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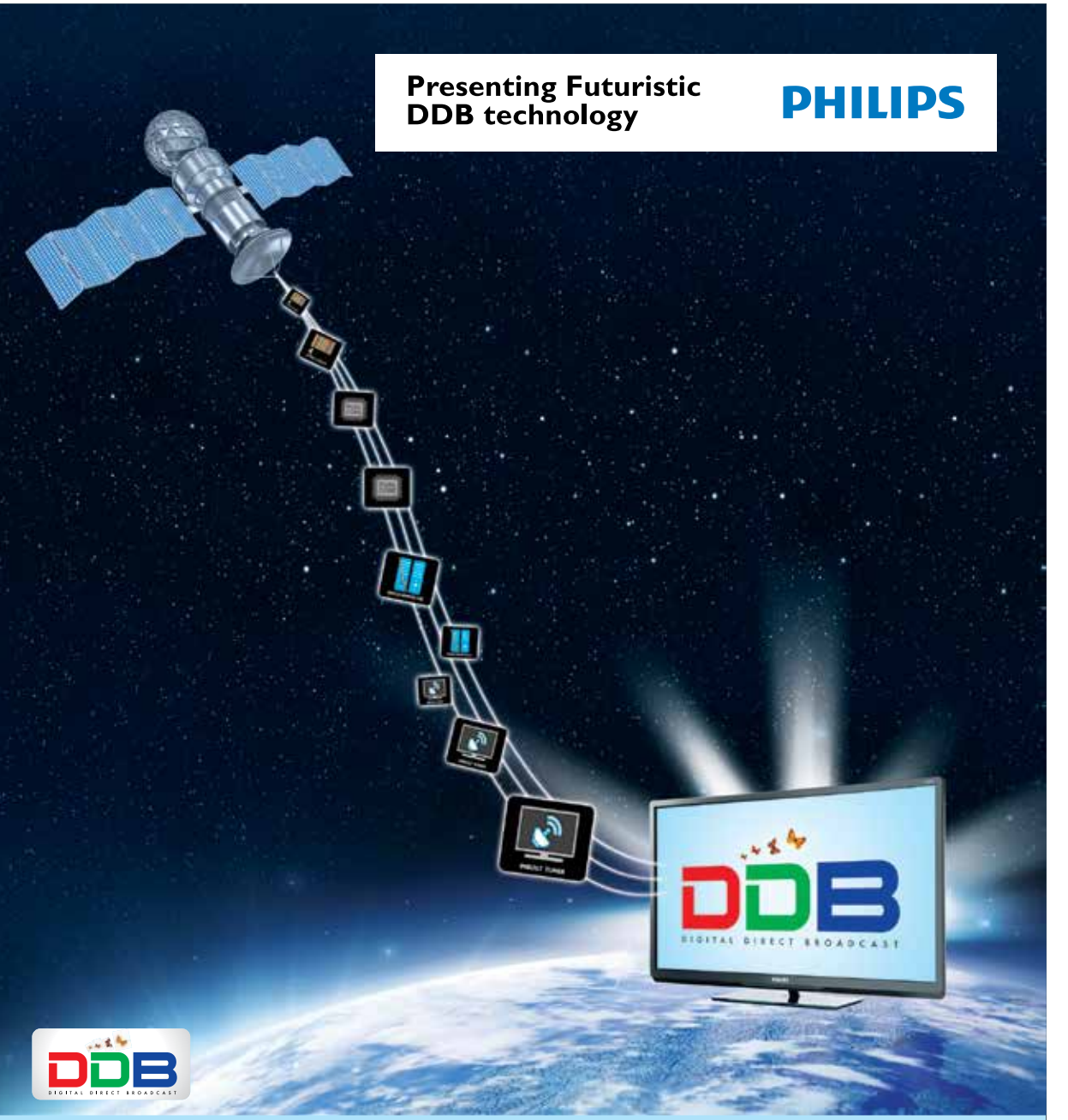
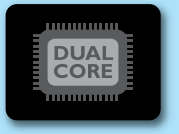
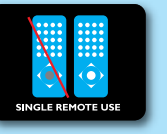
3Q2013







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FUNDAMATICS

3Q2013

IIT BOMBAY ALUMNI ASSOCIATION

Quarterly magazine of
IIT Bombay Alumni Association

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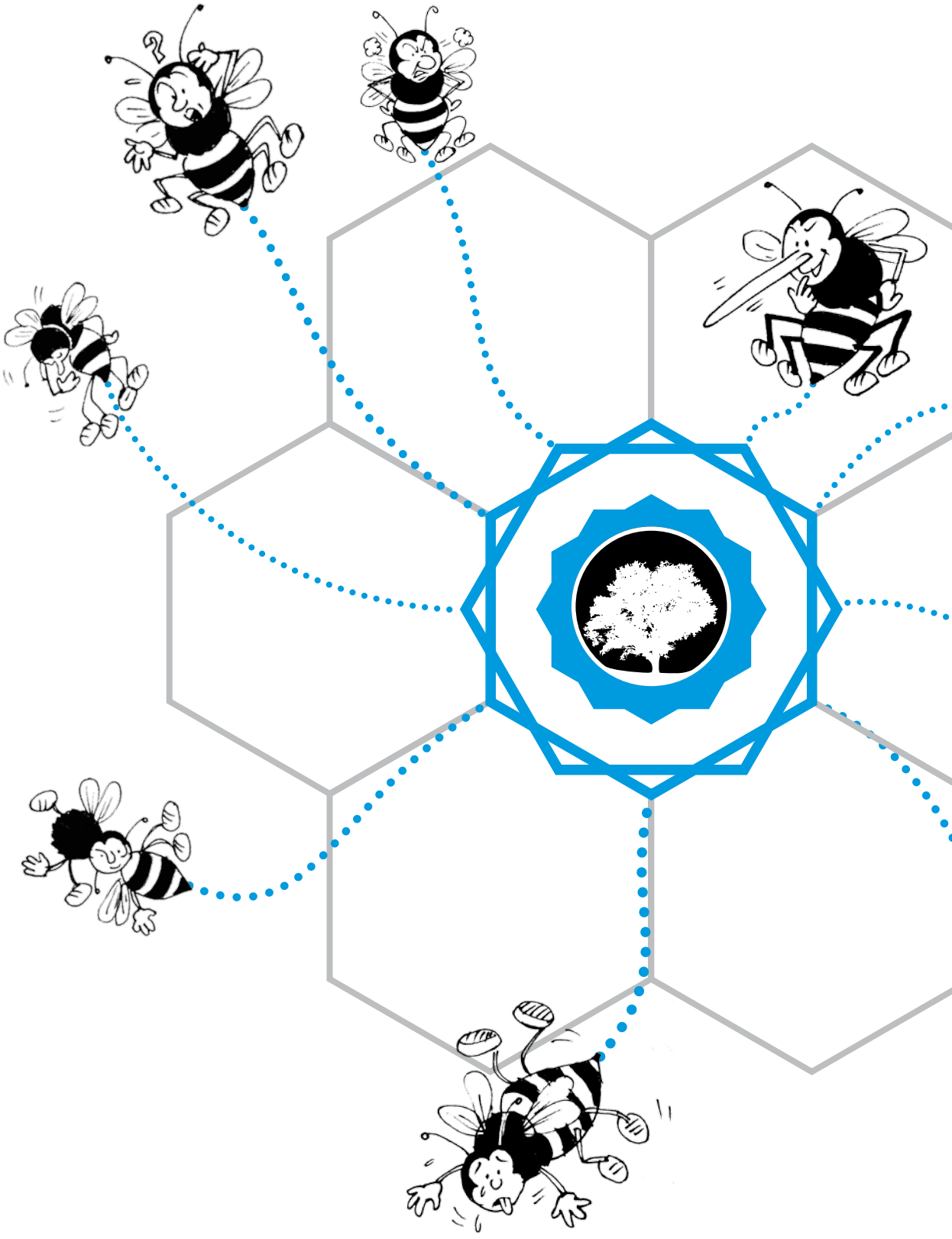
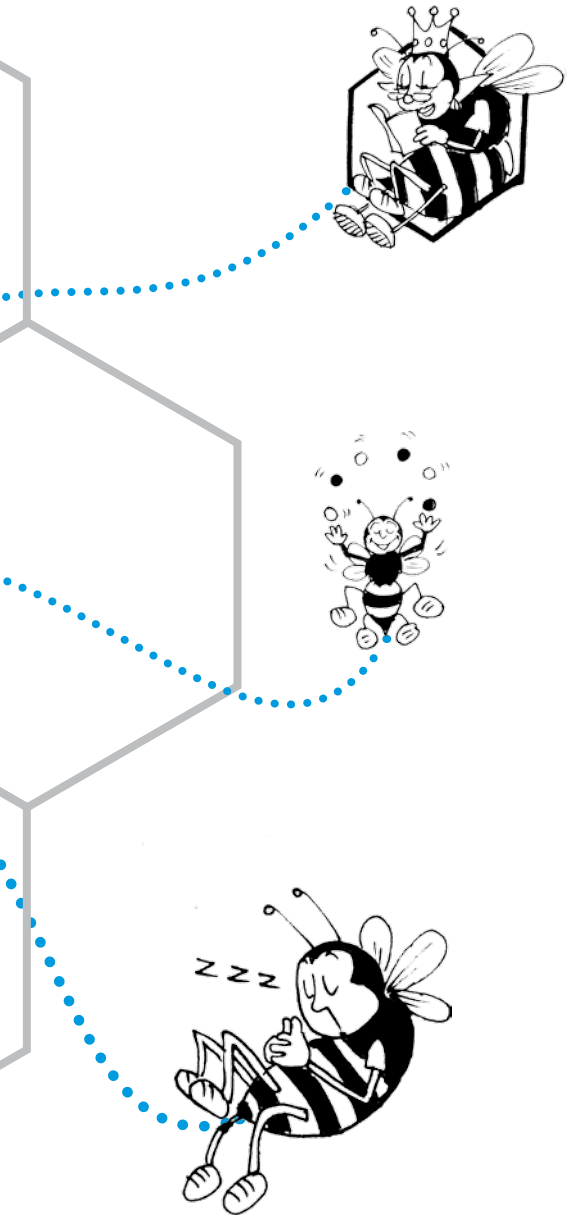


From the Beehive



Catalyst of Passion: ***Fundamatics wins three National Awards…***

I am writing from a happy – scratch that- an ecstatic place while penning down this editorial.

Monsoon came with a veritable bonanza. Fundamatics won three National awards this June. We are now the best in-house magazine in India adjudged to have the best content. It is cause to feel proud. The magazine is just 7 issues old and it beat over 500 entries of established, older vintage produced by multinational corporations, top drawer colleges, institutions and PSU's with unlimited publishing budgets and resources.

Did we just get incredibly lucky?

Truthfully, I was always quietly confident that we would win four and instead of three 'Golds' that we eventually won. It was not arrogance but quiet confidence that few magazines can beat our combination of passion and professionalism. Our content derives from the passion and conviction of a body of world class contributors, all leaders in their chosen field, from far corners of the globe. Our contributors provide us with our intellectual meat, giving the magazine its body and a unique voice of its own. To them we dedicate the "Thank You" section of this edition.

The backbone of Fundamatics however, is its

volunteer editorial team who despite other heavy personal and professional commitments meet deadlines like clockwork, dotting every i and crossing every t with precision. Our creative team and our designer who splash color and art across endless pages until they find just the right accent to make the articles stand out. For them, saying thank you is never going to be enough.

This issue of Fundamatics is also an exercise in acknowledging our creative antecedents. IIT Bombay had another international award winning magazine called 'The Raintree' published by the office of the PRO. Many of us in the editorial team of Fundamatics discovered our passion for publication while working in 'The Raintree'. And now in our own moment of triumph we wish to acknowledge our creative inheritance from it. The magazine closed a year ago and its last issue was never published. The thematic section of this issue of Fundamatics therefore centers on 'Philosophy of Science' and reproduces the best of that last unpublished issue of 'The Raintree'.

The theme explores the depth of our engagement with the study of historical, ethical and philosophical aspects of science in a bid to initiate a dialogue on the role of the internal values necessary for "mature science" and "innovative technology" along with the role of contextual or external values (cultural, social, political, economic ...) of science and technology.

As one window closed we chose to open a bigger and broader window. Like the Raintree, Fundamatics too acts as window through which the world beyond our gates could "look in" to gain insight on happenings and opinions within campus. It showcases and reinforces IIT Bombay and its alumni's image to the world and has grown into a plat form for all sections of the Institute community to "look out" and air views on not just issues that concern IITB Bombay but also the society and nation at large. We hope in time it can emerge as a true global community of opinion makers with the power to change policy and institute change.

On the surface the success of Fundamatics reveals itself on the pages of every issue of our magazine. But it is also my belief that the secret ingredient that makes it all work is our shared passion for the publication; a dedication to quality and a determination to rise to the challenge of producing a world class professional publication.

We have now somewhat idealistically cast ourselves into the role of a "catalyst of passion", to be the kind of magnet that brings together the writer's passion with that of the reader. It is now up to you- our readers, to make it all happen, through the print edition, the E-Zine and its blog space, discussion forums and Facebook page. We hope that you will continue to do so, in even larger number because you feel you have to – from that place of desire.

A new beginning is after all always better than even a happy ending.

Queenbee

Readers Write in

We had a good quarter dear readers. The sixth issue was well received and if that was not enough, come monsoon we got validated by the award Gods. Congratulatory messages have been pouring in and spun off into discussions on IITB history, hostel memories, the floods in Uttarakhand and lord knows what else. The mails are still flying in but we can only reproduce a few of our favourites. To start with there was this priceless mail from distinguished alumnus, Ajit Ranade who seemed to have been a tad too impressed by P C (Present Continuous) Bee and his "Thank you" note in the last issue. Do excuse us for pencilling out the names of individuals. What rules here (as you all know) is the spirit of the hive.

Fundabees

One

All these bees, did give me the hives. I mean goose bumps:)

What wonderfully you are writing. All you bees are hiving. And the Funda is really jiving. I mean also thriving. This whole D gang is giving. Me in the mood to sing sing. Keep it please going. On and ongoing.

Oh God be blessing. To you all, darling. It's me. Will do tring tring. Yours, with loving.

-A. Wanna-bee, Ajit Ranade, B.Tech.,'82, EE

Two

Dear Bees,

What a wonderful issue! I too wanted to go through the entire issue in one sitting, but stopping after reading about former directors is entirely my loss (albeit temporary).

My belated congratulations to the entire team.

Regards,

Ravi Sinha, B.Tech., '86, Civil Engg
Dean Alumni and Corporate Relations, IIT Bombay

Three

Would like to congratulate for the huge success of Fundamatics as evident by the replies by alumini from various geography and generations. Ultimately, *mahenat rang lai.*

Regards

Vrajesh Shah, Ph.D. '08, Chemistry

Four

Trust IITians to make such a bee dee – aw, shucks, I seem to have gotten hooked to this bee thing myself, I meant big deal – out of anything and everything.

First of all, congrats to you silent worker bees, who've worked towards bringing out yet another issue of F'Matics. To a person like me who has spent most of his career

in marketing, the challenges of producing content, hustling for ads from sponsors, dealing with semi-illiterate printers, facing deadline pressures, and so on, are only too well known, which makes your accomplishment all the more commendable.

Ketharaman, B.Tech. '85, Chemical Engg

Then there were the messages that came in after the ICE awards announcement…

Five

Congratulations to the entire Team!!!

Let the bees swarm the entire landscape of Awards...

Tarun Bhagattjee, B.Tech. '85 CSE

Six

It was only 18 months ago when the first issue was published. There were many sceptics, including myself. "Is this a comet of an idea that will appear and disappear?" Many projects come and go; only a few sustain. Mashru succinctly summarized the feelings of many -

" I am not sure of this fuss about 250 page BS and dozen of congratulatory messages. I am not going to congratulate you until you publish on time 6 issues.

We've received excellent training on meeting one time deadline. Quality rarely mattered, form and volume took priority.

Stop wasting time and get on with next issue."

The ICE awards is a convincing confirmation that Fundamatics does deliver quality (and volume) in a sustainable way.

I admire tenacity and persistence of the core team for pulling off this phenomenal achievement.

It is amazing that this is not the only achievement that this group of go-getters have accomplished.

There is real substance here - it's just not fluff.

Congratulations!

Hemant Patel, B.Tech. '79 ChE

Seven

I say, this is fundamatically terrific, I say! And does that ICE have some Bubbly in it, hidden somewhere?

ICE, ICE, ICE! Real cool, I say!

Hats off to all of you! From Bee to Zee!

Satish Hattiangadi, B.Tech. '71 ChE

Eight

The winning ways of Fundamatics is on display; just being part of such a team is an award for us. Everything else is icing, fluff.., actually an excuse to get thoroughly into a liquid state seminar. This does call for a celebratory "seminar" of that kind!

Cheers ye all, Thanks for this wonderful news.

Ajit Ranade, B.Tech.,'82, EE

Nine

Congratulations for a veritable bouquet of well-deserved awards to everyone who has made Fundamatics successful.

I cannot Beelieve I made it through the email without a single bee-related pun. Oh no, I just did ... aaargh.

Regards,

Ram Kelkar, B.Tech. '80 EE

Continued on page 9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Vice Chairman & CEO
Ph.D - IIT - Mumbai, 2005

Vivek Gupta
Chief Executive - Global IM Services
IIT - Delhi, 1984

Aditi Bhargava
Sr. Manager, Strategy and M&A
IIT - Kharagpur, 2003

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Ten

Clearly good magazines lie at the intersection of the best and "most imperative content" and the passion of the "Beehive" ... and I bet creating it was also a lot of of FUN and full of "DAMN-ANTICS".

Cheers,

Anil Padhye, B.Tech. '76 ME

Eleven

Congratulations to all the bees--the Queen and her worker bees--who brought home several ICE trophies. Incredibly proud of you all and contributing IITBees.

Warm Regards,

Pradeep Anand, B.Tech. '75 MetE/MatSc

Twelve

We are a witness to the magic you created through the sequence of:

"Think BIG" as "Nothing is Impossible" if you "Involve EVERYONE" and "Carry 'em Together" but offer "No Compromise At Any Cost" even if you have to "Work REALLY Hard" and yet "Expect No Rewards" and when they come "GIVE CREDIT PROFUSELY" and show everyone the "Power of Leadership that believes in its Team"!

Hats off to all of you! I am truly humbled by the tiny association with you.

I strongly believe this journey of Fundamatics from an just idea to its phenomenal realization deserves to be a case study at IITB.

Cheers!

Shridhar Shukla, B.Tech. '83 EE

Thirteen

Congratulations to all from the Bee family and others who have painstakingly achieved this tremendous feat!

