

LIGHTSABER

september 2013 inaugural issue

Students' Technical Activities Body

Awaiting Deployment: Tum-Tum Tracker

Late Sunday afternoon. A student at H7 desperately needs to go to the main gate. Waits for a bus for nearly an hour. And when the bus finally arrives, it takes him on a unsolicited tour of hillside.



Sounds familiar? Well, there is some good news! Sudheer and his team bring an end to your daily woes through the upcoming TumTum Tracker. Tested and working, the system is finally going to be deployed in the institute buses! Using a novel ZigBee mesh network, it will allow us to know which buses are coming our way, and its route as well. Moreover, we will also know if the TumTum

Read more on page 7.

Institute Technical Summer Projects

"I want to build the Iron Man suit."

If that has been your lifelong ambition, you should definitely spend your summers pursuing a technical project. ITSP 2013 saw more than 90 projects built to completion - from quad-copters and obstacle-avoiding bots to cool android apps and voice-controlled chess. Almost 300 students stayed back in the summers, and worked hard for nearly a month to complete their dream project.



We bring to you the best of ITSP 2013 in our inaugural issue. Not only the best technical projects, but also those personal experiences which make the journey especially memorable. Come join us in this journey as we reminisce about a summer well-spent.

Read more on page 2.

c o n t e n t s

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Institute Technical Summer Projects 2013

ITSP 2013 concluded with about 64 working projects being displayed at the Annual Technical Exhibition 2013, held on 25th August. The projects were judged by Profesor Girish Kumar from the Electrical Engineering department. Although all the projects were good and everyone put in a lot of effort, some projects stood out from the rest.

We present to you the winning projects of ITSP 2013. More details about these, and all other projects, are available on the project wiki at the following link:

[www.stab-iitb.org/ITSP_2013](http://www stab-iitb.org/ITSP_2013)

AEROMODELLING

Best Overall Project - VTOL Twin Copter (2AR05)



Team Members:
Karthik Shenoy
Sushant Khade
Sachin Sharma
Darshan Bang

VTOL Twin Prop Copter is a helicopter propelled by two rotors, inspired by the Scorpion gunship of Avatar fame.

Best Fabricated Aircraft - F-15 Eagle (2AR02)



Team Members:
Manjeet Godara
Shubham Dhake
Nishant Prakash
Sonal Kumar

The F-15 Eagle uses Thrust Vector Control to manipulate the direction of the thrust from its engine to control its attitude and angular velocity.

ROBOTICS AND ELECTRONICS

Best Overall Project - Sketcher



(1RE04)

Team Members:
Shubham Singhal
Ashish Goyal
Vivek Sangwan

The Sketcher is a bot that can draw the outline of any black-and-white image which is fed into its microcontroller.

Best Innovative Project (tied) - Wizard Chess



(1RE14)

Team Members:
Vaibhav Shah
Prahlad Kumar
Shravan Poloju
Shobhit Gupta

Wizard Chess is a voice-activated mechanical chess-playing bot. Especially made for those too lazy to move the pieces themselves.

Best Design - Recumbent Trike (1RE03)



Team Members:
Shreyans Tejawat
Abhilash Singh
Chetan Agrawal
Kshitij Maheshwari

A three wheeled cycle with suspensions and a recumbent seat which a person can ride lying at a comfortable angle.

Best Innovative Project (tied)- Wall Climber



(1RE32)

Team Members:
Pranjal Ralegankar
Meet Patel
Goutam Bhat
Yash Upadhyay

This robot can climb walls using its variable length arm. Syringes attached to a plunger create a vacuum and thus make it stick on the wall.

ROBOTICS AND ELECTRONICS

Best Research Project (tied) - Virtual Keyboard

(1RE46)

Team Members:
Shardul Jade
Jainesh Doshi
Anant Jaikray

(1RE26)

Team Members:
Jay Vora
Kamal Galrani
Pratik Sathe

This project was pursued by the above two teams independently. It is a virtual input board that recognizes touches traced by a stylus or fingers on the surface on which it is placed and relays them to the computer.

