

Prof. Karandikar completed his B.E. in 1986 and M.Tech and PhD from IIT Kanpur in '88 and '95 respectively. After working with ISRO, Ahmedabad and Centre for development of Advanced Computing (C-DAC), Pune, he joined IIT Bombay in '97.

He held the position of CC Head since 2008 to 2011. He was also Head of EE Department for the period 2012-2015.

His research interests are Wired/Wireless Networks, TV White Space, Device to device communication, Software defined networking.

Prof. Karandikar is well-known for among students for being perfectly punctual. A favorite for teaching the Digital Communications course, he is one to be feared if you manage to invite his anger. Yet, no matter what, he'll always be there to make sure that help is available whenever you need it.

BH speaks to Prof. Karandikar about life after being HoD, the range of projects he is currently working on and the key to managing all of it efficiently.

**Your tenure as the head of the department ended last summer. How is life different from when you were holding the head's position and now?**

When I was HoD, a lot of time was spent in administrative work which I don't have to do now. I continue to be busy even now due to other positions I am currently holding, for example I am the Professor In-charge of the IITB Research Park, and also I am driving two large initiatives, one of them is at the national level. I am the Vice Chairman of the governing council for the Telecom Standard Development Society of India (TSDSI). Second one is the rural broadband. All these activities started after I relinquished

## Interview: Prof. Abhay Karandikar

⊗ Saurabh Kumar, Dhriti Shah



my headship at the department. Apart from these there is also the NCETIS project. So I continue to be busier than when I was holding the head's position.

**Did you enjoy the administrative part of the work?**

Yes, it gave me an opportunity to make a difference. Of course in the department most of the decisions are taken with consensus from the faculty members. Yet you have an opportunity to implement what you feel is important. My role currently at the IIT Bombay Research Park is also on the similar lines.

**Can you tell us something about the NCETIS program which you are heading?**

NCETIS is setup with an objective to address the tech requirement of the state and central police forces, which is currently not addressed by any institute. The DRDO labs primarily address requirements of the armed forces, that is, Army, AirForce and Navy but we don't have any technical research division for state police forces and that is why I have been championing the cause for 2-3 years now. Finally the government agreed and sanctioned us a grant of 80 Crore rupees and we have participation from around 12 faculty members which are spread across departments like EE, ME, Chemical, Aerospace working in different domains like sensors, explosive detections, broadband communication systems, unmanned vehicles,

sensors, explosive detections, broadband communication systems, unmanned vehicles, UAVs video analytics, cyber security, cryptoprocessing, secure handsets, etc. Products that are important for the state police forces.

**TV Whitespace live network is another one of your exciting projects and we got to know from one of your students that your team had set up an ATM in a village in Palghar. Can you tell us about that?**

We have launched a network in 7 villages in the Palghar district, it is a live network. The network facility has been given to all the villagers and they are using it. We have setup 3 kiosks to access various e-governance services. And yes, we also tested an ATM machine there and now we are scaling up to 25 more villages with a further plan to expand to 500 villages.