Arun Dravid, B.Tech. '66 ChE

Fundamatics gets ICED

Ali Baba

Fundamatics grabbed the prestigious ICE (In-house Communications Excellence) Awards, the biggest national award in print medium. The first award we got was for "the best magazine among educational institutes". The second award to be announced was for "most imperative content" category. The biggest and the best was saved for the end --"best overall magazine-gold". In short, not only did we reach the very pinnacle of the pyramid, we swept all the awards we were nominated for. Considering that the competition was formidable (roughly 500+ contestants) and included prestigious airlines, banks, institutes, corporate houses, this is a crowning achievement indeed. Oldest member of our team Prof. Ali Contractor (C'73) and youngest member Tejas Suma Shyam (C'12) picked up the awards on behalf of team Fundamatics and reproduced below is a humerous account of the awards night.

We did not realise ICE could produce so much warmth! Thank you all. Tejas and I do deserve some credit for carrying back all that luggage. When Queenbee and Grumble bee kept advising us to take a suitcase along I did not quite get it until I saw the huge package placed in the boot of our cab. But I am getting ahead of my story.

It was raining yesterday like it can only in Mumbai. Monsoon had indeed arrived and it was no time to drive from Powai to Bandra, particularly if you had given yourself barely 45 minutes to reach the venue. But as Ratan Tata says, a promise is a promise, even if it's just a tin can on four wheels. Sitting in the traffic jam on the Link Road, I was contemplating what I would do if the award ceremony was over by the time I reached.

Perhaps I could go and surprise my mother with a Friday night visit rather than the usual Sunday morning. Or maybe I could introduce Ajit Singh, our cab driver, to Papa Pancho and fake rustic Punjabi cuisine. But then Queenbee called to ask how far we had reached and said Renu from ICE had called to ask for us. It was well past the scheduled start time but I have faith in our ancient Indian disdain for time and was not too worried. After a few more calls from Renu to check where we had reached, I realised these people really needed us. Maybe none of the other nominees have turned up!

The welcoming party at the entrance appeared to be eagerly waiting for us and I felt no need to introduce ourselves. We were escorted from entrance to the auditorium by a relay team of smartly dressed young persons and by now I was certain we would be taken straight up to the dais and presented with the trophy, whatever

it was. So it was a bit of a disappointment when we were shown to a couple of empty seats at the back of the auditorium and the MC went on with her compeering without acknowledging our arrival, one hour after starting time.

Fundabees were constantly messaging for updates, Bumblebee even calling to ask 'huva kya?' But we had arrived a little early, because the next item was a Swamy extolling the virtues of good old fashioned books as compared to ebooks, using a power-point presentation. Fortunately, all good things come to an end and this ended too. The MC invited Mr. Farooque Shaikh to the stage to present the award and I adjusted my blazer preparing to go up with Tejas to receive the award, but the preparation was premature. And we lost the opportunity for shaking hands with Farooque Shaikh and telling him how I enjoyed 'Chashme Bad-door', because he left immediately after giving the award to RBI.

After a couple of other awards, the MC announced nominees for the 'Most Imperative Content'. I was wondering, what is 'Imperative Content'? In spite of my skepticism about the category, I was quite happy when Fundamatics was declared the winner.

By now my cool confidence was waning but the very next announcement was for the best magazine from an educational institution and the names of Sophia College and another college were announced followed by IITB. And lo and behold, Fundamatics was declared the winner. We strode up to collect the trophy and pose for a picture, but they did not invite us to make a speech as we were hoping. So it was with mixed

feelings that we returned to our seats. The bees were informed and they sounded disappointed too, but the show was not over yet.

After a couple of other awards, the MC announced nominees for the 'Most Imperative Content'. I was wondering, what is 'Imperative Content'? In spite of my skepticism about the category, I was quite happy when Fundamatics was declared the winner. As the procession of awards proceeded,

The silver went to a team represented by young women and Tejas rushed to shake their hands, while I tried to look dignified. Finally, the MC invited Mr. Kumar Ketkar to give away the gold. "And the winner is – Fundamatics!"

several teams had collected two and Sophia had collected three awards. I was once again feeling not too good – what is this? They are giving awards to everyone? The procession of awards seemed to be finished and members of the governing council and jury were being introduced and the messages from the bee family were getting frantic.

The people seated next to us were probably wondering if we were involved in some kind of betting racket. I felt like I was personally responsible for the all-round disappointment. Just then the MC declared that now we come to moment you have been waiting for. And I thought we can perhaps get one more trophy and level with Sophia. But no, the bronze went to RBI. I know we would have been disappointed at getting the bronze but at least the tension would be over. The silver went to a team represented by young women and Tejas rushed to shake their hands, while I tried to look dignified. Finally, the MC invited Mr. Kumar Ketkar to give away the gold. "And the winner is – Fundamatics!" Getting the trophy from Mr. Ketkar was indeed special.

So much for ICE Impact. Now can you guys/gals go and respond to the IITB Impact Survey, please.

Prof. Aliasgar Qutub Contractor

Prof. Aliasgar Qutub Contractor, former HoD of Chemistry Department, and former Dean Alumni and Corporate Relations, is an alumnus from C'73. Endowed with a rare gift of narrating "serious" and "heavy" matters with a tongue held firmly in cheek, his incisive and informed views on IIT Bombay and alumni relations are in evidence in his column Sim Sim khul ja. He is currently 40 thieves short of his target.

Philosophy of Science:
Putting Society, History and Philosophy at the Centre of the Discourse on Science and Technology

Science (and the technology that emanates from it) and Social Science are often considered as opposing ends of a binary divide. But Science is also a human and historical practice.

The IITs have been quite successful in training their students to use established recipes of their chosen disciplines - by developing a range of skills, habits of mind to further the knowledge of their chosen subject matter. But how successful have they been in attending to the more important problem of orienting students so that they perceive a relevant segment of reality around them, perform novel primary ontological reductions, formulate the pertinent problems and solve them creatively?

About five hundred thousand candidates appear every year for the Joint Entrance Examination. Less than one in 50 of them get admitted into each IIT. These students are all admittedly a bright lot but they are also innocent of philosophy and often ignorant of history. Has history become a boring chronology of events and philosophy and a waste of time? Moreover, in their schools they are indoctrinated with received cannon of what science is. Have faculty in IIT Bombay been successful in sensitising them to the idea that science is a historical activity and there can be alternative creative punctuations of reality more adequate to the lived life-world than those of contemporary science and technology? In this relation, it is also important to ponder on the question - how deep is our own engagement with the study of any historical, philosophical aspects of science?

For this issue of Fundamatics, we would like to address these as well as some other related issues through a thematic focus on the "Philosophy of Science". Our aim is to lay equal emphasis on Science, Technology and Society so that philosophy of science and philosophy of technology can effect a "social turn" and highlight science and technology as social undertakings rather than just for its intellectual contents.

Lazybee

On Complete Education of the Technocrat

Prof. Urjit A. Yajnik

Faced with the need to write or make a presentation of his or her activity, a typical practitioner of the technical arts immediately thinks: so much English is to be written. Inherent in this is not only the lethargy to undertake an exercise that is not really their home turf, but also the vain presumption that the exercise is relatively less significant, when compared to what they have already completed in the technological sphere. To go a step further—they always acknowledge that they work within the social sphere, but if you catch them in their act, they are so engrossed in battling the material world and inanimate forces, for that duration at least, they are rather cut off from the world.

While several of these are simply the characteristics of the creative process, there is also a special line that divides the sci-tech practitioner from the other productive professionals. It is perhaps the same divide that C. P. Snow became famous for underlining in the 1940s. But attempts to actually pinpoint this divide have failed, because Ernst Rutherford, under the hint of being boorish technico, promptly produced a list of books he had been reading. At a more significant level, Einstein wrote articles throughout his life, making deep and moving comments on social, human and spiritual affairs in addition to exhortations regarding the practice of science.

The social mandate today seems to be (i) almost universal high school education, and (ii) an ever-expanding pool of technologists and technocrats, making an in-depth connection with science and its practices as mandatory for all citizens. In fact, it is safe to say that the industrial society demands awareness of science on the same footing as literacy, that is, the same kind of importance that literacy commanded half a century ago.

Thus, moving away from the preceding examples of exceptional luminaries, we still have a gamut of questions. What is the relevance of higher education? What is the mandate of higher technical education? Should there be formal instruction on the subject of social and professional responsibility on the same footing at the college level? The possible responses must take into account the nature of this subject area, as also the larger context of the society. And here we can get back at the luminaries referred above, since their generation helped channel science and technology towards the creation of means of mass destruction.

Knowledge of technology as scholarship: Before the emergence of technology in its modern sense, there were skilled trades, techniques and methods which belonged to the guilds, who transmitted it to their apprentices. But as technology got more complex and relied more deeply on the results of scientific

Amol Thakur , second year student at IDC, IIT Bombay

inquiry, it became necessary to be articulate about them, resort to their documentation, and in turn to also develop a language to encompass its scope and possibilities. In this mature form, technology education became a subject of higher academic pursuit. It is a reasonable guess that in any era or civilization where technology grew to such levels of complexity, it passed into the domain of scholarship. This would be true in the case of various ancient civilizations; however, for the modern times, the practice can be traced back to the Renaissance.

Motivations and sources: A simple view can be that "necessity is the mother of invention," and that the mandate for science or technology arises from society. Further, once the parameters of what is needed have become clear, the scientists or technologists engage in a big struggle with the inanimate materials and forces of nature. And this aspect of the practice of their trade does not require persistent reference to the larger societal context. We may refer to this as 'directed' discovery or invention, guided by a need.

However, the actual dynamics of science and technology is more complex than this simple view. More often than not, great ideas and inventions have come into existence because the practitioner pursued a curiosity to its logical end. Such ideas or inventions are often construed as accidental, but Sir C. V. Raman would disagree. In his view, an apparently accidental discovery is nevertheless the result of an inspired endeavour. We may refer to this class of developments as 'spontaneous'.

Autonomy: What is perhaps the most significant, both in the case of technology as well as science, is their autonomy as bodies of knowledge. Regardless of the sources, whether directed or spontaneous, the concerned knowledge came to be organised in a self-contained way. More essentially, the methods of authentication were objective, requiring engaging with inanimate forces, which yielded same results under same conditions.

This discussion immediately makes clear why most of the instruction in science and technology is not packaged with a serious engagement with social responsibility.

The great divide: To many scholars of the humanities, science remains an enigma. Needless to say, the feeling is reciprocated on the side of scientists and technologists who sometimes fail to understand the motivations and relevance of some of the humanities.

One of the classic characteristics of science and technology is the possibilities of quantification and exactness. On the other hand, biological and other qualitative sciences nevertheless derive their power from their meticulous organisation, classification and ultimately from their relevance, demonstrated by their sheer impact.

A great debate had begun to emerge in the 19th century about the ravages of the industrial age and whether the industrial society had become slave to the monstrous organisation necessitated by this age. In the 20th century in the English-speaking world, C. P. Snow is credited with attempting to address these concerns at the peak of that much glamourised, but devastating and fratricidal series of wars in Europe. Weaponry came from technology, and the scientist and the technologist became open to accusations going far beyond that of mere callousness, to those of heinousness.

Catastrophic indifference: But the terrible consequences of science and technology were not restricted to the war period. Indeed, the routine functioning of the industrial age, the great reach it developed over resources and markets, and the possible accidents and errors in its practice—these came to be sources of terrible events for sizable segments of populations. From the presence of toxic and damaging elements in the work place, to the kind of control that industrial giants wielded—from automakers to agribusinesses—and accidents such as that in Bhopal, Chernobyl and Fukushima—all these have highlighted the negative aspects of technology.

The other major accusation against industrialised production refers roughly to the same sphere of activity, but can have two somewhat different grounds for its formulation. First, the callousness demonstrated by most organised processes to the conditions of the human beings involved: treatment of the other life forms. While the treatment of human beings and other life forms would be contrary to the most normal human being's value system, the participants of those industries are desentitised enough to carry out these practices on behalf of the enterprise.

Second, the wanton destruction of natural resources, often far exceeding the actual depletion required, due to expediency or

> "Once the parameters of what is needed have become clear, the scientists or technologists engage in a big struggle with the inanimate materials and forces of nature. And this aspect of the practice of their trade does not require persistent reference to the larger societal context."

immediacy of profit motives, again makes the technocrat proposing the methods, often euphemistically called 'solutions', which are cut off from his or her normal human values.

It is time, therefore, to consider the checks and balances that may be imposed on the sci-tech practices—which may prevent these practices that now seem to threaten civilisation itself, due to the scale and scope that they have reached. It is natural to think that the most gentle, and also the most far-reaching approach would be to sensitise the budding scientist or technocrat—catch him or her young, so to speak. To make ethical issues and universally held human values sufficiently ingrained, and the concerns of depletion and destruction of environment sufficiently vivid, that as a practitioner he or she would not be

catastrophically callous and indifferent.

Love thy neighbour: Before we begin to think along these lines, we must recognise that the whole world is not industrialised. In fact, the number of human beings living outside or only marginally within the industrial circle of production and consumption is a minority. It is just that the resources expropriated and the rates at which they are consumed make the industrial world much more visible. This is in addition to the fact that the industrial society simply carries the lethal power to impose what it wants on the rest of the population. Perhaps, if we recognised the intrinsic validity of all those other techniques of living and of human organisation, recognised that the resources of the earth need to be shared by all, and avoided toting the gun to settle the issue, we would actually have more realistic reasons for imposing limits on the industrial civilisation. Likewise, recognition of the autonomy of the plant and animal kingdoms and the need to leave them alone would put realistic constraints on what we should be doing.

> "If we recognised the intrinsic validity of other techniques of living and of human organisation, and the fact that the resources of the earth need to be shared by all—and avoided toting the gun to settle the issue—we would actually have more realistic reasons for imposing limits on the industrial civilisation."

We are thus arguing that the value systems and operational regimes of the industrial world can be regulated in a more practical way, if we demand that we engage in dialogues with real human beings in alternative paradigms of living, than by merely appealing to our innate or traditionally transmitted value systems.

None of this is new territory. The environmental movement, even the audiovisual records and documentations of explorers and animal lovers, which make up tremendous TV viewing experiences have been advocating this point of view rather ardently. A danger inherent in the latter mode of sensitisation, however, is already becoming visible. So long as these wildlife documentaries were making a huge impact and attracting a lot of viewership, they were shown with great marketing zeal. However, as these documentaries become passes (a state easily and quickly achieved by anything in the industrial age), we find a new kind of programming emerging, which changes the message. We have programming called 'science' which is more about technologies of the destructive or extravagant kind, and we have programming on the animal kingdom which highlights cuteness value and immediate gratification over long-term concerns. Thus, it is necessary to think the strategies of sensitisation afresh. And perhaps, the solution lies in the academies, as the editors of this publication have envisaged.

The unarticulated contract: The strategies of increasing awareness, sensitisation and formulating operational regimes based on the resulting enhanced value system, would therefore require looking for deeper intellectual or emotional sources than the ones already operational. A case in point here is a somewhat broader and historical view of society. We must recognise that almost all of human society operates more by trust, unspoken expectation, undocumented transactions

Tanushree Paul, second year student at IDC, IIT Bombay

and ultimately, a very powerful contract that is not even articulated. Again, this point of view is not terribly novel. We already find within the discourse phrases such as 'the waiting world'. Very simply put, it takes us back to the lucid preaching of religions. If you have, share; if you are more powerful, protect, et cetera.

To a considerable extent, the operational aspects of the industrial civilisation's spread have been simply that any new segment of the population that comes in contact with it begins to see its reach and power, its ability to protect and also to ingratiate, and those populations then begin to yield up their own resources—at first material, but subsequently human. A transaction ensues, whose bargaining terms obviously lie with the more powerful—but an engagement which even when it is overtly coercive, can be confused with collusion. It is this point that an activist intervention is required, one that sets right what expectations engendered the collusion, and defines where limits on the more powerful, one-sided expropriation lie.

To a considerable extent, real examples of such exercises have emerged within the last two centuries, more identifiable in the emerging industrial societies such as Tsarist Russia versus its nationalities. Another example is Indian feudal rule colluding with British colonialism, culminating in the terms of negotiation of the freedom movement and so on. There is much to learn from these.

Summary lessons: In the limited space available here, and with much more limited knowledge and experience base that I have, I would think that an overall awareness of such unspoken contracts with other populations of human beings and of the plant and animal kingdoms should certainly become a part of the training of a modern scientist

or technocrat. Some courses that create the awareness and provide the core terminology of the discourse would be very desirable. It is difficult to see what deeper resources of human values such an engagement could rely on, especially in a secular society where the internet is supplanting both god and parent. The obvious alternative is also to push into the domains of that medium, alter its content and format to suit the purposes of this sensitisation.

"The value systems and operational regimes of the industrial world can be regulated in a more practical way, if we engage in dialogues with real human beings in alternative paradigms of living, than by merely appealing to our innate or traditionally transmitted value systems."

The main unanswered question as far as I am concerned, is whether any such engagement will necessarily also affect both the kind of motivations spoken of above. Whereas the directed activity of exploration and research can be moulded well by these methods, it is still not clear what drives the spontaneous explorations. To the extent that these spontaneous explorations arise from thoughts subliminally implanted by the rest of the education and value system, they probably are under control. But controlling them too much would also be uncalled for. The persons, who created the murals of Alta Mira, however useless, are important, if for nothing else at all, then for communicating to our times how clever they were!

To some extent we have to live within the enigma presented in The Jurassic Park. The greedy, uncaring financier, the mad inventor scientist devoted only to his craft, and the curious bystander population which allows their chemistry to unfold in the unspoken contractual understanding that if they are, as mutually engaged agencies, so passionate, then they must be up to some good.

Prof. Urjit A. Yajnik

Uriit A. Yajnik did his M.Sc. (5-year integrated) in Physics from IIT Bombay in 1980. He later did his PhD from the University of Texas, Austin in 1986. He returned to IITB and his old department as a faculty member in 1989. Urjit has been a Visiting Fellow at Tata Institute of Fundamental Research (TIFR) and a Visiting Faculty at McGill University and LPS Universite de Montreal. He is the current Dean (Student Affairs) at IITB and a member of the Alumni Association's Board of Directors.

Opportunities and Obstacles:
Introducing 'Science and Society' in India

Prof. Dhruv Raina

The field of science and technology education has long been an embattled one for policy makers, educationists and science educators. The discussion has often been mired by an intrinsic tension separating concerns of a liberal education on the one hand and issues of specialisation and vocational education on the other.

Studies in the social history of knowledge have emphasized that, corresponding to every system of knowledge, there is an institutional form – institutions and forms of knowledge co-evolve. Since the nineteenth century, most of our constellations of knowledge have been anchored within the universities as disciplines [Gulbenkian Commission, 1996]. The space created within the universities for disciplines is now contested by newer knowledge formations that are multidisciplinary, interdisciplinary or transdisciplinary. These knowledge formations are located not just within but also organizationally outside the university, prompting a new set of questions concerning the new constellations of knowledge in the novel institutional structures that are likely to emerge.