Best Research Project (tied)- Glove Talk

(1RE23)

Team Members:
G Roshan Lal
Chirag C Shetty

Glove talk recognizes simple static hand gestures to control remote operated machines. A simple camera records the user's gestures which are then interpreted using MATLAB.

WEB 'n CODING

Best Complete Project - Automated Answering

Team Members:
Mihir Kulkarni
Sagun Pai
Kush Motwani
Deepak

It parses the search input and displays a consolidated result. Currently implemented for queries regarding IIT-B courses, grading etc.

Best Research Project - iNote

Team Members:
Deependra Patel
Ashish Shirolkar

A note making android app with a difference. You can make notes using your own handwriting and the app will parse and store the note in plain text.

My ITSP Story - Guitar Playing Bot

Ishaan Rakshit

It doesn't take me much time to think about memorable instances in my 40-day long undulating journey, trying to build stuff this summer. Three people brainstormed over all kinds of random ideas, two of us Spartan musicians. It took us a lot of time, almost 4-long-minutes to come up with something the "majority" agreed upon. An automated guitar player!

Novices in all spheres of tech, we just had the L293D and IC7805 in our knowledge arsenal (dating back to the primeval days of XLR8). Ah! Relief. We had a mentor! And a project manager. ITSP was surely sounding more fun than just sweat and money! The most noticeable saga in our ITSP chronicles was the first half (literally 20) of the days which we brainstormed (as the tech guys call it here in IITB) over something we didn't know would work; ultimately wasn't even mentioned in the report. Electromagnetic actuation, we would call it, fancying the awesome stud inventor feel that it would saturate us with! We spent hours in the WEL lab and well, tested it with all video recordings and data measurements. I'm sure we can

do a PhD thesis on this stuff once we are done with many more summers! It was all fun but only till we realised that we just had around two weeks to "get started". And then came my trip to Europe with my family and the other guy also had to go home.

There were surely times when the trio of us would give up, or start blaming each other. But undeniable is that we completed this project, more with a sigh of relief than a haste of escape. We stood much higher from where we had begun; in terms of knowledge, understanding, innovation and reasoning. The millions of ideas that we worked upon (even if we didn't quite implement any) truly helped us in ways more than one. The million debates that we had in comparing options, debating them out - all this had somehow added to us in a whole. For me, I learnt to work out things in a team of diverse individuals. Although, obviously, Europe was much more fun, ITSP is what stays with me when I recall what I did last summer.



Have a passion for modelling your own plane? If true then the Aeromodelling Club is the place for you . Essentially the Aeromodelling Club is a group for aviation and aeromodelling enthusiasts in the institute. The activities of the club include RC Plane making , lectures and talks on various aeromodelling and aviation topics and simulator flying. The club also supports and guides freshers in making their first model airplanes! Come join us on our journey to understand the secrets of flight.

Club Manager:
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Electronics Club
Get Electrified!

The Electronics Club is one large platform in the institute for everyone interested in Electronics. Be it pursuing electronics as a career, or just a hobbyist who loves tinkering with circuits, this is the right place for you. Our activities include hands-on 'Electrified' sessions in the well equipped WEL lab, lectures by students and faculty, and various competitions. It is here that you'll get to design your own circuits, learn cool stuff like image processing and micro-controller programming.

Club Managers:
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AEROMODELLING
ELECTRONICS
ROBOTICS
KRITTIKA
WnCC
MATH & PHYSICS
TECHNOVATION

It is the umbrella clubs in the institution mainly coordinated by other clubs. Most of the project oriented. Notew

for are the Tech Week and end. For more information visit iitb.org. There are six technical activities - Electronics Club, Krittiika, Robotics Club, Coding Club.

Overall Co-ordinator
9167146655 || as

Club Manager:
Ruturaj Atre (9922902964)
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Every one of us is amazed by the spectacle of the night sky and feels curious about the mysteries that lay hidden in plain sight. Krittika provides you the opportunity to do just that. The club has bi-weekly lectures and discussion sessions on various topics in Astronomy. Krittika boasts of a few telescopes which are used during the astronomical events like Eclipses, Occultations and general star/planet observations. Also, every semester the club conducts trips to observation sites where the skies are clear, and also planetariums!