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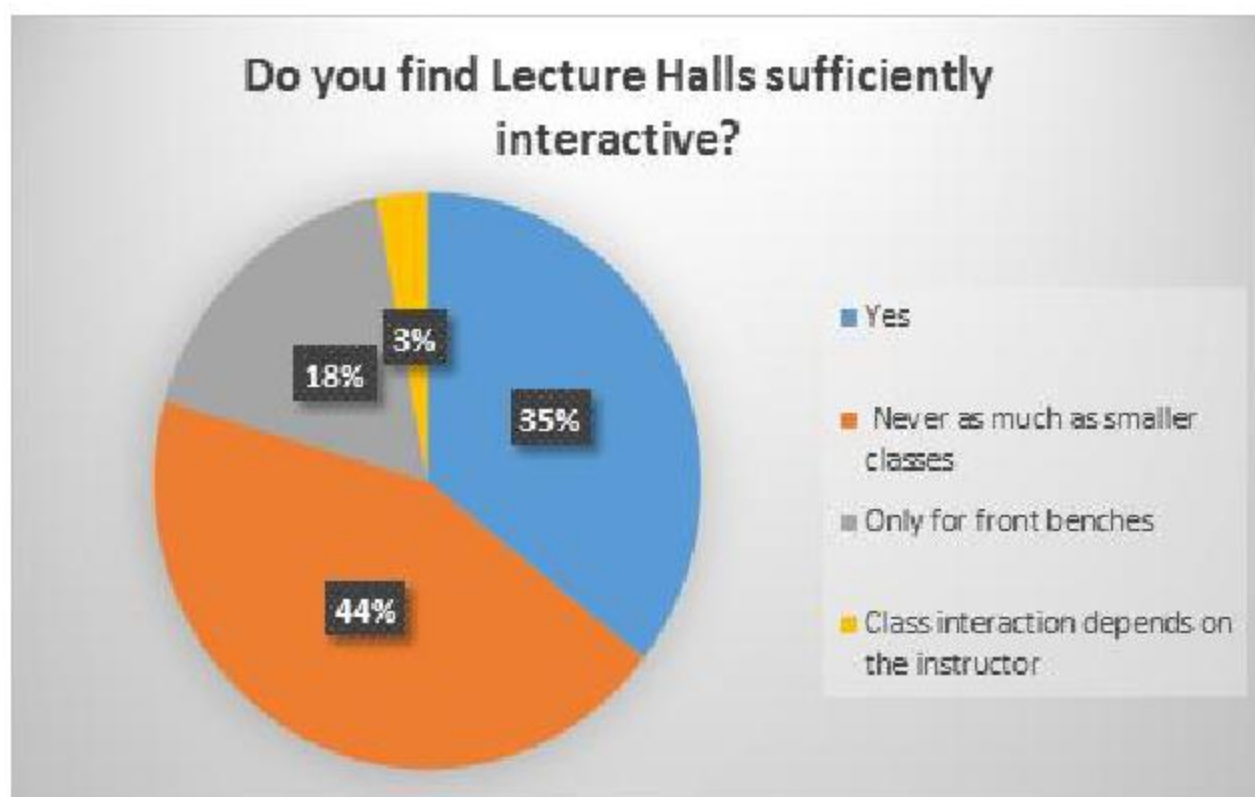
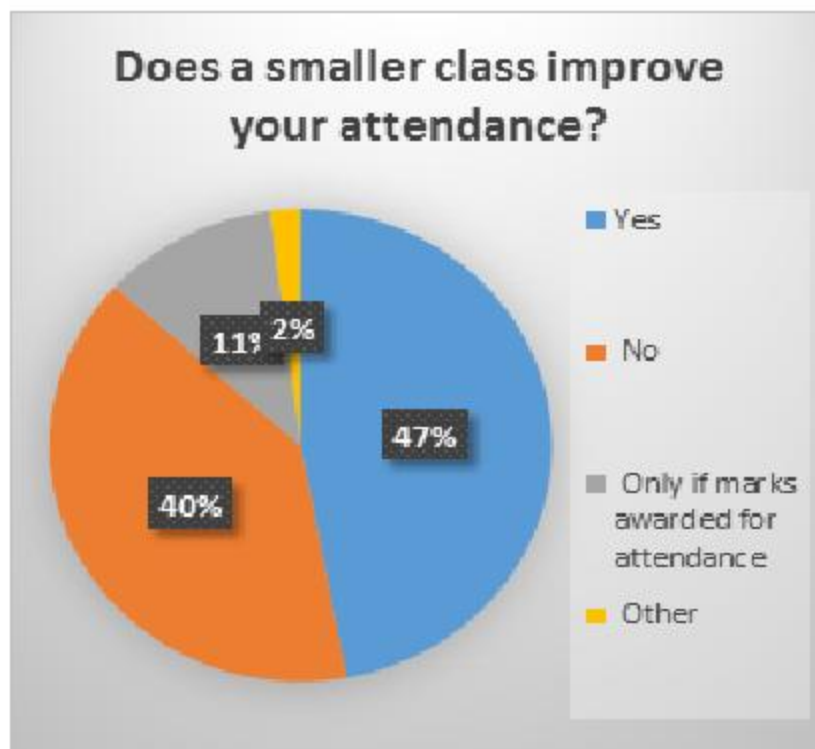
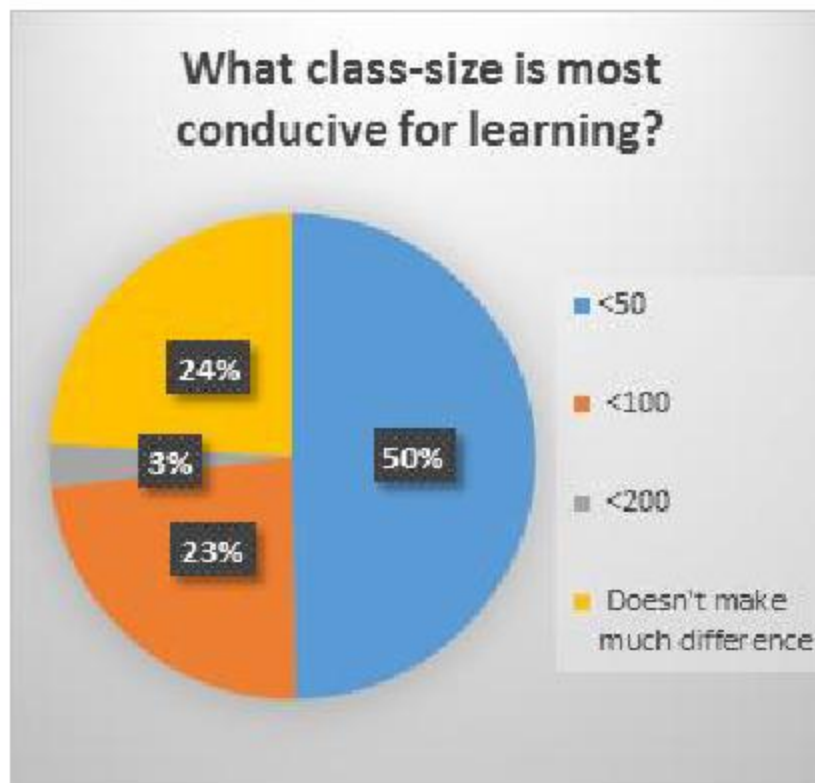
# Lecture Halls vs Conventional Classrooms

⊗ Ritika Bhamare

When President Obama announced targeted funding to bring USA's classrooms up to a 21<sup>st</sup> century standard, many educators around the country applauded his vision. But then asked, "What does a 21<sup>st</sup> century classrooms look like?"

Over the last five years or so, the advent of Lecture Halls has brought changes to learning in more than one ways. Class strength has increased bringing along its own baggage of pros and cons, teaching (to quite some extent) has moved from blackboards to PowerPoint presentations on screen; basically we have put our technological foot forward in order to enhance learning experience. While adjusting to the change has been a challenge to both students and instructors, the result it effectively has on learning is pretty much the students' side of the story.

We asked students about factors that affect their learning in a classroom and also about the existing infrastructure. The result was a good 24% saying that class-size does not matter, but a whopping 50% students are of the opinion that a class-size of less than 50 students is an ideal learning environment.. Also, 47% of the students said that a smaller class has positive effect on their attendance (since it is easier for the instructor to keep track of students in a small classroom) and 44% students maintain that interaction in smaller classes is incomparable to that in a large class. The statistics clearly establish that learning in classes of a small size is more effective.