This institutional transformation and the concurrent reconfiguration of the boundaries of knowledge are products of the rapid evolution of the sciences and social sciences themselves, the changing political economy of the production of knowledge, and certainly a consequence of specialization and institutional differentiation. Differentiation itself ensures that each subsystem runs in a highly productive mode but, on the downside, the system is rendered incapable of handling the disruption of organic flows between the subsystems that socially manifest themselves, for example, in the form of environmental and ecological problems. Excessive fragmentation, specialisation and diversification ensure the optimality of the sub-systems but, at the systemic level, produces a range of morbid symptoms [Luhmann, 1982]. The discussion on inter and transdisciplinarity reasserts the compulsions for diversity while emphasizing the urgent need for adaptability within varied contexts of application.

Over the last half a century we have witnessed the university lose its primacy as the locus of knowledge production to becoming one in an array of knowledge producing institutions [Gibbons et. al., 1994]. These new institutional forms include consultancies, industrial, academic and government research laboratories, think tanks, institutions of national importance, hybrid research institutes across research institutes, and industrial laboratories. The old academic, discipline based approach to knowledge production is referred to as mode -1, while the new inter or transdisciplinary mode oriented to problem solving located within a variety of organizational arrangements of which the university is perhaps just one nodal hub is referred to as mode-2 [Gibbons et. al., 1994] The table on the next page summarizes the two modes.

Image on facing page: Tanushree Paul, second year student at IDC, IIT Bombay

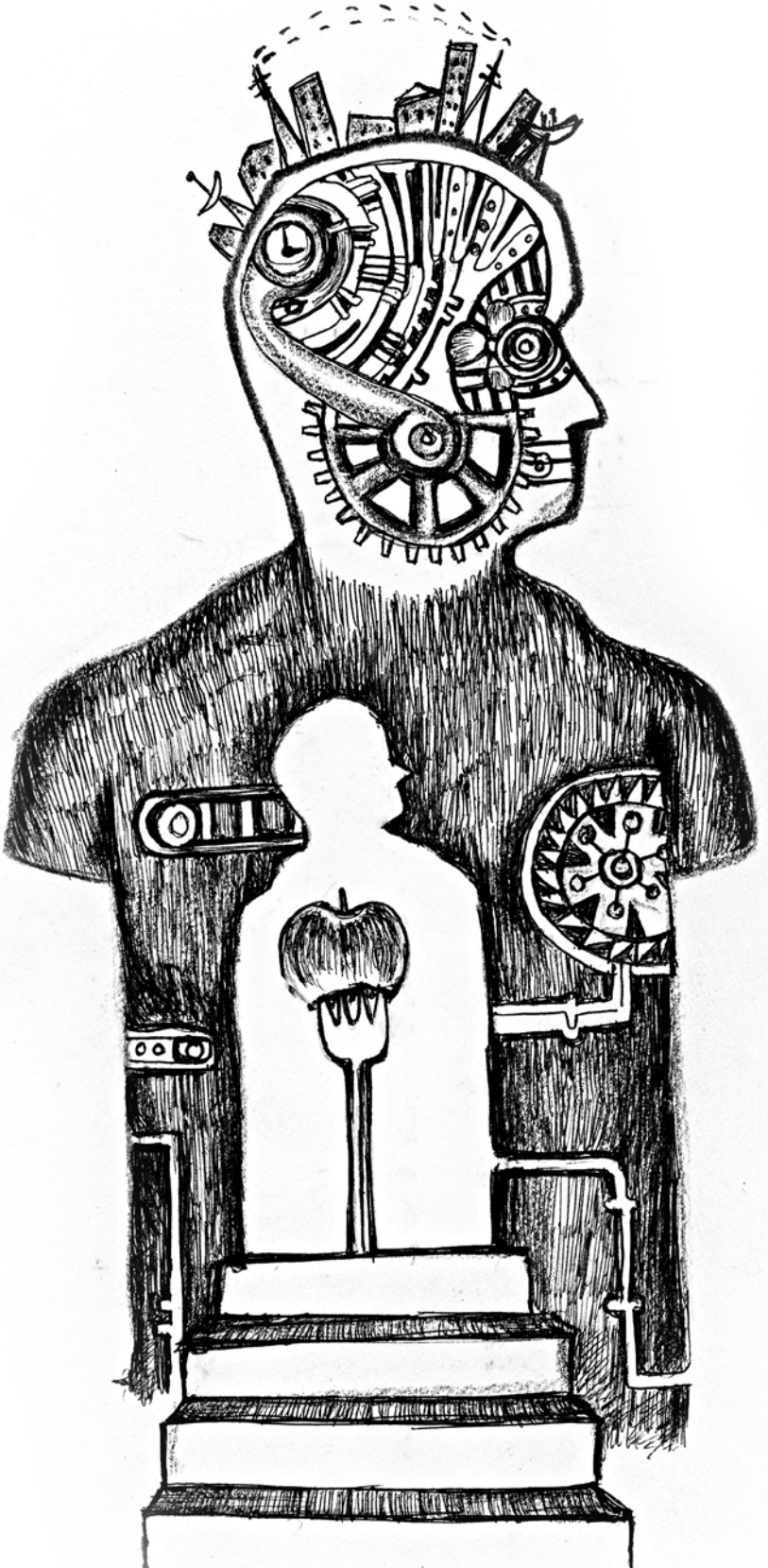

Table 1: ***Modes of knowledge production***

Mode-1	Mode-2
Problems set and solved in contexts governed by academic interests of disciplinary communities that are homogeneous	Problem solving governed by the context of application within transdisciplinary communities that are heterogeneous
Organizationally hierarchical and form preserving	Organizational hetrarchical and transient
Accountability in disciplinary and normative terms	Accountability is social and reflexive
Permanent and homogeneous set of practitioners working on problems defined by global and general contexts	Temporary set of practitioners working on problems defined by more specific and local contexts

In the light of the emergence of these knowledge forms and institutional realities, any rationale for developing a curriculum for an integrated science education cannot overlook two concerns, the one historical and the other pedagogical. In the first instance, it is essential to revisit the history of sciences and the history of the formation of disciplines in order to understand the cognitive and social factors that shaped and subsequently resulted in disciplinary fragmentation and specialization; recognizing that the consensus around existing disciplinary and methodological identities and practices has possibly broken down. We need to understand why this is so before we construct new forms of knowledge and classify knowledge afresh, triggering new versions of the culture wars. Secondly, the deeply problematic nature of science education and science curricula in India is not merely a product of simple disciplinary segmentation. The problems reside elsewhere. At least for the last fifty years – even prior to the Kothari Commission report, attempts had been underway to remedy in different ways what could be regarded as very bad pedagogy.

Curriculum development at the level of higher secondary and higher education is structured by the demand of the market (vocational courses) on one hand and by the demands of research at the frontiers of knowledge on the other. The challenge today for the university system at the global level is that several fundamental propositions that have structured curriculum development are now questioned. One of these is premised on

> Excessive fragmentation, specialisation and diversification ensure the optimality of the sub-systems but at the systemic level produces a range of morbid symptoms

the idea that the curriculum at the graduate level assumes that every student enrolled in a graduate course would be trained to be a researcher irrespective of what the student subsequently does with her or his life [Elkana, 2005]. The assumption is that the repertoire of skills of a researcher is good enough to be applied in a variety of life situations. But this is an assumption that needs demonstration because there is specialist vocational knowledge just as there is specialist knowledge of a researcher.

Furthermore, beyond the traditional concerns of the pedagogy of science education, the needs of contemporary society necessitate the development of a more interdisciplinary science curriculum. This curriculum would need to traverse several disciplinary boundaries and several cultures of knowledge- not just two or three, but cultures within the sciences themselves.

Interestingly enough, we are living almost

fifty years after the publication of C.P. Snow's essay on the "two cultures" that bemoaned the division of the world into communities of 'literary intellectuals' and 'natural scientists', separated by walls of profound mutual suspicion and incomprehension [Snow, 1959]. The cultural alienation and the near total collapse of communication between the sciences and the humanities (the "two cultures") have generated a very limited perspective of the actual shaping of scientific and literary ideas to the exclusion of each other [Hayles, 1992]. The current concern with "Integrated Science Education" raises, amongst other issues, the inclusion of courses from the social sciences and humanities within the curriculum of mainstream science education. The purport of this inclusion is to provide a more wholesome education and a reflective understanding of the contemporary compulsions to transcend disciplinary boundaries.

On the other hand, the study of science, technology and society emerged as an academic field more than three decades ago in response to the growing need for a comprehensive understanding of the societal context of science and technology. This produced an interdisciplinary and "issue-oriented and activist field of study" simultaneously dedicated to understand and appropriately respond to the complex issues precipitated by the modern culture of science and technology [Raina, 2003; Visvanathan, 1997].

The important point to realize here is that two distinct phases in the study of science and society must be distinguished. The phase from 1950 to 1970, and the phase after 1970, that for the sake of generality continues into our own times. In the first phase, studies of science and society were inspired by a history of science whose disciplinary roots were traced back to the early years of the 20th century [Thackray and Merton, 1972], but this discipline underwent rapid institutionalization during the 1950s and 1960s. The second phase commenced in the 1970s – where we began to see border crossings and the history of science became more social and the sociology of science became more historical, thereby drawing on the insights of both fields and often blurring disciplinary boundaries [Cutcliffe, 2000, p.25].

The impulse to teach "science and society" in the 1960s was not to integrate the two or resolve the dichotomy of two cultures, but to provide students of science an understanding that:

- History matters even for the sciences,
- Science is exceptional in its method, but yet it is socially located and its advance can be impeded or catalyzed by forces within society. This appreciation was essential both for the future of science and society.

At the Indian Institutes of Technology, the departments of the humanities and the social sciences were established and running before the courses on the social studies of science were created. In fact the origins of these departments date back to the creation of the IITs as part of an attempt to incorporate the liberal culture of the university within the structure of an elite polytechnique. The humanities and social science departments were initially considered, as were some of the science departments, as service departments to the engineering faculties. But as happens within any academic context, gradually these departments developed their own post-graduate teaching and doctoral programmes and acquired an independent academic agenda of their own, even while they continued to provide the "social" and "cultural" instruction that was part of the undergraduate curriculum. By the late 1970s and mid 1980s several IITs were running programmes on the

history, philosophy and sociology of science.

While science educators need to engage with the fallout of the three cultures divide, since it matters all the more for the practice of science itself and not merely in terms of revising the knowledge ideals of science, our fear about integration as opposed to cultivating interdisciplinarity is that the former overlooks the dangers of subsuming `a real difference under an assumed unity'. Interdisciplinary dialogue could result in something transdisciplinary but needs also to ensure that the rigours and virtues of the discipline are perhaps not lost. Ashis Nandy once pointed out that, given the nature of the problems we work with, "we are interdisciplinary by default".

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Philosophy in a Teacup

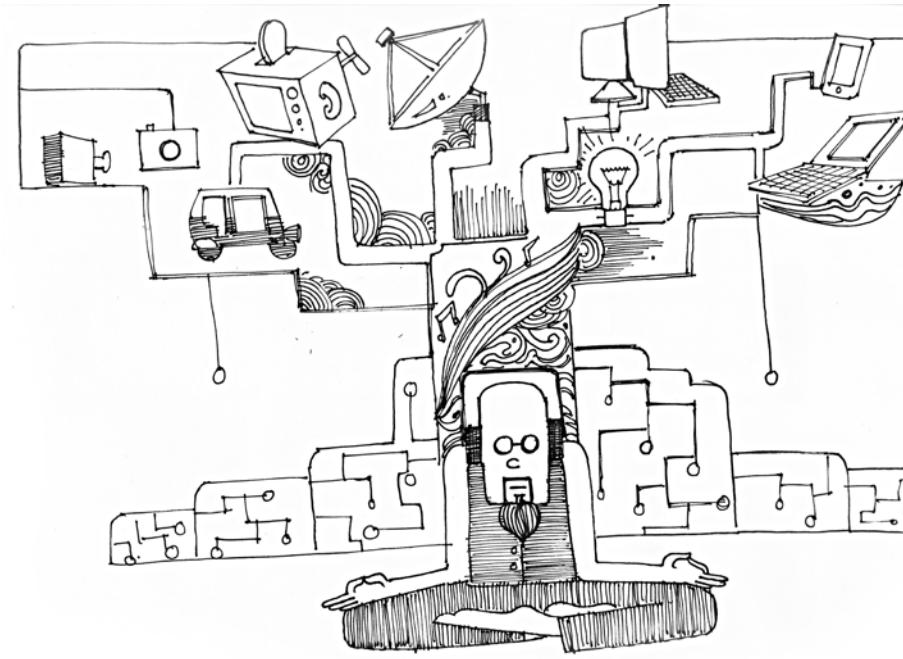
Bakul Desai

During my sojourn at IIT from 1977 to 82, I liked the HSS department for one strong reason and one stronger reason. HSS canteen chai was the best. At 25p, it was 5p dearer than the ChemE canteen chai, but the cups were larger and the ringside view from the stairwell afforded a better view than any other department. There were more women here than anywhere else. And they did not wear thick specs and mull over differential equations and SP3 hybridization. For some reason, homo-sapiens of the female kind look better when they are writers, psychologists, sociologists, philosophers and economists than when they are engineers and nuclear physicists.

Coming to the stronger reason, I loved the HSS department because it was the only department that gave me A grades. They did not D-Grade and E-grade me like everyone else in IIT wanted to. Looking back, I often wonder why. I was not the HSS type by a long shot. I did not sport ponytails and French beards. I did not smoke bidis while wearing a soiled kurta and torn, faded jeans. I did not even know Marathi, leave alone Latin and French. I did the philosophy courses in HSS because it was compulsory to select one elective in HSS for every semester in which some of us tried to learn some engineering. Maybe the curriculum setting chaps knew that we would have to practice some social engineering in the real world outside, once we got there. Or maybe they had a stake in the canteen that needed to wean tea-drinkers away from its counterpart in ChemE.

I think I landed with all philosophy courses like Ancient philosophy, Indian philosophy, Contemporary Philosophy, Moral & Political Philosophy etc., because some of my been-there-done-that seniors had advised me that you can "faat" your way through a philosophy exam. The first lecture witnessed standard questions from inquisitive IITans. What do we mean by philosophy? Is philosophy a science? Is science a philosophy? Define metaphysics- serious questions from serious folks who believed that philosophy can be learnt; that it was not a means to 'faat' your way into an A grade. Some learnt fast. Some were slow in learning. But eventually, it was clear. Philosophy was means to an end. "The ends justify the means"-that's what one philosopher had said while we gawked and gaped at a buxom student to pronounce that "the ends justify the jeans".

Some valiant professors fought back at the barrage of questions. "Philosophy is all-encompassing, while science is limited by empirical models that it has imposed upon itself" they thundered from the pinnacle of a 12 inch high platform. Some of us were a valiant lot too, before we gave in to the



Amol Thakur , second year student at IDC, IIT Bombay

compulsions of 'faating'. "Philosophy is the creation of fluids emanating from chemico-physico-bilogico-neuro-cortico-haemmo agglomerates of the human body." Finally, everyone gave in. "What is philosophy" was a question that had plagued mankind (there's a philosophy about whether man should be called kind, but let's defer it for a later day philosophical discussion) for many centuries, and it was not about to be closed in a lecture hall at the HSS department while some hot tea was brewing downstairs and asking to be drunk.

So, lecture after lecture, semester after semester, some eminent personalities were unleashed on us. Names like Shankaracharya, HF Bradley, Emmanuel Kant, Kierkegaard, Heidelberg, Jean Paul Sartre, Simone de Beauvoir, Karl Marx were drummed into our psyche and our vulnerable sensibilities. Amongst this set, there was a Charvaka who would have posted maximum "likes" on his FB page, had it existed then. He gave us a reason for our existence in our humble hostels. Drink and make merry, he said in Sanskrit long ago. English speakers called it hedonism, but we didn't care. The experience was headier than Sanskrit or English and explained away our absence in the lecture halls to equally hedonistic Profs. Outside lecture halls and in cycle stands and while sharing a 'bidi', these Profs asked us, "I piss and shit, you piss and shit, Sartre pisses and shits. So, why is he special?" SHIT, we didn't know. Om Piss Piss Piss (that's gujju for "peace")!

From the nasty lot, there were exactly 3 devils- Rene Descartes, Ludwig Wittgenstein and Karl Marx. Just look at this Descartes guy. He assaulted us with coordinate geometry in the Maths lectures. And while we trekked to HSS, assaulted and mauled, presto! He was there too in a phenomenological avatar with his Latin-ish "Cogito Ergo Sum". He was so "all-pervading" that even the canteen boy Shankar knew what cogito whatever meant. "I think, therefore I am." Well, I also think. And I think you are a jerk. So are you a jerk? But how did this Deswhat's-his-name travel from MA to HSS faster than we did? Or was he faking his coordinates and his geometry, not to mention, his phenomenology? Whatever, he tried to become a "basis" for existentialism. Coor-

dinate (0, 0) for the funny graph that would be called existentialism. And the existentialists suffered from an identity crisis about whether they were Buddhist or communists. Truth be told, this confusion worked well for us 'faaters'. In the exam, I forgot the cogito phrase but substituted it with "Citius, Altius, Fortius." That was Latin for "faster, higher, stronger" of the Olympic motto fame. Quote was wrong, but the Descartes name was correct and A-grade-able.

Outside lecture halls and in cycle stands and while sharing a 'bidi', these Profs asked us, "I piss and shit, you piss and shit, Sartre pisses and shits. So, why is he special?" SHIT, we didn't know. Om Piss Piss Piss (that's gujju for "peace")!

So also was with Ludwig Wittgenstein and his"Tractatus Logico Philosophicus". His name sounded like a Sten gun. His book title made us duck for cover. And expectedly, he wrote his treatise in bullet points, in clauses and in a cheap paperback that must have made his publisher laugh his way to the bank. Approximately, he said that language and vocabulary are faulty communication tools. Very true, considering his language and vocabulary. But then, with a name like his, you can get away with anything. I was tempted to 'faat' that Ludwig W said, "H4 mess food sucks" and I am sure that my A-grade would not have been impaired.

About Karl Marx-less said the better. Would he and his 'ism' have worked had he called the rich as rich and the poor as poor rather than calling them bourgeois and the proletariat? No sir, definitely not. Chaudhary Charan Singh called the rich as rich and he called the poor as poor and he did not progress beyond his Baghpat constituency in Western UP. Karl M was a marketing genius. He threw in some dialectic materialism and historical determinism to confound and psyche some engineers into a stupor. rattled the world into a movement that had to stop moving some day. Russian airline Aeroflot ferrying passengers from Mumbai to Delhi to Moscow to Leningrad to Nairobi at a cost of INR 2000 and with a free copy of Das Kapital thrown in was guerrilla warfare unleashed by activists that did not visit the HSS department. But quoting Marx and his nonsensical-ism was a ticket to getting high marks, while those brandishing his philosophy on railway stations and in messes were consigned to low marks.

