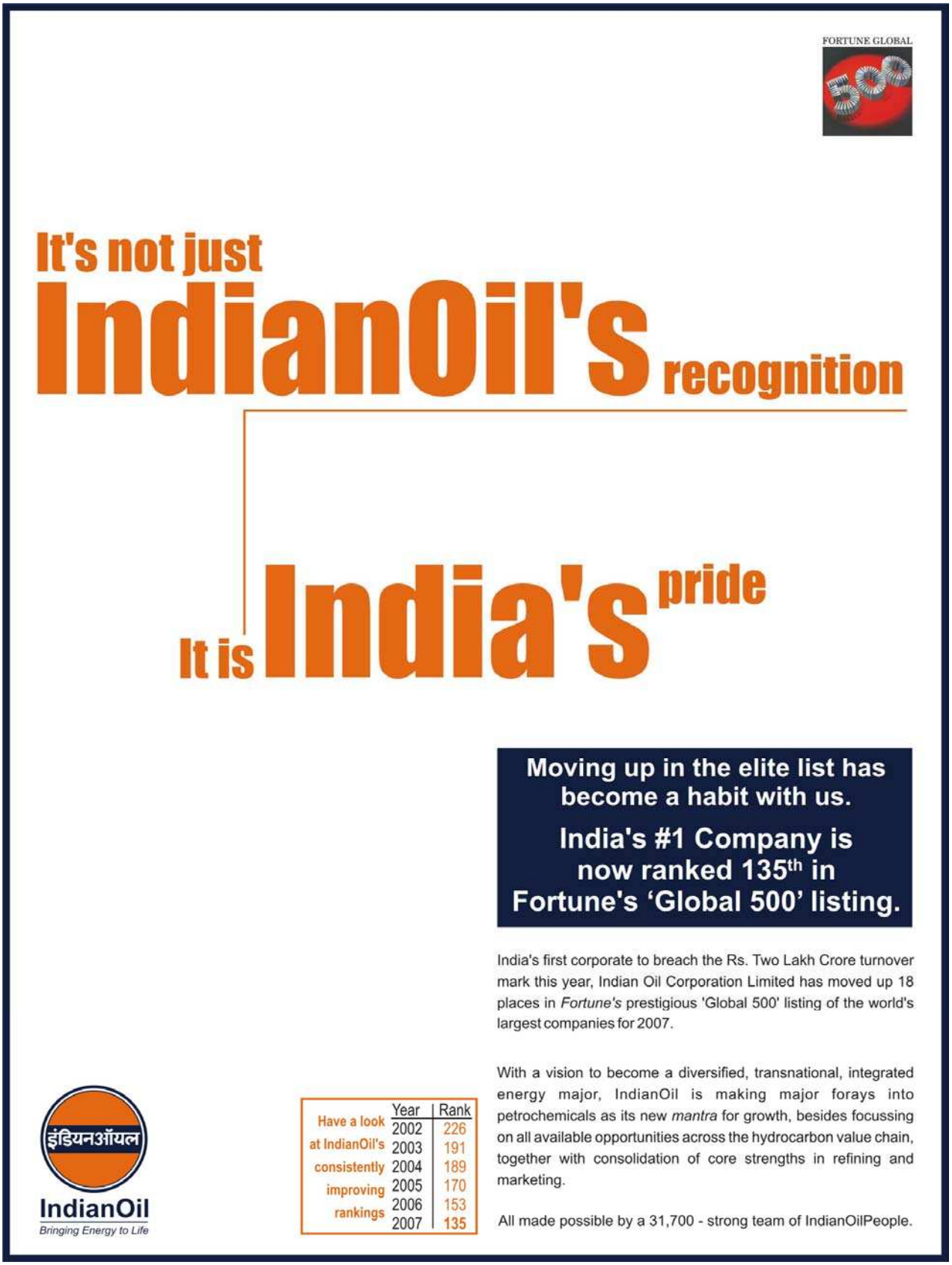
Now with two years gone, it has not only been a huge success, but also **come up with a new way to involve first year students to do technical work**. This year a **team of eight first years** along with senior members support, **developed the website which now boasts of features like the digital library**, RSS feeds, forums, polls, blogs etc.

With more than 150 registered students on the site there are great discussions on the forums and polls. The blogs present an opportunity to **share technical know-how** amongst various student members. And the digital library provides with **amazing code sharing opportunity**, in a safe yet open source way. The best thing is that the website has been built completely by students.

We also participated in the Asia Pacific website contest and stood a creditable 9th/1,200. We wish to keep up the success in the future and strive for even higher success.