A class size of 130-180 is generally encountered in first, second, third year Undergraduate courses and also some first year M.tech courses, these being the courses common to an entire batch. One approach used in the past with first and second year UG batches, was to divide a class into two groups to be taught in parallel by two different instructors. Given the constraints on student-to-teacher ratio and number of classrooms available, it is not yet practical to use the idea with all large classes. It also means under- utilization of classrooms in the Lecture Hall Complex (LHC). Another way to look at this problem is in terms of the changes that can be made to large classrooms so that they deliver an experience just as good. At which point, suggestions from students come in handy.

In terms of infrastructure, though LHC classrooms are strongly voted as the better ones, it turns out that there is quite some room for improvement.

GG classrooms are far from ideal. Basic facilities like lighting, ventilation take a serious hit.

In terms of infrastructure, though LHC classrooms are strongly voted as the better ones, it turns out that there is quite some room for improvement. Maintenance issues like broken chairs, proper working of both projector screens, air conditioning too strong, need to be kept in constant check. The sound system in particular faces problems quite often. One important problem that needs to be tackled is use of the board being hampered. Visibility from the seats on the sides is poor, whereas if a student sits at the back, following the instructor becomes troublesome once the board is in use. Use of sliding boards in some of the classes could help ease this concern. Another problem that these classrooms face is class participation. This can be best enforced by the instructor through adopting policies like awarding marks for attendance/participation, encouraging the class to brainstorm over problems for short durations in class and asking questions.

While having established that smaller classrooms are more conducive learning environments, we found that with respect to infrastructure, GG classrooms are far from ideal. Basic facilities like lighting, ventilation take a serious hit. Students complain that in a hot climate, it is practically impossible to endure a class unless one sits under the fan.

One approach used in the past with first and second year UG batches, was to divide a class into two groups to be taught in parallel by two different instructors. Given the constraints on student-to-teacher ratio and number of classrooms available, it is not yet practical to use the idea with all large classes. It also means under-utilization of classrooms in the Lecture Hall Complex (LHC).

Seating is extremely uncomfortable especially since most classes conducted in the building span over an hour and a half. The seats are also not well spaced and as bewildering as it is to see nails poking out of the floor, they are likely to cause accidents. Besides, there are not more than a couple of sockets in any classroom that are in working condition, so laptops cannot be used. Classes on the lower floors also experience a lot of background noise made worse by the non-availability of a sound system in the smallest-sized rooms.

Classrooms do play a role in the teaching-learning process and as seen from the response, a rather important one. If students are to be encouraged to attend classes regularly and derive value out of the experience certain changes need to be enforced. Currently there exists a gap between what is and what is desired, mainly when it comes to the GG classes. As far as the LHC classrooms are concerned, even the Department may not be able to implement changes, but plans for renovating GG classrooms in the near future should certainly be meditated.

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## Continued from page 1...

### **Another one of your students told us that you are in touch with Ratan Tata for your projects! Please tell us about it.**

Mr. Ratan TATA is interested in funding the TV Whitespace project and we are getting funding from TATA trust. We may be doing this pan India as well. Immediate focus is to extend from 7 to 25 villages in Palghar district and then do 7 villages in the Gadchiroli district in Nagpur. Next we plan to cover 250 villages and then maybe whole of Maharashtra. And the next target would be Andhra Pradesh

### **You are also involved with the setting up of the upcoming Research Park at our campus. Can you tell us about that?**

The model for the research park is something like this, we will have companies set up their RnD labs here with their own engineers working. We are in the first phase of construction of a building with 250,000 sq. ft. of space which will expand to 500 thousand and a million sq. ft. in the next phases. The idea is to have companies set up their RnD labs and they will essentially be paying the rent to IITB. From a company's point of view it is same as the Bangalore or California office. What we want is that once they have an office here, it'll not be rent only activity. It will be necessary for the companies to demonstrate that they are doing some collaboration with faculty members and students. So in order

to be located on the research park they will have to earn some credits and these credits will be earned by sponsoring fellowships, projects or internships for IITB. Thus they can be located on the campus. Around 4-5 companies have already expressed interest for this before we even started. We have selected an architect for the construction which will kick off around October of this year and it'll take around two years for the first phase to be ready. Apart from that, we are also in talks with companies who would want space to start immediately and work with IITB. A land of 6 acres area has been allotted for this and there will be auditoriums, banks cafeterias etc.

### **One of things that we can't help but notice about you is that you are very punctual and have a well-organized office. How do you manage to keep up so consistently?**