At the end of the day, exam time was a free-for-all. Quote anybody on anything. If a question asked you to define physicalism, you could repeat your Prof's statement verbatim but get only a B. For instance, if you said what the Prof said i.e., "Physicalism is defined as repudiating the view that there exists anything in the universe that lies, in principle, beyond the scope of scientific explanation", you would get only a B. But if you could embellish it with, "Physicalism is *Polemically* defined as..." or "physicalism is *paradigmatically* defined as..." you were guaranteed an A grade. We didn't know it then, but it was marketing gimmickry- brand merchandising and value addition. I did not know…and still do not know…what polemics and paradigm mean. Just know that they are commodities that can get you an A grade. Semantic embellishments, you can call them!

So also was with other quotes. A Charvakaed KT once said in my wing during one of his customary staggering binge, "Worshipping idols is an intellectually immature act of depicting a supra-personal absolute." I

quoted him verbatim in the exam, but attributed it to Shankaracharya and his Advait philosophy. Neither Shankaracharya, nor KT nor I know what a supra-personal absolute is, but it sounded nice and more than that, it was a guarantee to an A Grade and a claim to be an avant-garde. The jury was out. 'Faating' was a resounding success. Misquoting a somnambulist as a "critic of the age of reason" was raison d'etre to get an A grade. Yes, there were times that we did suffer from some pangs of guilt. Every time I misquoted someone, I felt like a leg-spinner. I threw the ball outside the pitch, but knew it would turn in and get the target. I felt like a conman, like a modern art painter who asked his dhobi to thrash away at a canvas with a 'lungi' dipped in coloured dye and turned out as a winner.

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After having spent over 30 years in the real world, as compared to less than 5 in the HSS department and its canteen, it is but fair to look back and see if there was a tangible takeaway from the philosophy classes. Yes, we now know how to 'faat' at parties and impress our audience by referring to Hinduism as an uninstitutionalized religion and by referring to Herman Hesse as an Aryan-come-lately. What more? Seriously speaking, the philosophy classes did influence us beyond honing our survival instincts. They set the background and gave us a basis of understanding life that sets us apart as "thinkers". They are an integral part of the value-systems that we have evolved for ourselves. They have made us more inclusive in our thought by exposing us to various viewpoints and paradigms (in case paradigm means what I think it means). To quote Sir Bertrand Russell, "You are a sum total of all your experiences. Your strengths and follies are an outcome of what you imbibed from your education. Even while you pillory your learning process, remember that you have taken back something from it." Really? Did Lord Bertrand Really say this? Well, let me start confessing and stop 'faating'. This wonderful quote came from Lady Jaya Joshi who assures me that the HSS canteen still serves some good chai which may remind me about mysticism and teleology.

Om Shanti Shanti Shanti.

Bakul Desai

Bakul Desai, Chem. Engg., 1982, H4, was infamous in his student years for many things. He is famous in the alumni community for many other achievements. What has not changed in all these years is his love for "faat-ing". Similar examples of his unique brand of nonsense can be found in his book "H4 Madhouse: True Stories from the inmates of hostel 4".

Kids on the Campus:
Undergraduates and Academia

Bodhi Vani

I absolutely must begin this article with two disclaimers. Firstly, I would feel incredibly pompous writing a perspective on 'The Philosophy of Science' and then have it rub shoulders and share paper space with writing on the same by professors and the like. So this isn't that – this is just an expression of some sort, of how we – undergraduates – look at science. Secondly, I can hardly claim to represent the entire undergraduate populace, and I admit that I'm speaking purely on behalf of myself, and maybe a handful of people – the few who are still holding onto a love for science or engineering. Given that a very large majority of the undergraduate populace has its hands off what we would refer to as 'core', this leaves a very, very small part of the demographic.

For that small part, science is a defining part of our lives – the defining part of our lives. The idea of doing anything that is not science seems so absurd, so empty, and so unsatisfactory – that we've managed to romanticise the idea of science into poetry in our minds. Off the top of my head, there are a handful of things about science that engulf us completely. The (arguably) unyielding nature of structure, the slightly more tangible idea of a large mass of thought that uncovers the nature of things that are just there, the fact that it at once satiates, and generates the most satisfyingly insatiable feeling of curiosity and fascination there could be, and that it is driven by a philosophy of logic. Of course, I could be a little whimsical, a little naive even, but there it is.

The idea of structure, though so inherent to science in so many ways, is perhaps the most fanciful obsession I have. It is a beautiful concept though, and the idea by itself is so exciting, that the world can be broken both macroscopically and microscopically – and nanoscopically, and so on – into absolute, perfect structure, and mathematics. It makes one pause and kind of grin to oneself. But when it happens in real life, when you're watching a professor solve absurdly convoluted equations and toggle numbers around on the board for no apparent reason, till somehow, everything just falls into place and gives you a result that makes you turn to the person next to you, whisper (in wasted 20-year-old accents) – 'that is sooo cooooool'. And then you look towards the professor, and he's just turned around from the board with a characteristically triumphant smile on his face. Look out for these professors; they're always a lot fun to learn from.

Having grown up on a steady diet of science fiction, I clearly remember a quote from an Isaac Asimov novel I read when I was barely 15 – "... if a conclusion is not poetically balanced, it cannot be scientifi-

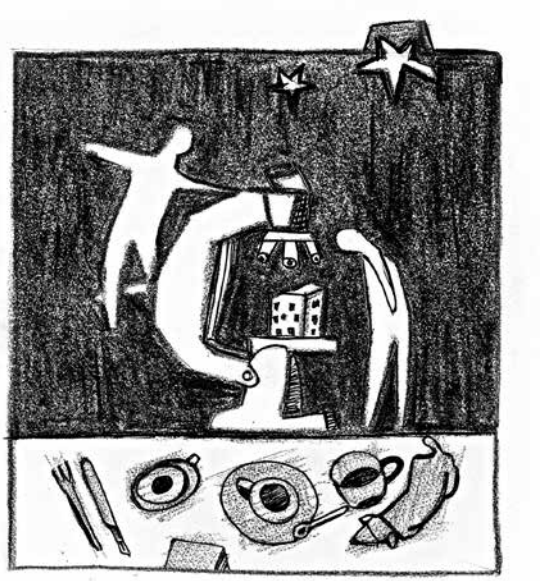
cally true." At the end of the day, science tends to take chaotic complexity, and give us definiteness – not always an expected definiteness, often strange and perplexing, but always, always stunning in its perfection.

As fanciful, but maybe just marginally more tangible, is my next favourite thing about being a student of science. We have the satisfaction of knowing that in some

> The depth of our entwinement with science is because it's so easy to have faith in something that doesn't believe in, or accept the concept of 'faith'.

small, almost – but not quite – insignificant way, we will contribute to a large mass of thought and information, arguably the most pure and unalterable mass. Yes, it is ephemeral and transcendental in its content, but in its purpose to uncover how the world works, and exists, it is absolutely pure. The idea is so grand, so overwhelming, despite the fact that we're just one tiny cog in an enormous wheel, it's almost giddying to think about it. I like thinking of science as a gigantic umbrella of metaphorical consciousness comprising all of us, that's constantly moving towards accuracy and reality, and we're moving with it, and celebrating it every moment.

I remember first recognising this idea with an actual understanding while doing a project in my department, at the end of my first year. While simulating the motion of denatured mutated strings of peptide, I accessed a site called the rcsb protein database – a database containing structures, experimental data, and simulated data of proteins, peptides, and amino acids



Tanushree Paul, second year student at IDC, IIT Bombay

analysed by scientists all over the world, updated every week. The constant real-time nature of the knowledge database was something I hadn't witnessed ever before. To add to this, I used open-source software developed by a group in Groningen University (which was charmingly peppered with pop culture references). This was extremely small scale, yes, but the fact that for my simulation, I'd used a structure (with mutations) that had been found by a scientist in who knows which country, and a simulation software developed by another, gave me some kicks. In my second year, I actually carried forward a multiple-month long email conversation with an eminent scientist in a German university, badgering him over a problem I had, and it was astonishing how forthcoming and helpful he was. Over the past two years, I have come to understand this idea more concretely, in terms of the constantly evolving and shared nature of ideas, and it remains one of the most pleasant things about the scientific community as I see it.

And finally, science might be the one school of thought whose primary objective is, as Richard P. Feynman puts it in The Pleasure of Finding Things Out, " a way of trying not to fool yourself." For that, science becomes the centre of our worlds, and begins to mould who we are. The depth of our entwinement with science is because it's so easy to have faith in something that doesn't believe in, or accept the concept of 'faith'.

It's about a voyeuristic fascination for the details and answers to things that are unnaturally wonderful, and seem to just exist with no ready explanation

Poets and writers- from E. E. Cummings to Mark Twain- have often waxed eloquent about the terrible effects of understanding- that understanding, or the excess of knowledge in some way sullies the beauty of things, which should, in their opinions, be appreciated for some mystical charm. I find this perspective utterly absurd- if anything, it is knowing the perfection and order behind the charm that multiplies its beauty so many times.

Honestly though, the beauty and structure, the magnificence of a collective consciousness of science – these are all pretty much afterthoughts. Doing science is, finally, about that unquenchable, desperate thirst to figure things out. It's about a voyeuristic fascination for the details and answers to things that are unnaturally wonderful, and seem to just exist with no ready explanation. With that fascination, doing or studying anything but science seems like an impossibly depressing and hollow idea.

And of course, being an undergraduate in science is by itself, at least in theory, a quintessential opportunity. Working in an atmosphere where this obsession becomes collective, almost social is something I'm encountering for the first time in my internship now. It is a heady experience. There is a constant buzz,- conversations brimming with an intense thirst to learn, it's lovely interdisciplinary nature that makes for a lot of learning, and an inexplicable chargedness that gives me a major high. And nothing, of course, can compare with the excitement of the work itself, and the opportunity to explore independently, to think and develop ideas, and learn from fantastic professors (who are as nerdy as you). One of my friends' walls has on it, in large, dirty, scrawling print, a quote he picked up from an MIT blog. 'This is the only time in my life where my only responsibility is to learn.' I'm hoping studying science makes that a motto for the rest of my life.

Bodhi Vani

Bodhi Vani is an Undergraduate student at IIT Bombay, studying Chemistry, and is interested in Theoretical Chemistry and Statistical Mechanics. She is currently interning at Tata Institute of Fundamental Research, and loves her work like she's never loved anything else. She is an avid reader, a very vocal feminist, and loves dogs and food.

The Meek Shall Inherit the Earth – Mathew 5:5

Ali Baba

Of all the biblical prophesies, this one makes the least sense. Even if one does not quite believe in Darwinian evolution, survival of the fittest seems quite axiomatic. There is no historical evidence to support this prophecy. The meek could not even inherit the KG Basin, not to speak of the Earth. How can one believe that the lowly former Advisor to the Ministry of Foreign Trade (yes, there was such a ministry in 1970) would not vacate the Chair in deference to someone who was already an exalted Member of Parliament in 1970, and a future Loh Purush. No wonder that the Loh Purush kept referring to him as weak, but with the passage of every session of Parliament the cry of 'weak' became shriller and less convincing. There was no dearth of reasons why he should not have fallen off the Chair like Humpty and gone to pieces. But he not only defied fracture mechanics, he seemed to defy gravity itself. It was totally inexplicable. When the CAG accused his government of causing losses of astronomical amounts, we suddenly realised that India is not a poor country. At first his government laughed it off as fictional, but when the SC got curious to know the truth, he could not even get the Solicitor General to not speak the whole truth. As a result, the SC got bolder and cracked the whip at CBI who soon put a junior minister in jail where he had the company of another former minister and

Gone were the days when the SC would take a cue from the PMO and set aside inconvenient HC judgements.

formerly powerful, but currently powerless, bureaucrats. Gone were the days when the SC would take a cue from the PMO and set aside inconvenient HC judgements. It seemed like the PMO commanded no respect, or did not know how to. And the Judiciary was strengthened, an unintended consequence.

When the CAG dropped a ton of coal on the government, many faces were blackened and it seemed that now his personal integrity would also be questioned. When his Law Minister sought to correct the syntax in the CBI report, the CBI Chief unashamedly admitted helplessness to the SC. As a result, he had to setup an EGoM to restore some credibility to the charade of an independent CBI. Another unintended consequence and an opportunity for the CBI to quit being HMV. It was found that the Rail Minister, from whom much was expected, had a nephew who expected even more. For the first time in the history of independent India, a Rail Minister became a fatality in an accident that did not involve trains. Both the Law and Rail Ministers had to resign without waiting for 'the law to take its course'. The last

time a Union Minister had to resign without a charge-sheet being filed was in 1957 when TTK resigned as a fall-out of the Mundhra affair. Another unintended consequence.

The Leader of the Opposition called for him to resign on a daily basis. He seemed to have even less clout than the BCCI Chief, who no one dared to ask to resign, only politely suggest that he 'do the right thing'. The ultimate proof of his weakness is that he cannot even get himself elected as President of the Board for Control of Kabaddi, the leg-pulling game, let alone BCCI.

And now the Weak Purush has taken a lesson from the Loh Purush, and refuses to walk into the sunset.

But like a rocking doll, he is impossible to knock off his feet. The Loh Purush has lost much of his charisma in the process. Frustration has reached such levels that the Opposition is at the end of their wits (such as they have). So they decided to shift their gun-sights to the heir apparent, but he does not want to oblige, either out of cunning or premonition of impending disaster in 2014. And now the Weak Purush has taken a lesson from the Loh Purush, and refuses to walk into the sunset. He has got himself another five year term which has truly put the Opposition (both in Parliament and Government) between a rock and a hard place. They are at a loss for words, forcing TV anchors to look for other provocative but inconsequential issues to vent their spleen. The hysteria on display in TV studios on a daily basis has toned down, another unintended consequence.

The Government loses no opportunity to take credit for transformative legislation like RTI, so does the Opposition constantly threaten to make black money a national issue. However, when the CIC rules that political parties should disclose their finances to the public under RTI, there is consternation all around. We are told that political parties are not public bodies, but private clubs like BCCI. No wonder then that the same people are in charge of both. Another unintended consequence of the absence of spine may be that CIC may take on a bolder avatar, like the EC and CAG.

All these unintended consequences, despite the best efforts of the Government and Opposition, makes one a believer. There must be a Force up there looking after India. May we continue to be blessed and the Meek inherit the Earth.

Prof. Aliasgar Qutub Contractor

Prof. Aliasgar Qutub Contractor, former HoD of Chemistry Department, and former Dean Alumni and Corporate Relations, is an alumnus from C'73. Endowed with a rare gift of narrating "serious" and "heavy" matters with a tongue held firmly in cheek, his incisive and informed views on IIT Bombay and alumni relations are in evidence in his column Sim Sim khul ja. He is currently 40 thieves short of his target.

Moving Target

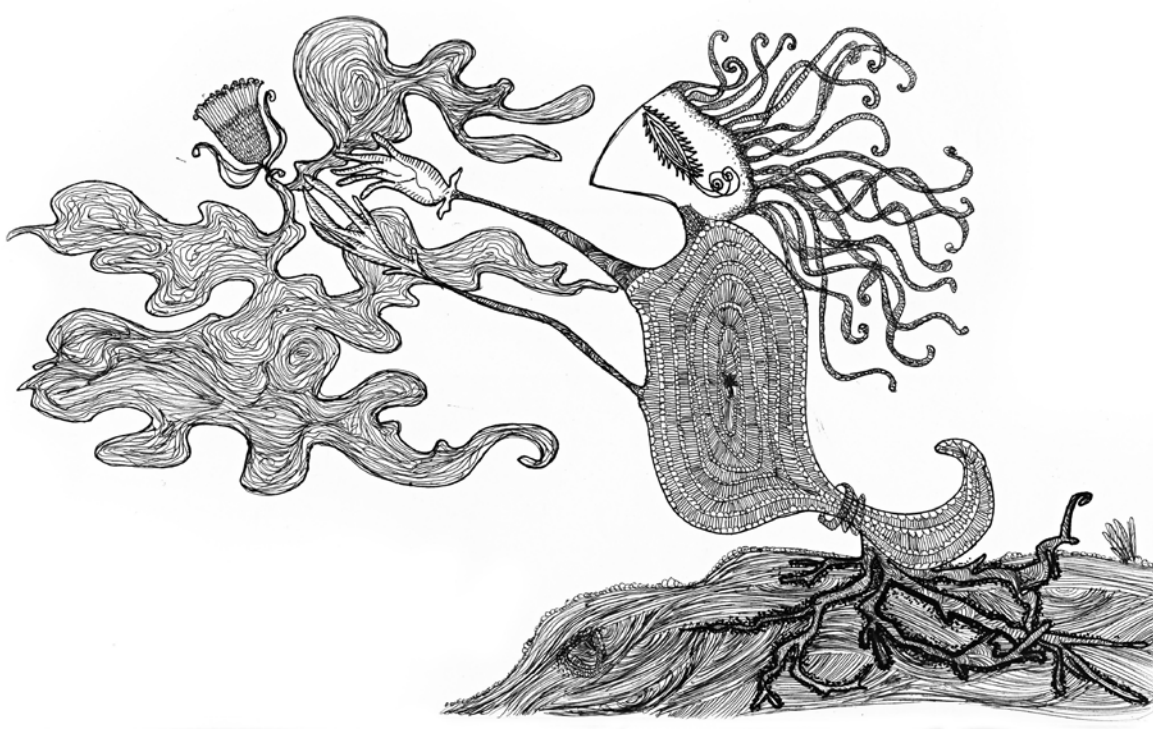
'Every Action has an Equal and Opposite Reaction'- A Closer Look at Ethics in Science

I work for a high profile firm whose upper management has been in the news for underhanded practices. I am on an assignment with a client whose business is funded by extortion money. A couple of months back, I was a part of an audit where we created the entire audit trail retrospectively and projected the story to be an outstandingly successful one, while the real story was a clean binary opposite. My friends work at those very investment banks which were at the heart of the meltdown in 2008 and which are still giving us newsworthy phrases such as LIBOR and 'the London Whale'. A batchmate at a famed engineering firm narrated a conversation with his finance guy at the cooler, "We will just not be able to survive a true audit." This batchmate is surprised at their absolute confidence in their fate. *"Not possible, sab number do ka hai."*

Let us say that in the future this client of mine is found to have funnelled his revenues into his underhanded dealings and that I was a direct part of the assignment. Or that the audit is exposed as a big fraud and I, the junior-most on the team, am pinned up as the unethical scapegoat. Or that those other friends in Consulting tip off friends of theirs on "stock prices" and are caught out, much like our fallen idol. Or that a bridge designed by this infrastructure firm collapses without warning, and my friend, as the project manager in-charge, is held guilty and sent to jail. It is only the part about getting caught that rouses me out of my indifference. I wouldn't want to get caught and go to jail. It is a personal thing, you know! My parents would have their reputation on the line. My reputation would suffer, I guess. Not a palatable thought. I'll go talk to my Engagement Manager and see how I'm insured against the risk.

Why did I choose to work for a consulting firm, you might ask. Well, it was a big brand with a big footprint, and they were paying me well! Now, I don't like being so indifferent to the consequences of my actions. It is just that they somehow don't come to me at the right moment. On rare occasions it has bugged me, I have had the assurance that there are senior people around me, people I respect, who are in it with me. I am not the only one. If they are alright doing something of this sort, it must not be such an issue. These wise people must have taken care of the ethical calculation; isn't that what "experience" is supposed to mean?