- Gautam Hans (member, web-team)

Indian Oil moving up the ladder in the Fortune 500 club



Schedule of Events

- 01/08/08: Session begins, new students are introduced to IEEE in the orientation session.
- 04/08/08: Class to class orientation of students.
- 06/08/08: Talk by alumni on life in college.
- 11/08/08: Interaction on college life.
- 13/08/08: Basic Workshop on C++.
- 18/08/08: Talk on projects in college.
- 20/08/08: Seminar on emerging technologies & entrepreneurship.
- 25/08/08: Technical meeting on stock market.
- 27/08/08: Trip to NDPL.

August 2008

Mon	Tue	Wed	Thu	Fri	Sat	Sun
				1 *Session begins*	2	3
4	5	6	7	8	9	10
11	12	13	14	15 *Independence day*	16 *Raksha Bandhan*	17
18	19	20	21	22	23	24 *Janmashtami*
25	26	27	28	29	30	31

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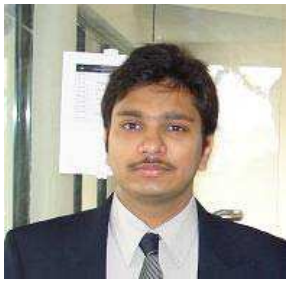
From our desk

BRANCH COUNSELOR:

My heartful congratulations to all the members of IEEE NSIT Student Branch for the third issue of YUGMA.
A nations wealth is the young generation of the country. They have to be guided properly so that, their lives find a proper direction and their creativity is allowed to flower. On the academic front the IEEE students have been bringing laurels galore. It is important for the students to shape up their career by producing the research in the form of the paper that may find the path to be published in the journals. To IEEE students I would like to say that as iron rusts from disuse and stagnant water loses its purity, similarly inaction saps the vigor of mind. In your hands you hold the power of life and the potential of greatness so indulge in research and use yourself to the best. I would also like to congratulate the WIE affinity group on its successful inception and working its first full year of operations. Lastly, I would like to take this opportunity to make a call to all new intakes to join IEEE and make full use of the facilities available, to do your institution your parents and last of all yourself proud in this competitive world.

- Prerna Gaur



CHAIRMAN 2007-08:

IEEE is a great foundation stone for all budding engineers to showcase their talent to the world. Be it in the technical arena, managerial skills or human resources, IEEE fits the bill for all engineers.

And at a mere USD$ 25 it is an investment worth, and may turn out to be the highest paying investment in your life as I have found out. It adds tremendous value to your resume in a way which no other technical society is capable of. **Which other society will provide you a chance be a part of an all expenses paid conference to interact with students from 18 different countries?**

We at IEEE NSIT are amongst the biggest and most active branches and I hope the same continues for years. With participation from all members and support from our branch counselor (who has been an excellent pillar of strength for me) we sure can reach places no one has ever dreamt of. I wish the next Exe-Comm to very best and may they fulfill their goals in a spectacular way.

- Ayush Jain

Free Offer

Join IEEE before 31st August '08 and get the following benefits:

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The **IEEE basic student membership costs US$ 25**, gives almost **all the major benefits that IEEE** has to offer. But, if students want to get the **specialized benefits of their field of interest** they **should subscribe to atleast on of the sub societies** as well, to get the **maximum technical knowhow and expertise**. So choose from one of the eight sub societies mentioned below.
NOTE: You can choose to subscribe to more than one sub-society as well.

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IEEE Vehicular technology (MPAE)	US$ 9

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IEEE

IEEE NSIT

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Ankit Anand - IT Dept, 3rd Year

Abhimanyu Sanghi - ECE Dept, 3rd Year

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IEEE - Founded in 1884

About IEEE: A non-profit organization, IEEE is the world's leading professional association for the advancement of technology.

The IEEE name was originally an acronym for the Institute of Electrical and Electronics Engineers, Inc. Today, the organization's scope of interest has expanded into so many related fields, that it is simply referred to by the letters I-E-E-E (pronounced Eye-triple-E).

Who IEEE Serves: Through its global membership, IEEE is a leading authority on areas ranging from aerospace systems, computers and telecommunications to biomedical engineering, electric power and consumer electronics among others. Members rely on IEEE as a source of technical and professional information, resources and services. To foster an interest in the engineering profession, IEEE also serves student members in colleges and universities around the world. Other important constituencies include prospective members and organizations that purchase IEEE products and participate in conferences or other IEEE programs.

Membership: There are more than 365,000 IEEE members in over 150 countries around the world. IEEE members are engineers, scientists and allied professionals whose technical interests are rooted in electrical and computer sciences, engineering and related disciplines.

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For more info, contact Mrs. Prerna Gaur (+91 9810906245)