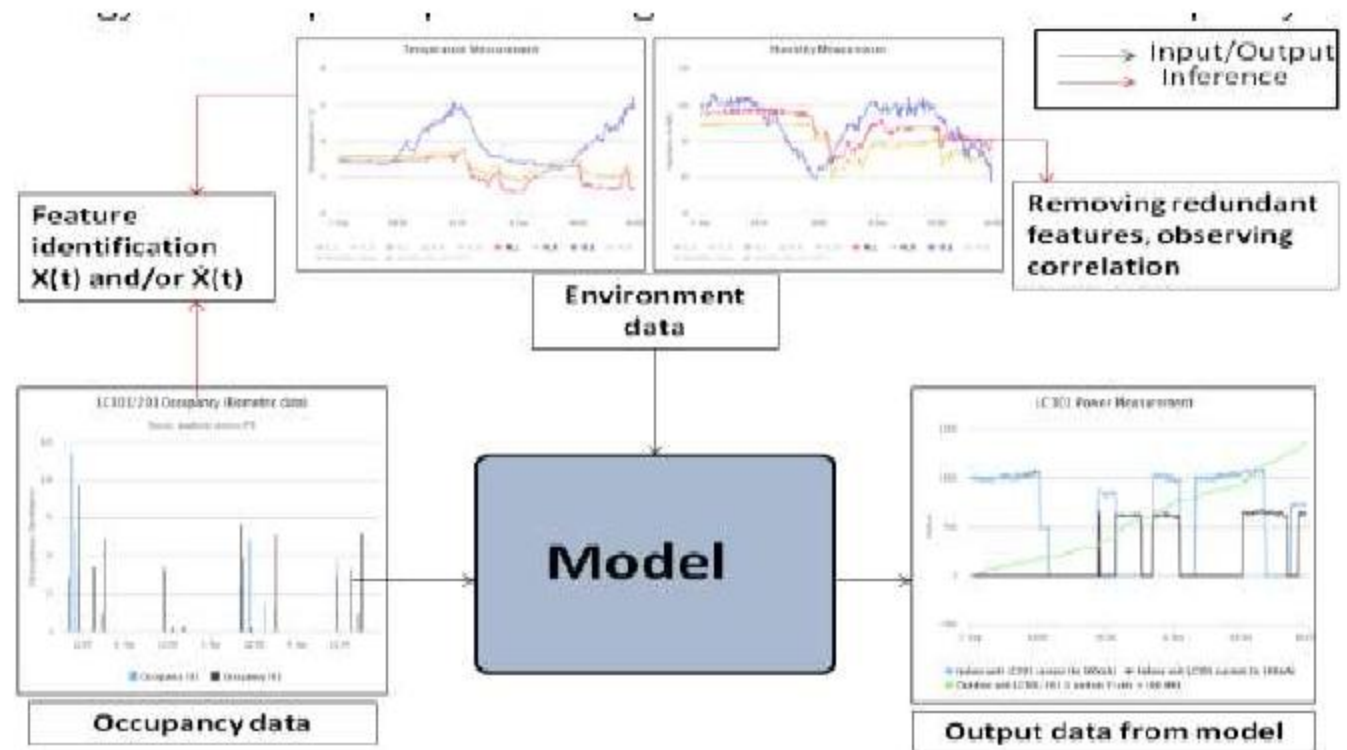
Being organized is the key to the fact that I am able to do so many things. I think being organized and on time is very much required for doing any kind of administrative work. To handle these kind of leadership roles, especially for projects of a national level, being organized is very much required else you will end up in a mess.

*That's some good advice for all of us procrastinators!*

# Sensor Networks for Solving Real life Problems

⊗ Dhruvi Shah

The biggest question we ask ourselves today is whether we are using energy efficiently? Is there any way that we can optimize the current energy consumption? Vinay Joshi, an Mtech student in the Electrical Engineering Department used sensor networks to study the energy consumption patterns against a few parameters, in the lecture halls. The main aim of the project is to develop a model to optimize the energy consumption while maintaining a comfortable environment in the rooms.

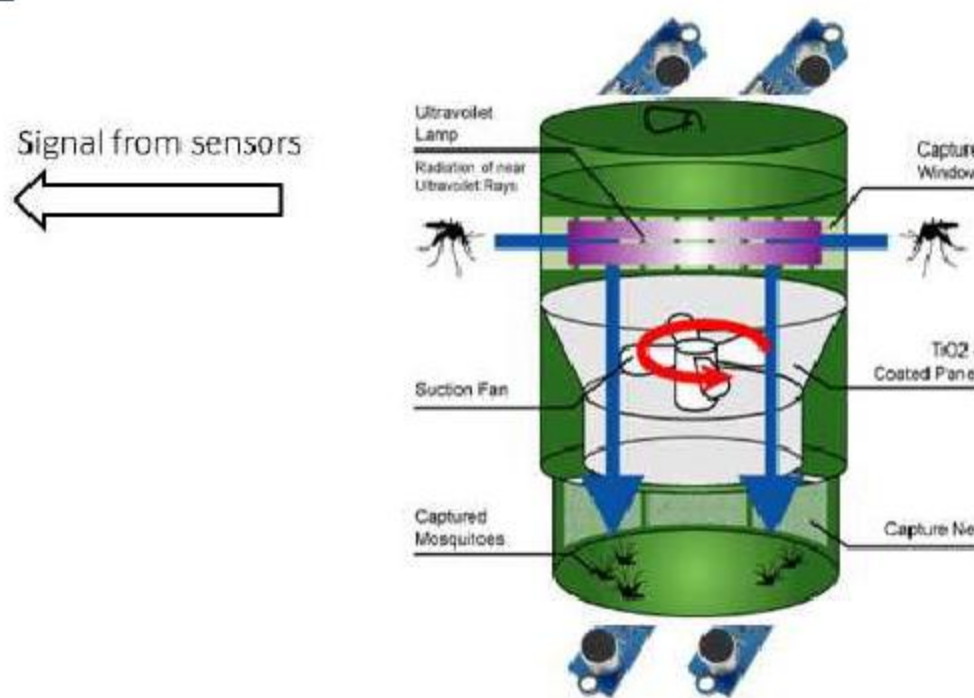
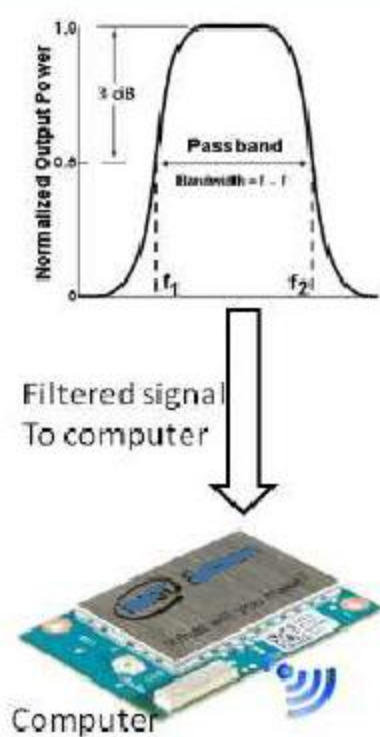