As I write this piece however, with each trashed draft, the realisation grows larger - something is not right. There is indeed something which my morality used to condemn long ago, which it still would have condemned if I had been a student and still hadn't learned the ways of the corporate world. Looking away and feigning ignorance on such difficult questions (and surprisingly, it is an "accepted" way of dealing with it). These people whose judgment I trust, wise people with years of "experience", they probably trusted someone just like I did. This ethical calculation - they delegated it to their seniors as well. Their otherwise sound judgment was not applied here. Neither was mine.



Vaishnavi Bangar, second year student at IDC, IIT Bombay

In this process however, we are all still adolescents - we have great intelligence or the ability to out-work anyone and everyone. But whenever there is even a mention of responsibility, we gladly let some other "adult" do the calculation for us.

We, in engineering, hold great power. Seriously (yes yes, i know. Even i'd have cracked up at such a statement while in college)! We create giant buildings, huge machinery, pervasive digital architecture and what not – things which are grand in scale, no less. And we, from IIT, don't believe in doing lesser, inconsequential stuff. We are hardwired for challenges. We'd feel like failures if we fail to dent space-time during our lives. IIT gives us that opportunity to develop our skills, especially those not related to engineering. The institute gives us a great, big kick. And we, the kicked, go out in the world and often do our thing.

In this process however, we are all still adolescents - we have great intelligence or the ability to out-work anyone and everyone. But whenever there is even a mention of responsibility, we gladly let some other "adult" do the calculation for us. That part of us never matured, and there is little scope for it to mature once we are out in the real world.

To be honest this "Philosophy of Science" is too much of an ivory tower ideal for me. What I do understand, however, is that there is an ethical calculation involved with every decision I make. Real world problems aren't the same as engineering problems, set in an ideal world where wind will always blow at constant speed and where two or three Greek letters sum up the state of the world. Real world problems are complex precisely because there is an additional,

scarcely understood, angle of "impact" that comes into play. We, from IIT, who the world looks up to, cannot shirk away from that calculation, especially if we are to be leaders. If a dam is to be constructed, it isn't just flow and seismic calculations that do the trick. There are people's lives and livelihoods which we would be destroying.

But, this is not ingrained in us. One preachy article is not going to change our perspective. Neither is a 'Philosophy of Science 101' going to do the trick. What might help, however, is a wider sprinkling of this attitude which signals to students that there are real world calculations with real people. To twist a Marxist statement, we need to

To twist a Marxist statement, we need to be more connected to the ends of our own work, rather than being hired robots on an assembly line.

be more connected to the ends of our own work, rather than being hired robots on an assembly line. The lead could surely come from our instructors themselves, who present to us regular examples of where the best of engineering resources come to naught because of the other, unaccounted-for, calculation. When dams are being talked about, instructors could probably spend a bit more time on the one million people displaced by the Three Gorges dam in China. Closer home, maybe when we start working with a client, we would do well to ask where their money comes from, and what kind of a value chain we're helping to enable.

A somewhat more radical idea is to invite more and more activists and people with such differences of opinion to take center stage at the institute - maybe someone like an Arundhati Roy, who would at least push us to think of consequences in terms of people, and possibly think deeper on our personal ethical boundaries.

Science, as I understand it, was meant to make our lives easier, happier. We, the practitioners of scientific technique, in our fields of finance, consulting or core engineering, are essentially working towards this very aim. The objective of science was never to steal value from one to hand it to another. This is something of a lesson for me from all the drafts I have trashed so far. A few years from now, when I have my own business, I'll try and remember this exercise. Or, better still, I'll try to remember where it is that I come from, and that people around me, because of the IIT tag, will always look for some kind of leadership - that in itself is enough of a kick to look for consequence.

Anonymous

I graduated from the institute a few years ago. I'd written this piece when I still used to listen to Floyd and Dylan every morning before work to assure myself that I wasn't a sellout. I did move from that organisation to another one (which is also said to be the Devil's lunch place), but thankfully, I recovered my ethical code in full measure. And now, I go to work every day with the understanding that any day can be my last - for putting a clear and ringing "Why?" to everything my colleagues and I do. But, it gives me peace of mind.

A Philosophy of Science for India:
Education for Solution

Raghu (Guddu) Murtugudde

A Philosophy of Science (POS for short) must always include harmony of science and technology with nature and it should always be guided towards finding solutions for the least privileged.

IITs are institutions that have produced big names ranging from technocrats to environmental ministers to chief ministers and billionaire venture capitalists. And yet, there has never been, to the best of my knowledge, a stated philosophy on what role, if any, they want to play in offering solutions to the lay people. It is always a thrill when you meet individuals like Milind Sohoni who work hard to focus on specific problems to provide simple, affordable solutions to rural communities through CTARA. Even as I write this, India is dealing with the deluge in Uttarakhand that killed more than a thousand people who were on a pilgrimage in the Himalayas in addition to the tremendous loss of life and property of the local residents. This comes on the heels of the failed monsoon of 2012, which saw a severe drought in many parts of India. The rescue efforts going on in Uttarakhand are quite heroic indeed. Right now, a subgroup of IITB alumni are discussing rescue efforts by some alumni in the Uttarakhand disaster and climate change got mentioned already.

The Indian Institute of Tropical Meteorology in Pune has been leading the concerted efforts at dynamical monsoon forecasting to produce extended-range (1-2 weeks) and seasonal monsoon forecasts. The India Meteorological Department combines the dynamical forecasts with its statistical approaches to issue monsoon forecasts. The Ministry of Earth Science, which oversees IMD and IITM-Pune, has established the Agromet initiative that delivers text messages to lakhs of farmers each morning on rainfall for the next few days. It would appear that all the pieces are in place to make for a coherent POS for the country plausible. But what will it take to actually develop it and implement it, not only for delivering solutions for the country and its populace but also for better use of its human, natural, and financial resources to continue economic development and also lift those below the poverty line into the burgeoning middle class?

Do we need a new paradigm?

The vision of our first Prime Minister, Jawaharlal Nehru, led to the establishment of science and technology institutions, including the IITs, which are now the envy of the other developing countries. The early post-independence investments have paid off in terms of India's ability to take advantage of the outsourcing boom. As IITians we can be proud of all that we have collectively accomplished. But it should also make us pause to think about where IITs should be in the

coming years and decades as their number is being increased to meet the demand and newer entities like IISER are being grown much more rapidly than the IITs were. IITians, educators, technocrats, bureaucrats, and all the other powers that be must face the fact that setting up elite institutions, while laudable, leaves the majority of aspiring students in the country with second-tier institutions that are not as well monitored for their quality. Access to the top institutions is

WEIRD – Western, Educated, Industrialised, Rich, and Democratic – population, comprising of less than 25% of the global population but consuming more than 75% of the natural resources

hardly equal while affordability can become a severe issue for getting into the second or even third and fourth tier institutions. It is more than obvious that there is a need for concerted efforts to establish and elevate state universities and other private and publicly funded institutions to stay competitive at the national and international levels.

Government efforts for elementary education are laudable especially for rural areas but recruiting and retaining teachers and the upkeep of facilities and buildings leaves much to be desired. Nonetheless, the goals are well-intentioned if one does not get into the issues of rural kids migrating to cities and leaving agriculture behind despite the poor quality of life and standards of living in peri-urban and urban regions. Surprisingly, no concerted efforts are considered necessary at the high school level and beyond, especially for girls. It is well known that with each year of education beyond grade 7, women tend to have fewer children and education and empowerment of girls is the best birth control. India can solve the education and population problems together, especially in terms of avoiding the growth of disparity between the rich and the poor, by focusing on education with an emphasis on girls and on education beyond the elementary and middle school levels.

Solution-based Education as a Philosophy of Science

Now let me return to the POS and solution-based education. India is a vast country with a diverse set of problems in each crucial sector like food, water, and energy. Environmental destruction, deforestation, air and water quality degradation, and coastal erosion are confounded by the unplanned urban sprawls and land use mismanagement to produce disasters like the one in Uttarakhand. There are increasing extreme weather events because of the ongoing climate change, clearly attributable to human activities (albeit mostly of the WEIRD – Western, Educated, Industrialised, Rich, and Democratic – population, comprising of less than 25% of the global population but consuming more than 75% of the natural resources). But the economic growth of the past decade or so in India has also led to the inevitable increase in consumption by the nouveau riche, especially in terms of energy (gasoline and electricity), food (meat), and water (bottled water). It is clear that we need to heed this trend since India relies mostly on importing gasoline and even electricity is barely available to only about 50% of the nation's citizen. Since the population will not decrease as fast as consumption will continue to increase, the demand for energy, food, and water will only get worse and the rural-urban disconnect and the takeover and abandonment of agricultural land has the potential to reach a crisis stage. What can education do and how can a

well-thought POS help?

Building on Human Tendency for Interdisciplinary Thinking

The human mind has always been solution-oriented. Going all the way back to our ancestors like the Australopiths and Homo habilis, we know that stone tools and spears were the early origins of engineering approaches. Medicine also grew early on. With the evolution of formal education, we

> Students who join places like the IITs, for example, must be well-versed with many disciplines and must be able to adopt engineering for solving problems on how climate affects human health by building instruments to measure bacteria in the air or in the water in classrooms, buses-trains-airplanes, and handheld probes creating digital libraries of genetic fingerprints.

Indians led by establishing the first university at Nalanda and it even offered scholarships to international students from the other parts of Asia! Industrial scale printing revolutionized knowledge sharing. But the industrialization of education had an unintended consequence of creating disciplinary walls, which have since become great barriers for solution-oriented education. There is a new renaissance needed for bringing down the walls that inhibit a holistic and solution-based approach to training the students. It can start at kindergarten level where technology can be used to have them use their cell phones to take pictures of insects, birds, and plants to start mapping the biodiversity. Every step of the education from then on can be about integrating everyday life and nature into classroom teaching and using computer and communication technology to survey the planet and even the universe for the problem-du-jour and brainstorming about solutions. Students can begin to identify their natural talents and love in terms of what they would like to focus on – social or natural science, medicine, engineering, and so on while still staying within the solution-based approach of working on joint projects to address specific issues identified locally, regionally, nationally, or internationally. Education without 'disciplinary' borders should lead to schools without geographical boundaries and learning without mental barriers! Students will not be doing individual projects and thesis but will be part of a group that solves problems from end to end. The projects need not be limited to the school or the town or even the state or country but can include students from all over the World! So anytime an event occurs, a team will be in place to assist locally and remotely to solve the problem. Problems can range from droughts and floods to fires and wars or terrorism or industrial accidents or simply a rural woman trying to reduce her daily drudgery of gathering food, fuel, and water.

Philosophy of Science for Livelihoods

Individual innovation can still be nurtured and more intelligent and humane approaches can be developed for patenting and sharing wealth and being gainfully employed as a member of a team. Individuals can move from place to place and team to team based on their disciplinary expertise from engineering to social science to medicine to acting to sports to politics. Interdisciplinary, trans-disciplinary, multi-disciplinary, and cross-disciplinary, and so on are all buzzwords

Vaishnavi Bangar, second year student at IDC, IIT Bombay

these days. As an Earth System scientist with an engineering background, I apply computational fluid dynamics approach to solving the basic ocean-atmosphere fluids but also to include nutrients, phytoplankton, zooplankton, fish and carbon in addition to fishing fleets, fishermen, market forces, and game theoretical approach to solving the entire problem of physics to fish to fishers. This facilitates the inclusion of climate change stressors on sustaining fisheries for the future. Such an interdisciplinary approach is made possible because the system allowed me to transition without being hindered by the system. India must adopt such approaches – a friend, Divya, with a Ph.D. in behavioral ecology from the US is seeking a job in India and she is being turned away from teaching zoology because she does not have an M.Sc. in biology! We must get past such silliness.

Linking Disciplines for Responding to Life

Students who join places like the IITs, for example, must be well-versed with many disciplines and must be able to adopt engineering for solving problems on how climate affects human health by building instruments to measure bacteria in the air or in the water in classrooms, buses-trains-airplanes, and handheld probes creating digital libraries of genetic fingerprints. They should be able to offer communication solutions for taking the predictions from IMD to a doctor in rural India on whether air quality and water quality are healthy enough that day. There should be trained students from IIMs and geophysicists from universities who should be able to translate severe weather predictions from NCMRWF to disaster risks of floods and landslides in Uttarakhand and link up teams

rapidly with governmental and non-governmental agencies to mitigate risk and respond in case of rescue efforts are needed following the disaster. Longer term preparations for droughts, food and water shortages, can also be possible. We can even be prepared for disease outbreaks based on the approaches in social computing or computational social sciences which take environmental and physical connectivities of where and how much time people spend during a day to estimate how contagious diseases may spread from local to global scales. This is already being tried in place like New Delhi. IITB itself has a team in Civil Engineering led by Subimal Ghosh and Subhankar Karmarkar that is looking at combining weather and climate predictions with instrumentation and other engineering solutions for managing urban floods in places like Mumbai. Needless to say this can easily be extended for coastal inundation and storm surges.

Disciplinary boundaries have become a tedious barrier to real life application of all the exalted education we can provide to the smart kids. But the possibilities are unlimited in terms of working on solutions once we minimize artificial boundaries. All we need is a solid and well-thought out Philosophy of Science.

Breaking down the Disciplinary Barriers

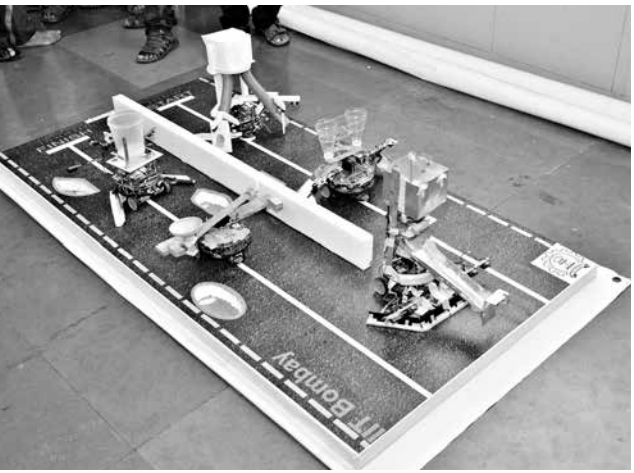
Clearly, the disciplinary boundaries have become a tedious barrier to real life application of all the exalted education we can provide to the smart kids. But the possibilities are unlimited in terms of working on solutions once we minimize those artificial boundaries. All we need is a solid and well-thought out POS. Surely, all the great minds of IITs can explore this concept a bit further. Education for solutions and solutions for adaptive decision-making is the order of the day considering the impending crunch of natural resources and the need for economic development that is in harmony with the environment and one that does not leave anybody behind. Sustainability has become a cliché and yet hardly measured with real metrics just like biodiversity. And yet we are all keenly aware that we really do not have any choice but to choose a path towards sustainability that maintains and grows biodiversity. Now that is something all the future generations can get behind and something we can building into our POS – education for solution. ⬢

Raghu (Guddu) Murtugudde

Raghu (Guddu) Murtugudde wandered through the wilderness after IIT and ended up as an accidental tourist at the University of Maryland in climate sciences. Now he tries to do some good with his time since life offered up opportunities without any hard work. He is an active blogger and writes on themes related to History: Earth, Life, and Sustainability - a theme he is working on for research, education, and outreach.

Embedding Fun in Embedded Systems

Stumblebee

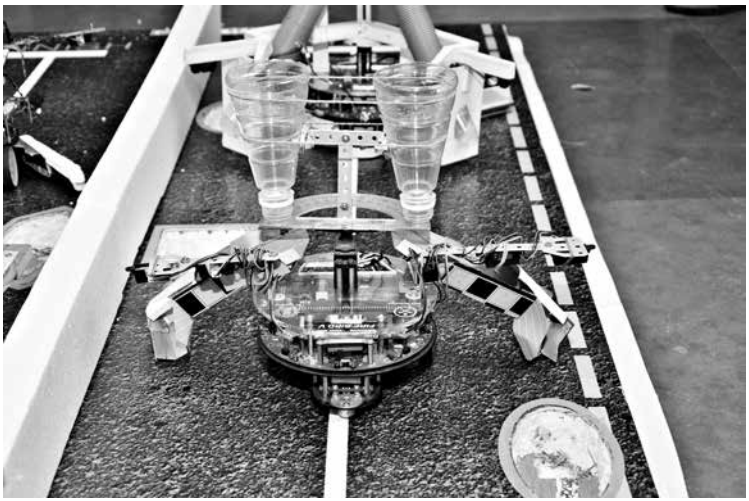


Market pundits aver that the Indian economy has grown to $1T in 60 years since independence. In 6 years we're going to grow to $2T and then exponentially at a similar rate to that of China – only 10 years behind. This growth will prove a drastic challenge to our youngsters like never before. How do we meet the demands of a rapidly modernising economy with its 1.2B people with challenges such as limited trained manpower and limited automation in our industries? This is going to cause demographic upheavals like never before - urban families already find domestic help difficult to find. The rural NREGA scheme has rendered labour scarce like never before. These are the tips of the iceberg that indicate a severe need for automation in the economy. But who is going build these machines for us - and at what cost? Imported technology costs us between 8-10 times as much as locally produced technology so it is clear that we need to find these resources within ourselves by preparing our youngsters for these challenges.

The progress of our nation lies in producing high quality (employable) engineers with the education and adequate exposure to technology at a young age to think innovatively and develop indigenous technology. Brainchild of two of IIT Bombay's open source evangelists and veteran professors in Embedded Systems, professors Kavi Arya and Krithi Ramamritham of the institute's Computer Science & Engineering department, e-Yantra is an is an initiative in Embedded Systems sponsored by MHRD under the National Mission on Education through ICT (NMEICT).

It seeks to cultivate qualities in students that make them better engineers – and to make it fun to build embedded systems. The modus operandi is to provide hands-on learning-infrastructure to engineering students with limited access to labs and mentors. The goal is to create a practical outlook by articulating problems students see around themselves and to solve them in the small using a robot developed by the IIT-Bombay team.

Opines Prof. Arya, "It is only when students



e-Yantra seeks to cultivate qualities in students that make them better engineers – and to make it fun to build embedded systems.

articulate a problem and then solve it themselves, using a little machine with flashing lights and things that move, that they acquire confidence as embedded systems engineers." The important part of this exercise is to instill a "can do" attitude in the students as a first step to achieving anything in life. The next step being to prototype a solution by solving a problem in the small - this is the classical way engineers usually work. Then we can scale up to a larger more realistic solution. In the Embedded Systems course we see projects which are completed in 6-8 weeks and include working examples of "Jhadu pocha" robots, “fruit picking” robots, “autonomous vehicle” robots, "servant bots," factory automation bots, pothole filling bots and what not. Each solves a problem picked up from around us and solved in the small. From here the transition to a "real" machine is not as large as it might have been otherwise.