Technovation Manager:
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wncc

Web and Coding Club caters to coding enthusiasts. It conducts workshops, hands-on sessions, which are well supported by lectures, coding competitions and hack nights where you can compete with the best in the field- this prepares you for international competitions like ACM-ICPC, Google Code Jam, etc. WnCC is a learning community and it has been successful in creating a good learning ecosystem to cater to beginners and experts alike.

Club Managers:

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Guna Prasaad (9920147551)

gunaprsd@gmail.com

AB

body of all technical
ite. STAB activities are
by the individual daugh-
events of the Clubs are
worthy events to watch out
d the Annual Seminar Week-
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hima.mittal@gmail.com](http://stab-
clubs that cover all the
Aeromodelling Club,
rittika, Math and Phys-
s Club and Web and</p>
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The Robotics Club is a community of students who derive pleasure in creating robots. Each member of this family is provided insight into mechanical, basic electronic, monetary and informative aid besides the indispensable guidance of experienced members. Competitions of various levels like Formula-1, Maze solver are held under this club which will develop your interest in Robotics. Robo-geeks are provided a workspace, tools and other amenities to let their imagination loose.

Club Managers:

Krishnakant (9820715401)

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Himani Singhal (9405621818)

himanisinghal92@gmail.com



MATHS

This is IIT Bombay's hobby club for students who are interested in the purest forms of human knowledge - Maths and Physics. It is a platform for students to fulfill their desire to unlock the mysteries and the laws of nature! Whether it be thoughts on fibonacci sequence in flower petals or dark matter in the huge Universe- It Lies Here!

The club conducts lectures by eminent speakers on both the subjects . There are also many quizzes, workshops and puzzle solving sessions conducted every year by the club.

Club Manager:

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Publicity and Media Managers:

Pranav Chandra (9161343956)

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Anurag Mundhada (9967978312)

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TECHNOVATION

Manager: Kunal Phalak

Do you have a groundbreaking idea for a technical project on your mind, but don't know how to finance it? If yes, Technovation is the place for you. Technovation is a platform for students who have a passion and knack for tech to do sophisticated projects and take them to completion.

Projects taken under Technovation are necessarily innovative in nature. They could either be a new and unique combination of existing technologies, or completely out of the box solutions for a problem! Apart from addressing major concerns of tech teams such as mentorship and financial aid, it serves as an avenue for neophytes at tech to gain

invaluable experience.

A review committee evaluates progress and supervises teams. Technical visionaries go on to become team leaders at technovation if their project is approved by the review committee. Team members are selected by the review committee and the team leader based on their passion and experience. The teams keep the review committee posted about their progress on a regular basis by making presentations. The long-term goal of Technovation is to generate independent teams on lines of bodies like MIT Media Labs and create opportunities for coming batches.

A few projects

For more details visit technovation.stab-iitb.org

Parinat

Parinat is IITB's first transforming humanoid. The fact that a humanoid robot typically costs "an arm and a leg" didn't dissuade the Parinat team in their endeavour of making a humanoid. They started off with a biped and have assembled 5 prototypes to date. They envision an end product that can imitate a person's movements in real time, and also transform into a vehicle thereby making it energy efficient. It can be employed to carry out tasks of a human in dangerous circumstances, such as research work in an unforgiving climate and rescue operations.

Blindsight

Blindsight uses ultrasound ranging to alleviate suffering of blind people by giving them a mental image of their surroundings, thus enabling them to navigate with ease. Besides that, Blindsight is also capable of indicating the direction of an approaching obstacle by actuating a pager motor (the same device used to vibrate cell phones) corresponding to that direction. GPS feature is expected to be incorporated in Blindsight as an add-on, to guide the user to any location.