- How to solve this problem?
- Predict energy based on some known features
  - Forecast energy usage using this obtained model
  - Dynamically schedule classrooms based on known features to minimize energy consumption
  - Identify wastage of energy based on features
  - Control power hungry appliances so as to minimize power consumption and still maintain desirable conditions in classroom
  - Determine efficiency of power hungry appliances hence

Temperature, humidity and luminosity sensors are installed in the classroom at various locations. The data from these sensors is then transmitted wirelessly over Zigbee protocol to a central node which then sends the data over ethernet to a server. The sensors are integrated using Microcontroller board - Libelium Waspote. Energy meters are installed at the AC, light and fan units of the classroom. The data collected from the server and the occupancy data

of the classroom is then used to develop a model which predicts energy consumption given the environment and occupancy. Dengue and malaria continue to plague our nation. These are mosquito borne diseases and currently the action taken against them are all preventive measures which mainly include spraying mosquito repellants. Using sensor networks, a preventive rather than curative solution has been proposed. Study has shown that different

types of mosquitoes can be distinguished based on different wingbeat frequencies. ie a dengue carrying mosquito has a distinct wingbeat frequency histogram than a malaria carrying mosquito. If we could obtain the mosquito density in a certain region, preventive measures can be suitably taken. This data is obtained using sensor networks.



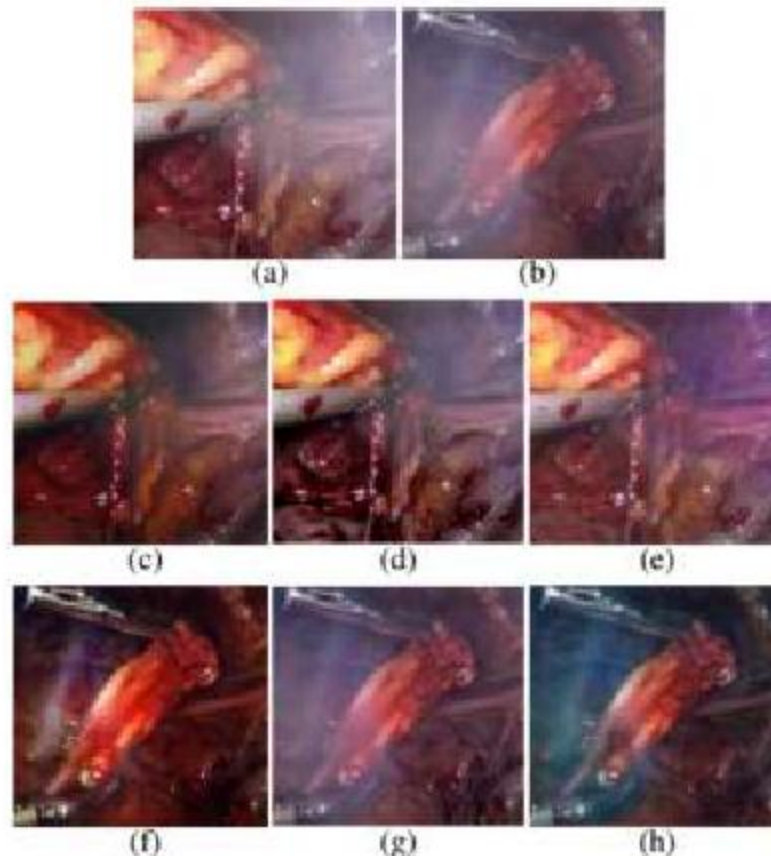
A device which simulates human temperature, is used to attract mosquitoes. A high sensitivity microphone is placed in this device which senses the wing beat frequencies. This is then filtered out for the particular range of frequencies we are interested in, for instance the frequency range corresponding to dengue carriers.. The filtered signal is sent to a computer server.

# Laparoscopy Image Enhancement

⊗ Alankar Kotwal, Riddhish Bhalodia

Alankar, a fourth a year DD student and Riddhish, a final year B.Tech student, both pursuing research under Prof. Suyash Awate of CSE Department will be presenting their work at the International Symposium of Biomedical Research. They go on to write about it.

We have proposed a novel algorithm to enhance the laparoscopic images by removing the effects of surgical smoke and noise. This will help improve the surgery time, reduce surgical risk and will act as a pre-processing step for many medical vision algorithms. We formulated a bayesian inference problem on the hypothesised degradation model and learned specific priors for laparoscopic images. A crucial observation was made by plotting the histogram from the data of the clean laparoscopic images, we have found that these histograms can be very well modelled via gamma distribution functions and they do not change significantly between singular clean images. Using this observation we constructed a histogram based prior and included it in our probabilistic formulation, and it made our method significantly better than the state of the art dehazing methods.