What started, as an impossible dream five years ago is already a nationwide phenomenon. e-Yantra initiated a National Robotics Competition where students from all over India participated. The selection process last year had 6000 student registering in 131 teams. This was followed by 500 students participating in a climaxing grand finale competition at IIT Bombay on 22nd March 2013. 25% of the finalists were female. There were 20 finalist teams participating under 4 themes including teams from Allahabad, Bangalore, Coimbatore, Salem, Jalgaon and Shimoga.

Throughout the competition, e-Yantra had never announced what the winning teams will secure. However, the way all the 500 participants went about earnestly competing in this competition, it was clear from the beginning that the biggest reward of e-Yantra competition was not just winning it but also participating in it. Yet another proof of perceived currency of IIT Bombay’ commitment to education being higher than any other cash prize that the winning could have received. A gratifying trend brought to

We are confident that these e-Yantra empowered engineers will step forward and play the important role demanded by a country with lots of challenging problems for them to solve'.

light through this competition. Keeping the same philosophy, the winning team from each theme was offered the highly coveted summer internship with e-Yantra.

Taking the analogy of a garden, **Prof. Krithi Ramamritham** said, 'e-Yantra's role is to nurture vibrant ecosystem by making sure that the garden has enough variety and enough gardeners all over the country to let "a million flowers bloom - and tonnes of vegetables grow." In the process we are confident these e-Yantra empowered engineers will step forward and play the important role demanded by a country with lots of challenging problems for them to solve'. 'e-Yantra has discovered talent in little colleges all over India. For instance, it has discovered teams of girls in a small town like Sivakasi (TN), who held their own and have now reached the final,' he added.

Prof. Kavi Arya pointed out "an engineer is someone who solves societal problems with the help of technology. While distance education works on many levels, when it comes to teaching Embedded Systems and Robotics, it is difficult to get the concepts across because the students don't have access to any labs or appropriate supervision. The competition may look like a game but in reality it is a process that has enabled these youngsters to evolve into a practical engineer with proven problem solving skills, to take on real world problems and arrive at solutions.

An Aside:

A large amount of foreign exchange is used to purchase software. If we were to use legal copies, which most businesses have to nowadays, the costs nationally run into billions of dollars -scarcely affordable to our important Small Scale Sector. An important observation made by e- Yantra faculty is that all aspects of their work use Open Source software.

Prof. Arya mentioned how whenever he used to visit colleges he found evidence of half-finished robotic projects where, because students could not buy "standard robots" they spent their energy on building the platform rather than solving an interesting problem. "Every year this happens" with the result that there is never any progress. "Our robots being a commodity may be purchased off the shelf or built according to our design." Then there are over a hundred open source projects on our website which students can build upon to create even more sophisticated projects. "We must be one of the few faculty to encourage copying or reuse" Prof. Arya chuckled.

Conclusion:

If the enthusiasm of Craig Mundy, the Chief Technology Officer of Microsoft, is anything to go by when he visited Prof. Arya's lab at IIT Bombay - robotics is here to stay and just as we program

PCs today we will be programming robots tomorrow. There will certainly be a lot of work in making machines do our bidding in a variety of sectors. Perhaps that's why Microsoft commissioned IITB to port their open source Firebird robot into their Microsoft Robotics Studio, Microsoft's proprietary robotic application development platform. Clearly robotics is here to stay. For those who feel threatened we have this to say - there are a whole lot of dangerous, monotonous and painful jobs out there in the world best done by machines. Other than this it is believed that due to the drastically lowering costs brought on by robotic manufacturing technology and the increasing cost of transportation, a lot of manufacturing sector jobs are going to migrate back to the Developed countries. So it is not a question of whether we can afford to get into robotics but whether we can afford to keep out of this most important race in future. We need to protect the future of our youngsters in this fast changing world - like never before. Don't you agree?

The Ride to Nowhere and Back

Ashok Sreenivas

Chances are, when you think of a motorcycle trip from Manali to Leh, you would imagine lofty snow-covered peaks and swift-flowing rivers, and smell a bit of adventure and motor oil. But when Ravi, Somo and yours truly embarked such a trip in early August 2010, we not only encountered these, but also got much more than we bargained for.

We set out bright and early at 5:30am from Manali on day one of our trip, but still managed to reach Rohtang pass – just 50km away – only around 9:30am, thanks to overnight rains which had reduced the 'road' to something a water buffalo would love to wallow in. Since Somo's Bullet weighed in at a svelte 200kg and insisted on stalling frequently and pushed through the slush each time, we didn't starve for exercise. After breakfast at Rohtang, Somo's bike decided it had done enough for the day and refused to start, despite desperate ministrations from Somo. After a couple of hours of this, I decided to ride down to Khoksar, the village on the other side of Rohtang, to see if I could find a mechanic. An hour later, I was listening to a Khoksar native cheerfully telling me that Khoksar had no mechanic though there may be one at Keylong, a mere 50-odd km away. As I cursed and slowly rode back up to Rohtang, my eyes lit up on seeing what I first thought was an illusion – Somo and Ravi riding down. Apparently, a mechanic accompanying a French biking group turned the right screw the right amount. After refueling ourselves at Khoksar around 4pm and our bikes at Tandi, we rode to Keylong for the night.

> Somo and his bike managed to fall into a water-filled hole on the road which prised the silencer off his bike and was thence held in place by a thin string and a couple of stern kicks

We set out on day two to reach Sarchu via Baralacha La (altitude 4900m) and rode across a few moderately threatening and totally freezing ice-melt streams. Then we ran into the big one, about 300-400m below Baralacha La, with water gushing copiously across the remains of the road. SUVs and trucks could drive across it if they revved up sufficiently but smaller cars had to be towed across by a bulldozer and bikes were being pulled across with a combination of motor power and human strength. Your intrepid heroes watched and photographed all this fun while gently quivering in their boots. Until, that is, we were given the right prescription of a firm kick up our backsides

and a helping hand to lug our bikes across by an unknown angel called Rajesh Kataria (from Gurgaon of all places!).

Naturally, Somo's bike protested at being given such treatment and almost fell into the stream, and had to be physically pulled over rocks in the freezing stream. This sucked the living bejeezus out of us, and sent his bike into another sulk from which it would take a couple of hours to recover. We used that time to let out our frustration in language that would have made a sailor blush, while breathing nearly non-existent air. By the time the bike started, we were walking dishes of bheja-fry and we crawled up on a 'road' to Baralacha La that was basically pebbles and stones covered by melt-water. We were so tired that we barely noticed a beautiful eagle flying right by us or the magnificent Suraj Tal. But even there, we were not short of entertainment or exercise, as Somo and his bike managed to fall into a water-filled hole on the road which prised the silencer off his bike and was thence held in place by a thin string and a couple of stern kicks.

Around 4:30pm, we stumbled into some restaurant-tents about 20km short of Sarchu, to be told that the road beyond Sarchu was blocked due to multiple landslides and would take days to clear. By then, all of us had mastered the trick of sending the world into a spin and sending a shooting stab of pain through our heads by the mere act of moving the said head. So, we almost gratefully collapsed in Biru's tent for the night. The night did its bit to match the interesting day. First, Somo joined some Israeli tourists in inhalation exercises in an attempt to get higher than the 4500m we were at. Second, a busload of tourists from Karnataka, clad amazingly in half-mast dhotis in the bitter cold, swept through the tent like a band of locusts and cleaned it of all its stock of vegetarian soup. Third, there was the surreal experience of listening to Vin Diesel making throaty noises from a TV rigged up nearby while lying down with raging altitude sickness in the midst of nowhere! Finally, I rounded it off by setting a new record for high-altitude 20m obstacle sprint in the dark, as I dashed out of the tent in the middle of the night to throw up what little dinner I'd had.

We woke up on day 3 and learnt about a devastating cloudburst over Leh. So, our only option was to retrace and head back to Manali. But of course, it was never so easy. Custom dictated that starting Somo's bike meant an hour or so of kicking, praying, unscrewing, cursing, mechanic-searching, cleaning, drying and other similar rituals, and today was no exception. Luckily for us,

by the time we reached the infamous stream again, another biker group from Mumbai-Hubli had kindly arranged for a JCB to transport our bikes and us across so that we could stay dry and thumb our noses at the stream. Between the big stream and Keylong, we hit another stream that had swollen overnight due to rains. But by then we – the 3 of us as well as the 20-odd others who were also there – were seasoned professionals. We just shrugged and got down to work. An Innova

> A busload of tourists from Karnataka, clad amazingly in half-mast dhotis in the bitter cold, swept through the tent like a band of locusts and cleaned it of all its stock of vegetarian soup

stuck mid-stream was first rescued by pulling it back with another Jeep on one rope and a bunch of us on another. Then, the streambed was leveled and the Innova as well as the bikes were driven across, with a phalanx of people making sure the bikes didn't fall into the gushing waters. Even Somo's Bullet made it across fully dry – since one of the accompanying mechanics rode it across!

As we rode back to our hotel in Keylong, the staff excitedly shouted "Yahi hai woh log, yahi hai". Two grim chaps strode purposefully towards us and asked "MH12 DB 9245? Mr. Menon"? After Ravi had sheepishly confessed to those being his bike number and surname respectively, we learnt that the gentlemen were from the Intelligence Bureau (IB) of the state and were looking for us, since high-ups in the IB related to Ravi were alerted about our being on cloudburst-affected road and wanted to make sure we were in one piece.

After the excitement of the first three days, the rest of our trip was positively boring and predictable. We took a day off at Keylong on day 4, and the only excitement was that Somo was getting his bike repaired until about 1am leaving Ravi to have kittens meanwhile. The ride from Keylong back to Manali on day 5 was also boringly predictable, with Somo's bike refusing to start after stopping at Rohtang – this time the reason being mist and rain rather than slush.

Approaching Manali, I gave a ride to a chap. It turned out that he was a herbal remedy seller from near Pune and was roaming these hills collecting herbs. As a token of his appreciation for the lift, he tried selling me some shilajit, which he assured me will, erm, "improve my stamina" and "help in better performance". A perfect ending to a whacky trip!

Ashok Sreenivas

Ashok Sreenivas, B Tech CSE, 1987; PhD CSE, 1998, pottered away the best part of 18 years in software and applied software research before deciding to fritter away his time elsewhere. He currently does it effectively at a couple of policy research and advocacy non-profits based out of Pune.

When IITians helped make the Taj

Satish Hattiangadi

"Hey, Grandpa! I have this great business idea. I need you to fund it. It is going to make India a rich country!"

Shah Jahan was just a teenager when he made that statement. But, as usual, it elicited different reactions from his grandparents.

"Shah Baby, how many times should I tell you that your father should be called Jahanpana? Really, you drive me up the wall!"

"Well, son, let's hear it!"

"Suppose I made a fantastic mausoleum. All marble, and inlaid with lapis lazuli and mother of pearl. People would come from all over the world to see it. Just imagine. A million people coming and visiting every year! If they stayed for just ten days in India, and spent just Rs. 10,000/- on their hotel charges, can you calculate how much money they are going to spend in India?"

"Let us put it to Birbal," was the instantaneous reply. Akbar had a clear idea of his limitations as far as calculations were concerned. And so, the question got relayed the next day to the famed courtier.

Birbal was keenly aware of his own limitations at calculating, and equally aware of Akbar's lack of capabilities.

"The amount of money you will make can be correctly estimated only after you have made the mausoleum. What you have to first calculate is how much the mausoleum is going to cost, and how and where you are going to get the money."

"Oh, I was thinking of tapping my Grandpa for that," said the candid SJ.

"Your Grandfather will have to sell all the family jewels and then empty out the entire treasury, and still it will not be enough. In fact, he will have to hock the country to get loans, but all the 'marwadi' and the 'pathan' money-lenders in the country would run out of money to lend, and it still will not be enough!"

Akbar got his message, and that was that as far as his grandson's mausoleum idea was concerned.

But Shah Jahan was not going to give up so easily. He caught up with Birbal when he was alone, and pushed the matter further.

"Thanks for your help," he started sarcastically, "you have nicely poured cold water on my plans of reaching out to my Grandpa for a loan. Now, what do I do?"

"Tapping His Imperial Majesty was not such a good idea. It will keep raising all kinds of questions... But your idea of a mausoleum is not bad. It needs a bit of polishing, but we can explore it. And for the funding, what you need at this stage is some 'Angel Funding'."

"Who is going to provide the 'Angel Fund-

ing' for such a project?"

"Let us wait for Deshmukh to come to India. He normally visits in December, to catch the IIT B alumni meeting."

When Deshmukh was born, it was reported that he would fly into a rage even before he learnt to cry. That reputation led to his being given the name 'Jamadagni'. The reputation, of course, was quite unfounded. 'Jamadagni' Deshmukh was, in fact, born slightly premature, and had a voracious appetite. When the

"No, I was just wondering. When Jama gets children, do you know what they will call Jama? They will call him Pa Jama!"

milk supply stopped before his appetite was satisfied, it caused his sphincter muscle to contract. This led him to hold his breath and press against his sphincter. The contortions of his face and the flush on his face were a direct result of this, and not of any anger.

But the reputation of flying into a rage stuck to Jamadagni. Is it any wonder that he was taken very seriously by all around him? Even his teachers in school would not dare to ignore his questions, however trivial or foolish they might have been. Jamadagni never learnt to smile and relax, but the constant seriousness, coupled with constant support from his teachers, helped him to qualify for IIT.

His stay at IIT changed him totally. To start with, his "Jamadagni" was shortened to 'Jama' on the day of his arrival itself. And, about a month later when his classmates had gathered around him to polish off the goodies that his mother had sent, Pondy Shahani suddenly and inexplicably burst into laughter.

"What happened, Pondy?"

"No, I was just wondering. When Jama gets children, do you know what they will call Jama? They will call him Pa Jama!" and everyone burst out laughing. That was how IIT transformed the forbidding Jamadagni Deshmukh into "Pajama Deshmukh".

The Bard of Avon might have thought that a rose by another name would smell as sweet, but that is not true of humans. Where Jamadagni Deshmukh brought seriousness to all around him, the sight of Pajama Deshmukh brought a smile to every face around him. Reacting to all those smiling faces, the reserved Jamadagni became a jovial Pajama.

Pajama Deshmukh was extremely lucky. He passed out of IIT to land up in the Silicon Valley at just the right time. He was not much of a cook, so he ended up making salads for himself, day in and day out. He made his own salad dressing, which he thought of selling locally to augment his assistantship. He coined the name "Window Dressing" for it, and put in a small ad in the Palo Alto Chronicle.

This advertisement was noticed by an executive of a software house, which resulted in Pajama Deshmukh getting several hundred million dollars for giving up the exclusive right to his product. What that company wanted to do, or did, with the salad dressing is not known but Pajama Deshmukh, the Angel Investor, was born- with a good stockpile to invest.

Pajama Deshmukh helped a lot of projects that needed financing. None ever gave any return on investment, but his reputation as a source of Angel Funding spread all over the country.

And so it was that Shah Jahan, with considerable assistance from a lot of IIT alumni

scratching through their email and phone lists, finally traced Pajama Deshmukh and fixed up an appointment.

A Saturday evening in December saw Pajama Deshmukh and the Moghul Prince ensconced in a corner of Taj Land's End lobby.

"Imagine a monument to the world's greatest love! Or, if you want it another way, the world's greatest monument to love! It doesn't matter which option you choose. You are going to have droves of people coming to see this monument!"

"I agree, Shah Jahan. I can see the cash rolling in once the reputation of the monument is established. But it is a long term game, a very long term game."

"But then, this monument may last a thousand years! Can you even imagine any other project that can keep giving returns for a thousand years?"

"You have a point there. But maybe your business plan can be improved upon. I want you to meet Pondy Shahani. He is excellent at making new businesses more viable. He is a good friend of mine. I know him from IIT days. He will help you polish up the proposal to make it viable and also have more investor appeal. Here, call him on his mobile and tell him that I referred you to him."

Shah Jahan did call up Pondy Shahani, but could not meet him for a while, as his own wedding plans overtook him. So he met Pondy only after he had married Mumtaz.

"Pajama Deshmukh was telling me something about a mausoleum that you wanted to build?"

"Yes. I just married Mumtaz. I was thinking of making a mausoleum for her after her death, and calling it Mumtaz Mahal. A building fully made of white marble, with mother of pearl and lapis lazuli inlay work, something absolutely out of this world! A building that will shine on a full moon night, a monument to love that would last forever!"

"Hmm...Monument to love! Great! But a mausoleum? Nah! Tourists would be turned off by dead bodies sitting in the middle of the whole thing..."

"They won't be in the middle. I was planning to have the bodies interred in the basement..."

Even that is a turn-off. Why not ditch the 'makhbarah' stuff and go for something more attractive? I suggest that you fill the basement with slot machines and then see how the tourists swarm to the place!"

"Even that is a turn-off. Why not ditch the 'makhbarah' stuff and go for something more attractive? I suggest that you fill the basement with slot machines and then see how the tourists swarm to the place!"

"Slot machines instead of Mumtaz? I don't know..."

"And even the name 'Mumtaz' is worrying. It won't catch on. The 'Mum' in it would remind people of Egyptian Mummies. Nah... A bad connection. Let us see. Why not call it the 'Taz Mahal'? That should click! Anything that rhymes with jazz should click, especially if we can make a good jingle and put it on the radio and TV all over the western world!"

So Taz Mahal it became. But subsequently, as semi-literates ignored the dot under the 'Ja' in the Hindi spelling of Taz, it got more popularly known as the 'Taj Mahal'.

"And where are you going to put this Taj Mahal?" Pondy was not quite done with it yet.

"First, you must understand. I am having this round dome on top, built on a large square building, which itself is on an extra-large square pedestal. The square-ness of the pedestal is highlighted by four minarets springing up at the four corners, also made of white marble! And this whole monument I can embed in a moghul garden, enhancing the square design by the symmetry in layout of the plants and the fountains... You will be able to see the monument in front, as well as its reflection in the pool below!"

"Yes, terrific! But where is this going to be?"

"I was thinking of building this in Agra. My old man is building a whole city nearby – Fatehpur Sikri – so why not build this near that city, and the benefit from the tourists staying at Fatehpur Sikri will be enormous!"

"Yes and no! Yes, the benefit would be enormous to the nearby city, but the city also should have the proper infrastructure. And Agra and Fatehpur Sikri suck!

Nah... That will not do at all. I suggest Las Vegas. Or Atlantic City. Or, if you want to stick to the east, how about Macau? These are all tourist destinations, man! You cannot buck the trend! Go along! If the Mountain does not come to Mahomet, Mahomet must go to the Mountain! Yes, your idea is great. Just put some slot machines in the basement and relocate the monument in Las Vegas! Then you will see how the money comes rolling in!"

And so the Taj Mahal would have been built at Las Vegas, with slot machines in the basement, if only the constraints of time had not prevented Shah Jahan from getting the excellent advice of IIT alumni!