Non-Contact Emissivity Finder

Ever wondered how temperature of star's surface is measured? The answer is non-contact thermometry. Non-Contact Emisivity Finder (NCEF) can measure emissivity of surfaces with great precision from a distance. Infrared thermometers offer distinct advantages over contact thermometers as they can provide the user with instant and precise temperature readings of objects that are too hot to handle, and also objects in motion. The intention behind making NCEF is to increase credibility of temperature readings of infrared thermometers.

Book-Keeping Bot

The work of library workers would be mightily reduced if a robot stacked and sorted all the books automatically, and this is the main motive behind developing a book keeping bot. This autonomous bot is capable of delivering books from any place in a library to its drop off point. It accomplishes this task by acquiring the position of the drop off point corresponding to the accession code of the book scanned by an onboard android phone and this information is passed to a controller which in turn devises a path to the destination. The bot is guided by a variety of sensors to reach its destination without crashing into any obstacle.

Tracking those Tum-Tums

A Technovation project

Craning your neck to see if a Tum-Tum is coming your way shall soon be history. The Tum-Tum tracker made under Technovation has secured institute funding and shall soon be installed on buses.

What exactly will the Tum-Tum tracker be for a user?

Tum-tum tracker modules shall be installed on the buses and the bus-stops. The tracker modules on a bus shall communicate two things to the modules on nearby bus-stops - a) Which route it is going on and b) Whether the bus is full or not. The driver shall be provided with switches to assess and send both the details. The modules on the bus-stops shall display the route of every nearby bus that has free space. Also, the same information shall be forwarded to the central system, which shall update it on the database accessible through the web and mobile apps.

This project, which was started in December 2012, presently has a 7-member team led by Sudheer working on it. Praveen, Nikhil , Sumanth, Sushanth, Manoj and Varun are the other team members. After tinkering with three different technologies initially for inter-communication between the tracker modules to be installed on buses and bus-stops, Zigbee was the

one chosen. "Instead of going with a typical GPRS tracking system which incurs significant monthly network charges, we used a novel zigbee mesh network to be implemented all over the campus," said Sudheer.

The trial run of the project is expected to be complete soon. Final deployment in all of the institute buses is expected to be done by the end of the year.

Prof. U.A. Yajnik, the Dean of Student Affairs, commended the team's efforts and has called the Tum-Tum tracker a fantastic accomplishment. "It was amazing to see the project working as a finished solution, though still in pilot form," he happily added. He has also thanked the Civil Engineering Department for its advisory role and also for co-funding the project.

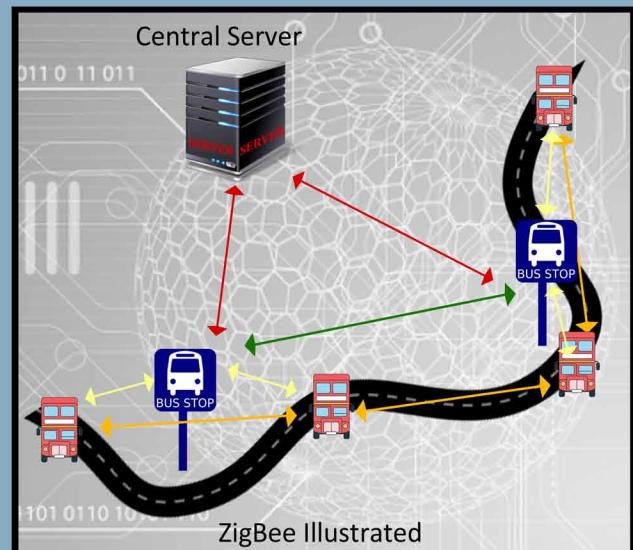
"Working on technical activities like these brings in the discipline required to see a project to its end. As people begin to tinker and get the confidence their attention will turn to immediate application, and the Tum Tum Tracker is one example," he added.

On behalf of the entire institute, we congratulate the creators of the Tum-Tum tracker on their phenomenal achievement, and wish them all the luck they need for the one last milestone of seeing it implemented across the institute.