**Figure 1 :** (a)(b) The real laparoscopic images, (c, f) Our results, (d,e,g,h) Results from two different dehazing methods

Degradation Model:

$$Y_i = T_i X_i + S(1 - T_i) + \eta_i$$

$Y_i$  : Corrupted image (observed)

$X_i$  : Clean image to be recovered

$T_i$  : Transmission Map (the degradation due to scattering by smoke particles)

$\eta_i$  : Additive Gaussian noise

$S$  : Corruption color (ambient scattering)

Then we propose a simple MAP estimation as

$\text{argmax}_{\mathbf{x}}(\max_{\mathbf{t}} P(\mathbf{x}|\mathbf{y}, \mathbf{s}, \mathbf{t}))$ , where the posterior  $P(\mathbf{x}|\mathbf{y}, \mathbf{s}, \mathbf{t}) \propto P(\mathbf{y}|\mathbf{x}, \mathbf{s}, \mathbf{t})P(\mathbf{x}, \mathbf{s}, \mathbf{t})$ . Here,  $P(\mathbf{y}|\mathbf{x}, \mathbf{s}, \mathbf{t})$  is the likelihood of observing the data  $\mathbf{y}$ . We design the prior  $P(\mathbf{x}, \mathbf{s}, \mathbf{t}) \propto P(\mathbf{x})P(\mathbf{t})$  and the  $S$  is obtained as a heuristic. For edge preserving smoothness we used MRF priors on  $T$  and  $X$ , along with that we also used a histogram prior which penalizes the deviation of the estimate's histogram from the learned gamma distributions. Using gradient descent with adaptive step size we solve the formulated optimization problem and recover  $\hat{Y}$ .

The validation of the above algorithm was done using both simulated images as well as on real laparoscopic images, we also made a qualitative as well as quantitative (RRMSE) comparison of our results with that of existing dehazing techniques (Figure 1). From the figure it is also clear that the proposed method not only removes the smoke well but also preserves the naturalness of the images. To evaluate the practical usage of this algorithm we also conducted clinical poll from several surgeons who scored our results based on their visual quality, the scores leaned in favor of the proposed method.

Future directions of the work would be GPU-based optimization of the algorithm to make it online, and to be deployed as a complete product for surgeons to use, also improving the algorithm by having an EM formulation of the likelihood estimation.

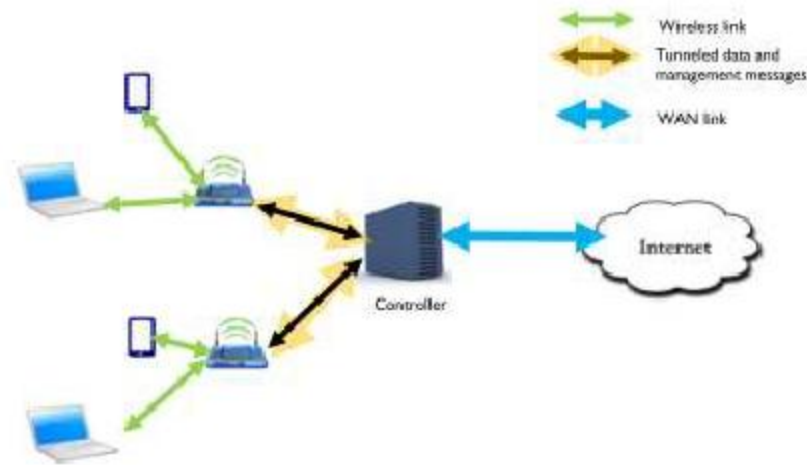
<sup>1</sup> *Laparoscopy*, otherwise known as *minimally invasive surgery (MIS)*, is a medical procedure in which a fiberoptic cable inserted in the body, with the assistance of a video camera and several thin instruments, inspection and surgery are performed. Advantages of MIS are tremendous, the surgical wound is smaller and hence the rehabilitation of patient is much faster (A normal 15 days discharge period is reduced to 2-3 days when we use laparoscopic procedures to do the surgery), also there is a reduced risk of wound infections.

As laparoscopic surgery involves putting a camera inside the body, visual quality of the received images is of the utmost importance. One of the factor in degrading the visibility of the laparoscopic images is the *surgical smoke*, it's mainly produced during electrocauterization procedures. Surgical smoke and the sensor noise not only hinders the surge's visibility but it also degrades the efficacy of the algorithms for robotic surgery.

# Case Study: 'How's of Campus WiFi Network

⊗ Saurabh Kumar

Our campus is known for the best internet speeds across the country. You sure have used wireless somewhere in the campus, either on your mobile phone or laptop. Pushing ON the WiFi button of your device will usually pop up 3 networks available, IITB-Wireless, Eduroam and IITB-Guest, These networks are pretty much omnipresent, at least so in the academic area. Well, have you ever wondered how these networks let us surf internet seamlessly and how do they work?



## •Controller

- Communicates to AP about connections, configuration various other things

## •Pre Configured APs

- Like identifying controller, data to forward to controll what data to accept from i

## • A Protocol

- For communication and se up the deployment

Figure: Rough view of how various components sit together



BH speaks to Aniruddh Rao, 3rd year M.Tech RA about the IITB-Wireless in particular. How did it come up and what does it take to set up such a network? Aniruddh, as part of his research work on standard protocols, explores how to achieve interoperability in wireless LAN.

Wireless of course as you might predict, needs a huge campus-wide installation of a number of Access Points (APs). Another thing is that at this large scale, things cannot be done manually! There is need for maintaining consistency and ease and flexibility of operation. This certainly demands for some sort of central management. So let's talk about how this management is done for such a large scale deployment.

Yes, there is a central controller that talks to the APs about configuration and connections. All this has its own protocol and is proprietary. A few important features this has to offer are the support for multiple networks (IITB-Wireless, Eduroam, IITB-Guest...), temporary networks for workshops & conferences along with facility of Roaming .IITB-Wireless is a centrally managed deployment by ARUBA Networks.

The IP address to a device you

connect is given by the DHCP server of central WiFi controller. The wireless connection belongs to the VLAN in which the controller is present and there is a tunnel from AP to the controller.

Err, what is tunneling? And whatever it is.. How is it set up?