Satish Hattiangadi

Satish Hattiangadi : (B.tech 1971, Chem Engg., H5) did his Masters in Chemical Engineering from the University of Massachussets, Lowell (at that time Lowell Technological Institute). He did a Post Graduate Diploma in Software Technology from NCSDCT, and has worked extensively in software development. He is married to his classmate from IIT Bomay, Leja. Satish has all along been working alone, and tends to work 24/7 till the problem at hand is solved. He has retired from software development for the last eight years, and has been a regular participant in his Rotary Club and Rotary District activities. He is also member of the Executive Committee of the Mumbai Chapter of IITBAA.

Pending Cases in Courts

Shailesh Gandhi

The Indian judicial system has managed to safeguard and generally expand the fundamental rights of citizens. It can rightfully claim a lot of credit in ensuring that a functional democracy exists in India, despite our diversity and huge challenges. However, the judiciary's increasing backlogs are creating a huge problem, which are threatening the rule of law. This ensures that an accused gets enough opportunities to prove his innocence in a very fair manner. However, the process has become so languorous, that a powerful or rich criminal can almost not be punished, denying any justice to the victims. On the other hand, if a poor person is framed, he suffers in prisons as an undertrial. India ranks amongst the ten worst countries in terms of having the highest percentage (70%) of undertrials as a percentage of the total in its prisons. India's prisons have more innocent people in them than guilty! Yet, time bound justice is not seriously talked about as an agenda for the nation. Perhaps, it is not believed to be achievable.

We have been hearing that the Indian judiciary would need centuries to clear its backlog. Justice VV Rao of AP High Court said that it would take 320 years to clear the backlog of cases in India. Since everyone talks of the huge and insurmountable backlog, it has been accepted that unless the number of judges is increased twofold or threefold, the judicial system cannot cope. I decided to take

India's prisons have more innocent people in them than guilty!

a look at the issue by doing some number crunching. The Supreme Court of India used to publish a quarterly 'Courtnews' until June 2012 in which various statistics about the courts were being given. These are available at the website of the Supreme Court at http://supremecourtofindia.nic.in/ in Publications. I assume that we can rely on the data provided as being reliable. I must also disclose my core belief, that unless the judicial system delivers in reasonable time, it is not delivering meaningful justice. I believe this should be a non-negotiable. I perceive that the Indian judicial system has become irrelevant for the common citizens, and this is responsible for many ills plaguing our nation.

Using the data from four Courtnews from July 2011 to June 2012, I noted the new cases instituted in each quarter, disposal and the pending cases in the Supreme Court, High Court and the District & Subordinate Courts. Evaluating the disposals of cases and the pending cases reported, it appears that the statement about the backlog being equal to centuries was an extreme hyperbole. I took the average number of cases disposed

in each quarter and calculated one-third as the disposal rate per month. Dividing the pendency by this figure gives the number of months pendency. I have calculated for each quarter, and in no quarter did the backlog appear to be over 34 months. The average pendency for the Supreme Court, High Court and the District & Subordinate Courts for the period July 2011 to June 2012 comes to 10 months for the Supreme Court, 29 months for the High Courts and 18 months for the lower Courts. Many friends in the legal profession are aghast when one talks about measuring such numbers, on the ground that the differences in cases is vast. However, over a large number of courts and cases, the large variations due to different cases would even out and can be used to compare or find possible solutions. It is reasonable to compare such data which is meaningful.

Giving the analysis below:

Qtr.A	Court B	New Cases Instituted	Disposed D	Pending E	Disposal Per month F=D/3	Pendency in Months G=E/F
Jul to Sep 2011	SC	21967	22842	56304	7614	7
	HC	435677	378353	4350868	126118	34
	D & S	4536527	4414118	27670417	1471373	19
Oct to Dec 2011	SC	17352	15137	58510	5046	12
	HC	548059	538845	4276123	179615	24
	D & S	4901498	515981	27371727	1731994	16
Jan to Mar 2012	SC	21706	20409	59816	6803	9
	HC	45885	407625	4327746	135755	32
	D & S	4146123	4400718	26986307	1466906	18
Apr to June 2012	SC	15187	11152	63851	3717	17
	HC	479042	464312	4340867	154771	28
	D & S	4337836	4482366	26851786	1494122	18

Columns A, B ,C ,D and E taken from Courtnews of the Supreme Court. F & G calculated.

SC=Supreme Court; HC=High Court; D&S=District and Subordinate Courts.

I have done a similar analysis for the earlier one year, which also shows comparable results.

This appears to indicate that if the principle of 'First In First Out' (FIFO) could be strictly followed, this would be the time for a case to go through the courts. I agree that this would not be feasible, but there can be no justification for many cases taking more than double the average time in the courts. The courts should lay down a discipline that no case could be allowed to languish for more than double the average time taken for disposals. The listing of cases is being done by the judges, and no human being can really do this exercise rationally, given the mass of data. It would be sensible to devise a fair criterion and incorporate this in computer software, which would list the cases. This would result in removing much of the arbitrariness, and also reduce the power of some lawyers to hasten or delay cases as per their will. If this was done, the maximum time at the three courts would be 20 months, 58 months and 36 months respectively.

> Justice VV Rao of AP High Court said that it would take 320 years to clear the backlog of cases in India

The vacancies in the three levels are 15% for the Supreme Court, 30% for the High Courts and over 20% for the lower courts. When citizens are suffering acutely because of the huge delays in the judicial system, there can be no justification for such high levels of sanctioned positions being vacant. After filling the vacancies, if the courts stick to their avowed judgements to allow adjournments rarely, it should certainly be possible to increase the disposals by at least 20%. If courts basically follow the principle of dealing with cases primarily on a FIFO basis, the judiciary could deliver in a reasonable time.

My suggestions based on the above are given below.

Main suggestions:

1. Courts must accept the discipline that over 95% of the cases will be settled in less than double the average pendency. Then, reasonable equity could be provided to citizens, and Article 14 actualised in the courts.
2. The listing of cases should be done by a computer program, with judges having the discretion to override it in only 5% cases.

Secondary suggestions:

3. Vacancies in the sanctioned strength of judges should be less than 5%.
4. Adjournments should be rare.
5. After this, a calculation could be done to see the number of judges required to bring the average pendency in all courts to less than one year.
6. Disposal per judge and court along with data of pending cases giving details of the periods since institution should be displayed by the courts.

Wide variation in disposing cases violates Article 14 of the Constitution and better case management can stop this. The perception about decades being required to clear the backlogs is a mirage caused because of arbitrary case management. Case listing should be computerised, to follow a predetermined logic, allowing judges to override the program only to the extent of 5% deviation. This would reduce arbitrariness, and ensure that courts adhere to the constitutional promise of Article 14 in their

working. Then we would have a functional judicial system, and a better rule of law would prevail. I am suggesting that the issue of cases pending for decades need not prevail, if we accept the most fair system in case management, viz. First In First Out and computerised case listing.

Shailesh Gandhi

Shailesh Gandhi DA, DSA, B. Tech. Civil, C'69. He ably shepherded IITBAA in its early years and was Chairman of the Board for three years. Shailesh is a first generation entrepreneur in plastic packaging, and was the CMD of Clear Plastics Ltd. He went on to sell his packaging business to become a Right to Information (RTI) activist. He has conducted over 500 workshops for citizens and government officers in slums, clubs, offices, schools and colleges, without any charges. He is also a recipient of the Nani Palkhiwala Civil Liberties Award in 2008. Shailesh has been the Central Information Commissioner for the Right to Information where he ran a file-less digital office.

Food for Thought

Grumblebee

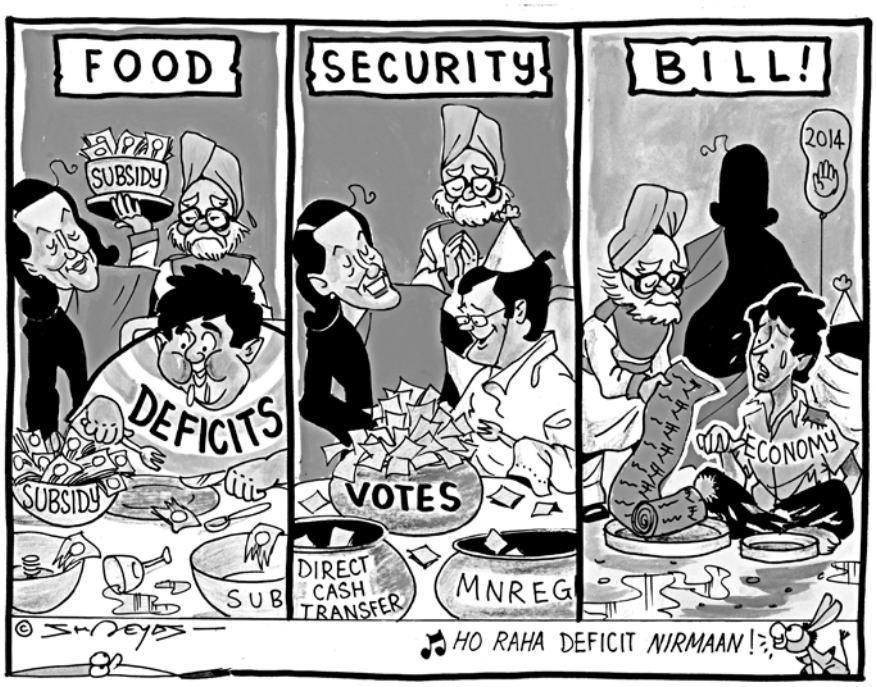


Image Courtesy : Shreyas Navare, Hindustan Times

It's been 460 weeks since the UPA has been in power at the centre. 220 weeks since UPA-2. But the concern that all must have food to eat has been awakened now, months before the elections. Why we are not surprised that all "good" measures are thought about just before the elections?

Even a cursory glance at the political history of India will throw up several similar examples of "fishing for votes". Sinister designs? Yes, thinks our resident cartoonist. However the larger debate on whether or not we need a Food Security Bill is open for an expert debate.

Our resident self-confessed Capitalist Pig from the Beehive has already bared his fangs. In his view the Food Security Bill *"is the worst piece of Pork Barrel Legislation being ramroded by the UPA in a blatant move to entice voters in the coming election."*

He is ready to write a 'Ranticle' on the Food Security Bill but wants a worthy sparring partner. So the Beehive is on the lookout for a Socialist Bee to argue the counterpoint. This debate will be featured in the next issue of Fundamatics.

Grumblebee

40 years of "Innovation" in India

Harshwardhan Gupta

"Innovation is The Next Big Boom on India Inc.'s Horizon!" declares a Management Guru. "Innovation Drives Us!" says a commercial from a truck-tyre manufacturer. "Innovation Amidst Tranquillity" blazons a full-page ad for overpriced bungalows in fake Spanish style oddly mixed with Gothic. "Innovation will drive India's inexorable march towards becoming a Global Design Hub!" opines a Design Celeb. Of late, "Innovation" has become a much hyped and misused word in our country, and a lot more people are preaching about innovation than innovating!

What's the reality on the ground? Let us first look at a historical perspective over the last 40 years from my vantage point of being a consulting engineer-designer-innovator for the last 31 years.

I am a practising engineer, not a writer, journalist, academician or philosopher. As a practising engineer, I have it in my nature and training to see and understand things quantitatively and objectively. Therefore, I have tried to make sure that the various observations I make here are quantitatively correct and statistically significant. Before I go further, I wish to clarify that technological innovation and engineering design go hand-in-hand. The former cannot take place without the latter.

Ever since I graduated from the hallowed portals of IIT Bombay in 1976, I have been designing all sorts of mechanical machines. I designed my first real-life machine for the industry in 1975 when I was still a student. After IIT, I decided to stay back in India and go on designing machines, as the challenges and opportunities to do original work here were much greater than those the developed world offered.

With stars in my eyes, I sincerely believed that as time passed, we would become a more mature nation, technologically more self-reliant, and achieve the efficiencies and quality of life approaching that of the developed world, which we all could enviously see even in 1976.

Effects of Liberalisation

In the 70s, 80s and early 90s, as our 'Licence-Permit Raj' Bharat lived behind closed doors, a large amount of real engineering design and innovation went on everywhere, especially in smaller companies; and usually they grew much faster than the then-prevalent so-called 'Hindu' rate of growth. This might be difficult for the younger generation to believe, but it is true!

Admittedly, much of it was copying – mostly from catalogues and machine manuals – but since we could not import or manufacture

A Taiwanese machine tool

the much-dreamed-about, much-vaunted liberalisation (and coincidentally the advent of CAD) came about, and very quietly, the bottom fell out of indigenous design and innovation.

many crucial components of what we were copying, we had to perforce redesign and innovate. We routinely saw these innovations in various trade fairs like IMTEX and others. I myself designed many dozens of high-end machines from first principles in many different fields in that pre-liberalisation period. Every machine-building industry had decent machine-designers and draftsmen who worked on paper on manual drafting machines and slowly but surely created many good albeit old-fashioned and over-designed machines.

Then the much-dreamed-about, much-vaunted liberalisation (and coincidentally the advent of CAD) came about, and very quietly, the bottom fell out of indigenous design and innovation. All these small companies and entrepreneurs rushed to get a foreign name on their letterheads, and on their machines. At the same time, anyone who was not CAD savvy began to be looked down upon as old school. So within a span of a few short years, a large number of our coveted design engineers and design draftsmen went out of real work, and many out of real jobs. Many took retirement; many more could not adjust to the advent of CAD, and failed to pass on their machine-design skills to the CAD-dependent Gen-Next. Gen-Next merrily took off on mastering CAD skills, believing that CAD skills equalled machine-design skills. This false notion has persisted till today, and real machine-design skills are becoming extremely scarce in India instead of becoming plentiful. This is quietly but steadily corroding our industry and economy from the inside.

Let's see this in a global perspective

In the period after World War Two (WWII), countries like Japan, South Korea, Taiwan and Malaysia embarked upon a race to become developed nations from almost the same starting line as us. Others like Brazil, China, South Africa and Thailand started much later than we did. As of now, all of them have almost achieved their goal of becoming developed nations. At the same

Employment Generation in China

Employment Generation in India

time, thoroughly devastated European nations like Germany, Poland, Czechoslovakia, Hungary and Italy persevered and ran the fastest, and more than recovered their lost grounds.

In India, we always try to interpret the rapid and fast-maturing industrialisation of these countries in monetary and political terms, being the money- and politics-obsessed (and technologically ineffectual) people we are. This is a very naïve viewpoint, which makes us miss their real secret to success.

After WWII, without much fanfare, Japan, Taiwan, South Korea (and later China and others) started their race to prosperity by buying and then copying machines from Europe and US and developing their indigenous industry. Simultaneously, they quickly ('quickly' being the key word here) learned the underlying engineering and design philosophies behind these sophisticated machines. And herein lay their secret to success: they then started improving upon the originals in leaps and bounds, and rapidly started mass manufacturing a vast array of products in very modern factories. Their low cost was an added catalyst to this effervescent chain-reaction. Within a couple of decades, many of the Eastern technologies came abreast of the Western innovation engine, and soon overtook them.

As India struggled and limped with her own feeble 'socialist model' of industrialisation, South Korea became the world's largest and best shipbuilder, forcing many renowned Western shipyards to close. Japan overtook and took over the entire world's electronic industry. Communist Russia went into space before the US. Tiny Taiwan became the entire world's machine-tool builder and globally threatened the machine-tool industry (and certainly overran ours). Thailand and Malaysia account for almost all of the world's microchip production. Now China is steamrolling the entire world's mould- and die-making industry (which is the very heart of industrialisation), among many other spectacular wins. China has also emerged as the world's largest single producer of consumer electronics and home appliances. Brazil has mastered the bio-fuel race and Spain is far ahead in solar energy technologies. Israel, despite its troubled existence, has given many unique innovations to the world.

Even today, we are nowhere near winning even one of these races, however much we may try to console ourselves with hollow patriotic boasts. We may pride ourselves in our software and IT talents, but the facts remain that not even one of the many massive leaps in software, communication and IT has originated on Indian soil. Quanti-

Designed and made in China

Designed and made in India

We have deluded ourselves to believe that jugaad is same as innovation. It is not!

tatively, our software and BPO industry grew mainly out of clerical labour arbitrage, and that arbitrage is slowly disappearing now.

The myriad tranquillising signs of industrial progress you see today are utterly and completely dependent on foreign companies, their technologies, machines and designs. Virtually nothing of their technologies, machines and their engineering designs are percolating fast enough into our own indigenous domain, excepting a few cheap copies in a few areas. We simply haven't evolved mechanisms to do so.

Let's return to discussing India's innovation and industrialisation; the two go hand-in-hand – you cannot have one without the other! One point always missed here by all commentators is the fact that in order to manufacture something completely new (like a CFL lamp, or a new kind of mobile phone, or an LCD screen, or a new-generation container ship, or a new kind of weapon system, or a new kind of process like laser cutting), you need dozens upon dozens of completely new kinds of physical machines.

Obviously, these machines too need to be invented and detail-designed by engineering designers, prototypes built, tried out and perfected in a short time. This enormous task goes on in all industry round the world – mostly cooperatively, and sometimes competitively.

All the newly emerged economies, except us, have quietly developed engineering design capabilities on a vast scale in a short time. Indian industry, however, has continuously failed to participate in this ongoing global engineering development process in any significant way. We too started our race by copying machines and technologies, but we could not shed our heavy cultural and habitual baggage, which weighed us down in this race. Of course, our Government and its officials have incessantly hindered us rather than helped (and it is fashionable to blame them), but they are only a minor reason for our technological backwardness.

So why have we remained so technologically backward?

What is the invisible baggage we still carry? Spurred on by our increasingly immature media, we have surrounded ourselves with many myths. Let's list some major ones:

1. Myth: ***India is fast catching up with the world technologically.***

Korean shipyards (Notice van in circle at bottom right)

View from a Typical Indian Factory

Fact: We are only using (or furiously installing in alien-owned factories) newer and newer technologies and machines, not generating / designing even a minuscule portion of those – as now we can import anything we want. Many countries are racing ahead with developing newer technologies and machines at a faster and faster pace, and we are falling behind farther and faster. We are becoming increasingly dependent on imported technology and machinery, losing entire vital indigenous industries (machine-tool building, plastic moulding, die making, etc.) in the process. *Our ever-increasing dependence on other nations for new technology and new kinds of machinery is making us a slave nation all over again, and is creating a deep cancer within our industry.*

2. Myth: ***India has given many inventions to the world, latest being jugaad.***

Fact: We have invented absolutely nothing worth the name after we (allegedly) invented zero. Look around – the pressure cooker, the auto-rickshaw, the diesel locomotive, the CFL lamp, the sports shoes, the mobile phone, the thermometer, the refrigerator… and the machines which make these and so many other things, and the machines which make the raw materials for these… *we have invented absolutely none of them.* We have clumsily copied many things, but not learnt how to develop newer technologies and design completely new kinds of machines.

We have deluded ourselves to believe that jugaad is same as innovation. It is not! *Jugaadbaazi* has not brought us the LCD TV, the smart phones, the washing machine, the luxury bus, the aircrafts, the x-ray machine, or processed food (including *dana-dana ek samaan* Basmati rice). In fact, *jugaadbaazi* has given our society and nation absolutely nothing, except misplaced vanity. It is a matter of national shame that books extolling *jugaad* have become bestsellers in India.