What's Z-I-G-B-E-E?

Zigbee is named after the erratic, zig-zagging pattern of bees moving between flowers. It may be easily understood as a point-to-point communication mechanism where there are three types of nodes: the central server, Tum-Tum stops and Tum-Tums, analogous to queen bee, drone bees and worker bees respectively. Tum-Tums do not communicate directly with the server but rather communicate between themselves and with the Tum Tum Stops.

Zigbee's advantages include less data consumption, long battery life, and secure networking.



Do It Yourself!

Simple tech project that you can make yourself. And sitting in your own room too.

The Bristlebot



STUFF YOU WILL NEED

A Pager Motor. It is the motor that makes your cell phone vibrate when you get a call. Easily (and cheaply) available at mobile phone repair centres.

A toothbrush. Buy a new one. Or beg borrow steal. Try to get one which has angled bristles, so that your bot moves forward instead of just going around in circle.

A button cell. This is the cell that is used to power watches. Should be available at your hostel shop.

STEPS

1. Cut off the handle of the toothbrush so that just the head remains.
2. Stick the small motor on the front part of the toothbrush head using two-sided tape (as shown in the picture) or Feviquick. Make sure it is stuck properly.
3. Before sticking the button cell to the toothbrush connect one of the wires of the pager motor to the bottom end. Connect the other wire to the top terminal.
4. Your bristlebot should now be running and ready to go! Just set it down on its bristles and watch it zoom around. If you find it veering to the sides you might need to balance the placement of the motor and cell a little.

PRO TIP: Dress up one of these beauties as a ladybug or a cockroach and launch it in the girls' mess! :D

The Lightsaber Cryptic Crossword

Send in your answers to

t.srivastava.13@gmail.com.

Set by Tanmay Srivastava

Highest scorers to win t-shirts!



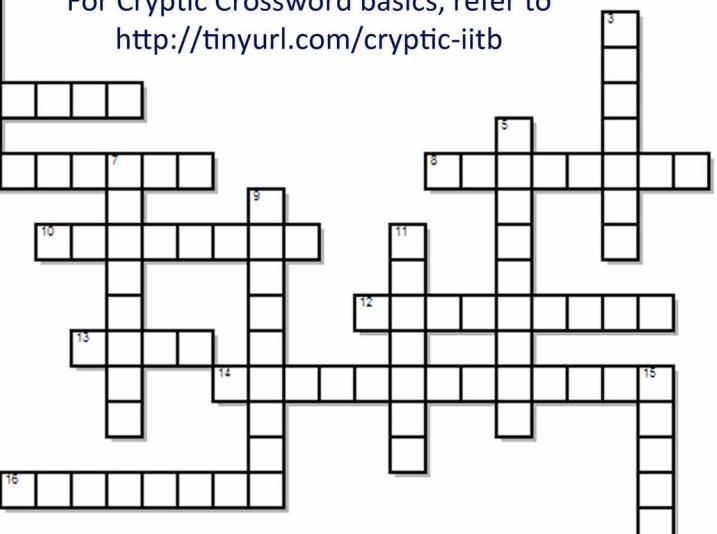
ACROSS

1. Line of the measure of central tendency? (6)
4. Transformer movie? (4,2)
6. The heart of the atom un-clues properly. (7)
8. Speed towards disorderly love town. (8)
10. Utility mapping? (8)
12. Strangely, GRE boiled down to this scientist's name. (2,7)
13. Father of a paradox is almost a noble gas. (4)
14. Compare to get slope? (13)
16. Endless ship, you and me, almost make a metal. (8)

DOWN

2. Scientist went on madly. (6)
3. Curry around it pulls us down. (7)
5. For example, low-wavelength bone for communication. (9)
7. Intestine lost time digesting the physicist. (8)
9. Puzzling algorithm is a manifestation of power. (8)
11. Mineral in them is a proven result. (7)
12. Sweet-smelling substance is not a festival. (5)

For Cryptic Crossword basics, refer to
<http://tinyurl.com/cryptic-iitb>



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