Tunneling is packetizing an IP packet again and forwarding it. Hope you know about VPNs. If not, a VPN - Virtual Private Network extends a private network across a public network, such that the end devices communicate to each other over public network like internet without any parsing at nodes in the middle. It is as if they are communicating to each other directly. In the case of Wireless at Insti, the tunnel is between APs and the controller. All the packets from a client connected to AP are forwarded to the controller in a tunnel and vice versa.

Here are the steps of events that take place during setup of AP:

- A preconfigured AP gets connected.
- The AP is configured with the address of controller so it goes ahead and contacts it.
- Controller then authenticates the AP and sends a reply giving the permission to setup a tunnel.
  - AP sets up the tunnel with controller.
- If any client tries to connect to this AP, data will be forwarded to controller and controller manages the connection from thereon.

Okay so how does an AP look like? You might have seen a device, as seen in the second image above, up in various places across academic area, Lecture halls, Department buildings etc.

What do these fancy APs have which a normal AP lying around in your room doesn't?

These APs have dual band radio cards along with Power over ethernet (PoE) port. On each of the radio card are hosted 3 networks and deployment uses non-overlapping

channels. Each radio card has its own MAC ID. Each of the 3 networks are hosted on different logical/virtual interfaces, equivalent to different APs and connections to each one of them is managed independently. The APs support IEEE 802.11 a/b/g/n technologies.

Another awesome feature this deployment offer us is that of roaming! You must have noticed that even if you move from one floor to another, the connection doesn't drop! Have you wondered how does this happen? Surely your mobile phone has switched to another AP automatically or something of that sort but what exactly is being done behind the curtain?

Wireless deployment in insti provides us with Extended Service Set(ESS) which means that, many APs are configured with same SSIDs and security credentials. For a client, all this is just one network (Since the SSIDs are the same). Within a ESS, client distinguishes APs from each other based on BSSID(ID based on MAC ID).

In WiFi, switching connection is always a client decision. As the signal from connected AP falls below a threshold, the client looks for another AP in same ESS and connects to this new AP. A client always switches to another AP within same ESS preferentially. Even if the signal strength of random WiFi is more than that of IITB-wireless,

client always switches to another AP within same ESS preferentially. Even if the signal strength of random WiFi is more than that of IITB-wireless, client prefers switching to IITB-Wireless. This is what happens with IITB-Wireless as well and the flow continuity is managed in a proprietary way by the controller here. Client switches its connection to another ESS only if no AP in the same ESS with better signal is available.

There certainly are a few shortcoming of this structure as with most things. One is that the entire setup is proprietary and is deployed by ARUBA networks and the tunnel along with the protocol are not standard. Secondly the deployment may not be scalable as all the data has to go to the controller all the way. To achieve interoperability across different vendor APs, standard protocols for communication, WLAN management should be followed. For eg. there are a few standards like CAPWAP and TR069 for this purpose. Also, multiple controllers may be used to scale the deployment. A hierarchical structure would address the scalability issue efficiently like having a local controller handling activities like roaming and a global controller to manage authentication.

## From the Editor's Desk

Greetings from the BH team!

Background Hum was last published in 2012, so understandably, only few are aware of its existence. While I hope this edition serves as an interesting read about some issues pertaining to the Department, I would like to talk about the objectives with which the content has been put together.

Being one of the highly ranked schools of engineering, our Department fares high on the scale of achievement. **Yet there isn't so much as a medium to show appreciation for people's work** beyond the word of mouth or posts on Facebook. As a community that is relatively large in size, our Department faces a lack of interaction between its various factions. Events like Department Sports Day, trips are attempts to have it otherwise but the level of participation remains low. A limited familiarity with people also **means limited awareness of people's work and other avenues that are outside an individual's sphere of concern.**

In this edition, we have tried to bring to the fore some appreciable work our student and professor have done in recent time. Besides, we have also discussed some issues that concern all of us, with a vote from students. With a constraint on volume of content, I admit this remains a faint attempt to do what we intended.

Besides this Newsletter, EESA also maintains a blog which currently has limited activity but I would like to invite you all to contribute to it. It can serve as a platform to initiate discussions, share experiences.

Your feedback on this edition would also be appreciated.

**Ritika**



# Confessions of A Freshman: Electrical ki maggu/machau junta

⊗ Devyani

Supposedly, the most memorable year of our tenure here in IITB, “The freshmen year”, as everyone puts it; has indeed been involving, to say the least. Starting with writing about stepping into our corresponding rooms and finding out about our respective roomies, I feel overwhelmed recollecting the innumerable memories that we made.

Beginning with the “infy” freedom we got here after coming from an extensive preparation for JEE, everyone was keen to consider going on night-outs with friends. Attending those late night orientations, where everyone’s centre of attraction were freebies, especially those lovely Tees, is a particular topic of nostalgia. And more eventfully, this was an exordium to the seeping-in of the insti lingo into our very blood! Thinking back to Freshiezza, a quintessential source of the multitudinous impression that’ll stay with us forever, brings a rush of wistful affection. The first few weeks passed in a haze, when everyone is in “enthu” to bathe right in the morning and recklessly attend classes after classes. EE111 class, scheduled in the late afternoons, took all of our willpower to stay awake. And forget about being attentive enough to decipher the cryptic code in which we were being taught! The continuous droning of the professor made it even more challenging. Many of us survived it though. But many didn’t. The juxtaposition of the first benchers, attempting to widen their eyes (to keep them from dozing off, of course), furiously taking down notes, ignoring the friction that might as well cause the paper to burn up if the intensity went up a bit more; with an intricately made line of snoring last benchers; was poetic contrast at its best.

The amount of assignments furtively sneaking in, to be done on weekends, and demanding extra hours of study, as opposed to the students from other departments, was a subject of bitter resentment amongst us, the *elec junta*. But as the marks started revealing their true “fickly” nature; we soon realised that these weren’t those spoonfed school exams or those JEE MCQs. And then began the holy-muggai of the maggu junta of electrical department, where after the results, many were threatened to get a GPL and others were merely looked at in blind admiration along with comments like “machaya bey!”

More importantly, the matters of common gossip amongst us, elec people, that ranged from the (sometimes called-for) diatribes of the department head to the lengthy cumbersome questions asked in the quizzes to the approval of requests for the extension of holidays to the bad-mouthing of CRs right to their faces, all done in a good humor, made our other non-elec friends bang their heads in pure frustration, which we merely shrugged off as “just department things”, were rather hilarious.

It is matter of proud privilege though, when we look at the seniors of our department in almost all the activities, attaining ingenious kinds of novel achievements in not only academics (which is generally assumed, once we mention our branch), but also various divisions of cultural, tech, and sports. Their constant *fundae* and help made it possible to not only survive but savour (despite the academic pressure) every bit of this semester to the brim.

The constant nudging homesickness we felt initially dissolved somewhere among the bubbling laughter when a friend cracked a pathetic joke to lighten up the environment, after a challenging exam (especially in the DICs) and in those moments when we started calling our places “home” instead of “hostel”. We have surely come a long way in these four months and our department feels like a huge family now and we wish to turn every second here to a memory we’ll cherish for the rest of our lives; so we can tell our kids in future how very “machau” our department can be!

I’d like to sign off by mentioning Sumit Shekhar, a physically disabled boy, whose sudden demise has been an absolute tragedy for the whole of our department. He was a passionate boy who inspired others to live life even after such unfortunate predicaments. Our solemn condolences for the departed soul and his family. It’s hard to imagine classes without him. But we’ll always think of him when we look at his seat in the front and we’ll know he’s there, taking down those meticulous notes. So today, we, elec people stand united to give him a final goodbye as equals and to wish upon heaven for him. Rest in peace, Sumit!



# Students' Reading Group: All you need to know

⊗ Saurabh Kumar

Surely, most of us have heard/ seen emails about the Student Reading Group (SRG) in our Department since the previous semester. Though such groups have existed in foreign universities for a while, in our Institute, this the first experiment of its kind. An initiative by Sagar Sharma, Department Masters' Representative, BH talks to him about the idea behind SRG and how it works.

## **BH: What was the motivation behind starting the reading group?**

Sagar: The main idea was that a lot of people are doing cutting edge research in their labs but there is no discussion among the students about what they are working on. Sometimes, **even in the same lab people aren't aware of what others are working on. So Reading Group** is a platform for the students to come up and share their research problem and ideas and get feedback from their peers in the process. Another thing I observed was that in the presence of faculty, **students weren't** talking openly enough and hence reading group talks have **only student attendees and no faculty. This way the speaker and audience can freely and discuss and criticize each others' work** in a constructive manner.

## **BH: How supportive was the Department when you pitched the idea?**

Sagar: **Initially when everyone wasn't aware of the model**, so they were unsure about its success. I worked with Prof. Kumar and Prof. BGF to make them clearly understand the purpose of this initiative and how it would help students. Eventually they understood my points and agreed to this idea.

## **BH: How is the speaker decided?**

Sagar: Choosing a speaker is a very critical part of this activity because if the session is not fruitful for the attendees no one will show up. The average attendance had been 21 in the first phase and hence we are want to make sure that we make the best of the 21 man-hours these attendees give us. The speakers are chosen by the Cluster Representatives (CR), who represent various specializations offered by our department. The CR analyzes the work done by a student and works with them to figure out how he could proceed with a talk. We have proper mock presentations before the actual presentation. Every speaker is required to give 2 mock sessions which are conducted by the session coordinator with the help of PhD session chair along with cluster coordinator. This is the basic mechanism.

## **BH: How often are the meetings held?**

Sagar : We meet up 3-4 time a month except during mid-sems.

## **BH: What are the expectations from this initiative?**

Sagar: We expected improved discussions and collaborative research via improved interaction between research groups and students. Apart from this, we also expected improvements in communications skill of the students and all this might lead to increased number of publications. As of now we have got very good feedback. People have mentioned that this has helped them in placements and looking at the problems they were working on from a different perspective.

## **BH: Now that the culmination ceremony is done for this semester's session. What changes you plan to bring in the initiative?**

Sagar: One major change we are bringing in is that we are inviting one alumni from each of the clusters for a talk. We are coordinating with SARC to do this. As of now we have an EE-CSP alumnus, who is the technical leader at Tensilica along with two others including a professor at IISc and a professor from IIT Kanpur from other clusters to come up and give a talk at the reading group. This is something which is significantly different from what we were doing in the phase one.

## **BH: 5MR (5 minute research) challenge was a novel initiative, how successful was it? Were 5 minutes enough for the speakers to convey their ideas?**

Sagar: Events like 5MR have a different rationale behind them. 5MR was meant to convey your problem statement effectively. I believe if you can convey your problem statement in 5 minutes then your understanding of the problem is very good. So this event essentially tested that how many students are there who are well aware and have a good understanding of their problem. Around 18 students registered for the challenge, 5 PhD and 13 MTech. Finally 3 PhD and 7 MTech students turned up for the event and we had prizes for them. The judges who were faculty members gave a feedback that most of them were not able to convey their problem statement in an effective manner. So this event in particular helped us conclude that most of us are not able to define our problem statement in a better and clear way. So we are conducting this event again this time and we will see how much of an improvement it is from the last phase.

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