3. Myth: ***Automation is a capitalist evil in our overpopulated socialist country.***

Fact:

a. 1.2+ billion Indians cannot sustain, flourish, or be nourished without a high degree of automation – which has lifted so many people of so many (even communist) nations out of drudgery and poverty – and significantly reduced wastage of resources. A few examples: Almost 1/3 of India's vegetable and farm produce is wasted, and much of it simply rots, as we do not have machines to dress, wash and pack vegetables right in the fields to give them longer shelf life and retain their nutrition; our roads are still cleaned (rather not cleaned) manually, and urban sanitation machinery

(therefore urban sanitation) does not exist anywhere in our hyper-filthy cities. Less than half of our people have access to a basic toilet. Majority of our factories are labour-intensive repositories of filth and junkyard machines.

b. Secondly, innovative mechanisation and automation across the country will need millions of skilled people in many fields. *As a seasoned engineer, I can vouch that this machine-dependent industrialisation I am talking about will generate widespread, better paying, cleaner, more fulfilling employment of a higher social level than the kind provided by the wretched NREGA.*

4. Myth: ***Since IP rights in India are not well protected, inventors are discouraged.***

Fact: I can tell you as a professional inventor-designer that this belief is just a cover-up for the sheer lack of engineering inventiveness among us.

5. Myth: ***It is expensive to do R&D, that's why people copy.***

Fact: As I explained earlier, copying is not the problem. Our problem lies in not learning anything from that copying process; since our copycats' one and only focus is to cut cost anywhere, anyhow and at any cost to himself and to others. The whole nation is paying dearly for our dear "reduce cost at any cost" mentality.

6. Myth: ***India has the largest pool of young capable engineers.***

Fact: May be numerically true, but ask any placement consultant how completely difficult it is to find even entry-level people with specific domain knowledge. Qualitatively and quantitatively, our engineering work force is very poorly trained, capable or even motivated to develop new technologies and machines. Majority fresh engineering graduates immediately abandon their profession and join a bank, a BPO, or a marketing setup (or take up non-core jobs in core industries), not merely because these offer a higher starting salary, but also because they are afraid of physical machinery, and averse to working with their hands.

7. Myth: ***India has a very large pool of cheap manual labour, so we need not mechanise.***

Fact: False, because:

a. Indian labour is not at all cheap in terms of cost per unit productivity.

b. A very large proportion of our labour is untrained or improperly trained (and many are untrainable) for all kinds of badly needed skills.

c. Suitable labour is often not able to relocate to where the jobs are, and vice versa.

d. Many vital skills, like precision machine assembly and operation, die making, etc., are becoming increasingly scarce, with no mechanism in place to train and motivate young workers. Socially we still look down upon a highly skilled engineering worker and look up at a graduate engineer working as a virtual clerk in a bank. The skilled worker doesn't know the theory; the engineer has no connection with the machines – this forecloses new development.

e. India's ability to quickly develop efficient automation solutions in every field is very severely limited, and is not keeping pace with whatever demand exists.

f. Most importantly: today, a vast and increasing number of things simply cannot be manufactured manually, or cannot be made manually at the scale the market is already demanding. Therefore, we are

already furiously importing entire shiploads of these things (or the machines to make them), or just ruing our misfortune if we cannot afford these sophisticated machines.

So much for our cheap labour!

8. Myth: ***Our young engineers are good at CAD and so will soon become capable of designing innovative machines.***

Fact: CAD is only a tool. It is a tool that fragments the profession of machine designers as it makes it difficult for them to change their CAD platform, and hinders them from finding a job best suited to their skills.

9. Myth: ***The world is now a Global Village, so we can import whatever we need.***

Fact: This is a very myopic and damaging viewpoint! A moment of pondering will show up its fallacy: If this is true, then why are all other countries investing so heavily in developing indigenous machines and machine-building skills? We simply cannot become a great nation by continually exporting rice and iron ore, and importing machines and technologies!

10. Myth: ***India is on the way to become a superpower.***

Fact: Every superpower has reached that crest by creating a vast and modern technology-generation and machine-building (and by corollary machine-design) infrastructure. We do not have such vibrant and deeply interconnected engineering infrastructure that makes a nation a true superpower.

11. Myth: ***China will soon falter and start having problems, leaving the field open to us.***

Fact: 'Sour grapes!' There are no signs of China faltering on any indices in any significant way. When it comes to innovation and engineering development, the entire Chinese nation works like an army phalanx to a whole raft of detailed interconnected long-term plans. In India, we keep arguing, working at cross-purposes, obstructing development, praising ourselves, and celebrating our super-chaotic, lethargic democracy.

12. Myth: ***India is too big for anyone to bring about any significant change rapidly.***

Fact: To see the fallacy in this thinking, we only have to look at the fast-paced development and quality of life in China, the US and the EU.

End of Part 1. To be continued in the next issue…

Harshwardhan Gupta

Harshwardhan Gupta (BTech Mech 1976 H5) is practicing machine design for last 38 years. Many of his designs are World's First. You can see his body of work at www.neubauplan.com. He has special competencies in designing high-speed mechanisms, pneumatic systems, maintenance- and adjustment-free systems, innovative mechanization and automation, and low energy consumption machines.

Metamor4sis

Sun rises in the East. A scientific observation with zero skeptics.

We would like to add another.

A bawa is an eccentric genius. For the skeptics who question our judgment, we present the case of Beheruz Sethna.

This bawa joined IITB in 1966 and left in 1971. But his name and his memory lived on, immortalised in yellow paint on a wooden marquee that proclaimed him as a recipient of H4's Scroll of Honour. He just retired voluntarily as the President of the University of West Georgia, a position he held for 19 long years. Not only was he the first person of Indian origin to become the president of an American University, he set some notable benchmarks during his career by converting a humble college into the University of West Georgia with a campus size, student and faculty population that is humbling for IIT Bombay.

In the late 60's, Beheruz was the G. Sec. of H4 and later, G. Sec. of the Students' Gymkhana. The 60's was a puritanical era, like Victoria and her scarlet secrets. In any case, hostel functions were held in hostels. But trust an intrepid bawa to break tradition and host a grand do at the Convo which became famous for portraying a Rakhee (of the Gulzar fame) look alike dancing in a cage. Rumours flew thick and fast particularly since the show was titled Metamor4sis and the rumour was that the lady was semi-clad but in truth wore a pant and shirt. Sethna was the G. Sec. who organised the show that managed to raise many eyebrows, including the diro ones.

Some 40 years later, our paths crossed once again with Beheruz whose career graph now spells Dean, President and one who has been voted the most influential Georgian as well. In a recent spate of email exchanges when Beheruz was "spotted" and congratulated for his meteoric achievements, a candid, forthright and Bawa proper, Beheruz spoke out like Voltaire. He disagrees with everything we say, but he will defend with his life, our right to say it. Not only that, he has several anecdotes from his illustrious career to demonstrate how he has fought for the freedom of speech in a conservative Republican land.

Fundamatics was delighted to have Beheruz sign up for a regular column and put forth his views and also illustrate with examples, his various crusades against ragging, fight for freedom of speech, views on teaching and the like. And what better way to celebrate the entry of a new columnist than to use a name from his past? Metamor4sis. That's what his life and the journey of Fundamatics have been anyway. A metamorphosis, sans the 4-lettered tradition of H4.

Applebee

Thoughts on Free Speech

Dr. Beheruz Sethna

In a recent electronic "bull session" over e-mail on an IIT listserv, I was asked about my views on free speech, and by extension, discussion about religious dogmas. I stated that I was a strong advocate of freedom of speech, but recognized that, in some situations, it takes considerable effort to stand up for such freedoms.

I have lived in the United States for almost 40 years (since September 2, 1973), and so certainly I have been influenced by the freedoms afforded in the U.S. by the First Amendment to the U.S. Constitution, though I was an advocate of free speech even before I left India. I was pleased to know that the one of the six fundamental rights recognized by the Indian constitution include the right to freedom which includes speech and expression (http://en.wikipedia.org/wiki/Fundamental_Rights_in_India). However, there is a parenthetical note in the Wikipedia article to say that some of these rights are subject to security of the State, friendly relations with foreign countries, public order, decency or morality. This is a slippery slope, in my opinion. I was also pleased to learn from a fellow IIT Bee that Article 51A (h) Part IVA-Fundamental Duties, in the Constitution of India states that *"It shall be the duty of every citizen of India -to develop scientific temper, humanism and the spirit of inquiry and reform."* (emphasis added)

Clearly, the upholding of free speech is the responsibility of all of society, but, in my opinion, two groups have to take the lead: Higher Education, and the intellectual leadership. **Translation -- all of us from IIT, and more.**

Of course, the role of Higher Education is critical. According to an article in the *Times of India* on June 22, 2013 (http://toi.in/PA7qhb), *Foreign universities will have to be non-profit making entities,* in addition to the fiscal issues, which I do not touch in this piece, I draw attention to this phrase: *"They would not be allowed to offer any course that adversely affects the sovereignty and integrity of India or its friendly relations with other countries."* Perhaps I don't understand that phrase, but I hope it does not mean: *"Come teach in India, but don't offend anyone!"* That would be antithetical to the concept and role of Higher Education.

I have faced these issues over the past 24 years, in previous leadership positions (Dean and interim Executive VP a University in Texas) and then in 19 years as President of a University in Georgia, I was hit by these issues.

Some examples follow – drawn from several different areas of discussion: politics, religion, sex education, etc.

1. During the Iraq war, a student stormed out of a Political Science class because he was offended at the professor's stand on the war. He complained, not to the Department Chair or Dean, or Provost, or the President (yours truly), but directly to his hometown newspaper which printed a front page, multiple column story about how the University was criticizing the decisions of President George W. Bush. A firestorm erupted – Georgia is a very, very conservative state and we live in a very conservative part of the state. I was besieged with letters and phone calls to fire the professor. Some people wrote directly to the Governor and legislators to cut our funding unless I fired the professor. One person said that I should fire him "as a start" – I always wanted to ask him (but never did), what he meant by that – would he have preferred capital punishment, but firing him was at least a start?! Actually, upon investigation with other, even conservative, students it turned out that the faculty member had not been critical of President Bush – his style (which some students found frustrating) was never to state a stand but let the students come to a conclusion on their own. So, while he did not defend the war (which is what really drove this guy nuts), he did not criticize it either.

There can be no more appropriate site for the discussion of controversial ideas and issues than a college or university campus.

Needless to say, I did not fire the professor nor did I even consider doing so. All I need(ed) to do is ensure that students' opinions are heard as well and that they are not penalized for those opinions on the exam or in class. So, in the context of any Political Science course, if we are bound by the dictates of the viewpoint in the above Times of India article, can one not comment on the pros and cons of any war or action by any (friendly) country? How does one have an intellectually stimulating discussion on any significant topic without debating its pros and cons, some of which might be critical of one's friends or even one's own administrative actions, and others defending those actions? Indeed, how can a substantive course in Politics or Political Science avoid discussing the merits and problems of past political decisions? Isn't that what we need to have education do?

2. A Psychology professor at UWG who is a respected theologian and former Roman Catholic priest, wrote a book called, "What the Bible Really Says about Homosexuality." His book shows "that those who perceive Bible passages as condemning homosexuality are being misled by faulty translation and poor interpretation" (http://www.amazon.com/What-Bible-Really-about-Homosexuality/dp/188636009X). He never forces his views on his students but allows for discussion on both sides. He had been invited to a seminar and open debate – the paper published an account of this and the town went crazy. Many called for a boycott of our university – this was close to our annual fund raising campaign and the calls were to teach us a lesson by not contributing to the campaign – unless I fired the professor. I didn't, of course. I must point out to all that, once it was established that these professors were not abusing their positions to force students to give "their answer" on pain of a bad grade (which would be unacceptable on any matter), these were not difficult decisions at all – I did not even think about the matter for a nanosecond.

My (considerable) time was spent preparing and communicating the free speech and academic freedom point of view – but not at all in agonizing over the decision. Incidentally, the campaign was a great success, better than the previous year, and one priest in the area even sent me a check saying that while he disagreed with the professor on the theology, he was a defender of free speech!

3. Again, because of the area in which we live, even an introductory Science class in Biology or Anthropology is a challenge. How dare we claim that Creationism is not Science? Don't you know that the Earth is 4000-5000 years old? Evolution is a dirty word,etc., etc. Again, calls for changing the curriculum and firing faculty. Again, my firm stand that they have the right to free speech and their opinions, but on the exam, we will grade according to the science texts rather than on religious texts (or their interpretation of them). So, back to the article in the Times of India, if a friendly country said that their religion was offended that a Science course talked about Evolution, should we stop referring to Evolution in our curriculum?

4. Speakers on campus: Many times, when we invite a speaker (we have had some very controversial, nationally-known ones on campus) I get hate mail – we invite speakers on all sides of the political spectrum and I never get hate mail when Newt Gingrich (who was on our faculty many years ago) or Andrew von Eschenbach comes, but if we have a Democrat, I get letters saying "You ruined graduation for my son forever." We actually have a speakers' policy that we have placed on our website, but some of those who are mad at us either do not read it or do not understand it. See http://www.westga.edu/index_speakers.php. It states, inter alia, including a quote from the AAUP (emphasis added), "As part of their educational mission, colleges and universities provide a forum for a wide variety of speakers. There can be no more appropriate site for the discussion of controversial ideas and issues than a college or university campus. Candidates for public office may speak on campus, as may their supporters or opponents, so long as the institution does not administer its speakers program in a manner that constitutes intervention in a campaign. Invitations made to outside speakers by students or faculty do not imply approval or endorsement by the institution of the views expressed by the speaker." In similar vein, my response in this piece reflect my personal views; I speak only in my personal capacity and not for the institution.

5. For sex education purposes, we stage an annual production called the Vagina Monologues. See http://en.wikipedia.org/wiki/The_Vagina_Monologues for an explanation. I get hate mail for that as well and defend the right of the students and faculty to stage it. Students also host an annual drag show as a fundraiser for very worthwhile charities, and this year they asked me to be a judge, so I went for the first time. In both these examples, while the talent is very good, I personally do not like some of the language. The big point here is that I don't have to agree with the speech to support the right to have it. I can be vastly offended by it, and yet support the right to have it.

Anyway, I could go on and on. But, let me make a couple of general points:

1. We (all of us) must be consistent in the defense of airing controversial and opposing ideas. You don't have to agree with the point of view to defend the right to have that speech. Offensive speech is free speech. The antidote to controversial or offensive

speech is more speech (of the opposing kid) – not the end of free speech. By all means, disagree. Write a paper with an opposing viewpoint, provide counter arguments, provide data, blow holes in the offensive speech, say that you are offended if you must, but don't gag speech.

We must provide the necessary intellectual leadership. Don't ignore the attacks on free speech. If we look the other way when the authorities say you cannot say anything that offends our sensibilities or those of their friends, we hurt the education of our citizenry and the future of the country. If we don't allow free speech, those different viewpoints don't disappear from the surface of the world – they are still out there, and we are simply unprepared to face them, because our authorities have ensured that we've never heard them before. We cannot just sit by and let speech be restricted. If we ignore it once, we empower those who will do it again.

If we don't allow free speech, those different viewpoints don't disappear from the surface of the world – they are still out there, and we are simply unprepared to face them.

When I was at IIT, I directed (and played a small role in) Judgment at Nuremberg – we performed it at the Convocation Hall and had two performances at Tejpal in Bombay as well. The last line is so powerful. See http://en.wikipedia.org/wiki/Judgment_at_Nuremberg:

Judgment at Nuremberg centers on a military tribunal held in Nuremberg, Germany, in which four judges are accused of crimes against humanity for their actions during the Nazi regime. Judge Dan Haywood (Spencer Tracy), the chief justice in the case, attempts to understand how defendant Ernst Janning (Burt Lancaster) could have passed sentences resulting in genocide, and by extension how the German people could have turned blind eyes and deaf ears to the Holocaust.

Here are those memorable lines after the trial and the sentencing. Ernst Janning seeks some sort of redemption or understanding from Judge Dan Haywood:

> ***Ernst Janning***: Judge Haywood... the reason I asked you to come: Those people, those millions of people... I never knew it would come to that. You must believe it, you must believe it!
>
> ***Judge Dan Haywood***: Herr Janning, it "came to that" the first time you sentenced a man to death you knew to be innocent.

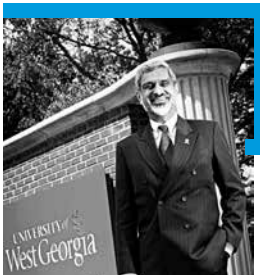
So, the first time we ignore restrictions on free speech, we create an environment in which there will be more restrictions and free speech will slowly die.

2. The Internet, which is supposed to be a broadening concept, often works in the reverse direction. About 25-30 years ago in America (there is probably an India equivalency), there were about three national TV channels and about three national newspapers. And, they provided news and information. You may not like one column's or one show's leaning but another one was fine. You learned about viewpoints different from your own. But now, you can design your information intake to be monolithic. You can choose your news feeds such that you hear only what you want to hear, and you can literally block out all opposing viewpoints from your daily intake. So,

when you come across something other than your own narrow views, you are horrified and offended. Because your world does not even know that that viewpoint has any credibility (or, in some cases, even exists as a mainstream viewpoint). That is why the authorities hurt the education process and by extension, the future of the country, when they insist that no counter viewpoints (which might possibly be offensive) can be heard. To repeat from the previous point: If we don't allow free speech, those different viewpoints don't disappear from the surface of the world – they are still out there, and we are simply unprepared to face them, because our authorities have ensured that we've never heard them before. Thus, these restrictions hurt the country in the long term by stifling the education of its citizens.

For all these reasons and more, we IITians must be defenders of free speech.

If not us, who? If not now, when?



Dr. Beheruz Sethna

Dr. Beheruz Sethna is a distinguished alum from both IITB and IIMA and is currently Professor of Business and President of the University of West Georgia (UWG). Among the many firsts he is credited with becoming the first known person of Indian origin ever to become president of a university anywhere in America. During his tenure UWG became a doctoral degree granting, SACS Level VI university with nearly 12,000 students who "Go West" for the opportunities UWG provides. He also obtained the University's first endowed Chair. He has served twice as Interim Executive/ Senior Vice Chancellor for the University System of Georgia with responsibility for Academic Affairs, Student Affairs, Instructional/Information Technology and Planning for 35 research and comprehensive universities and access institutions, 260,000 students and 10,000 faculty.

Beheruz has published a book and 69 papers (30 since becoming UWG President), several case studies, and obtained externally funded research from the U.S. Department of Energy, IBM, AT&T and others. Amongst his many awards, he has been named among the 100 most influential Georgians.

This Youth Is Mad

Review of film 'Yeh Jawaani hain Deewaani'

Jumblebee

Some 40 summers ago, a film unit came down to IIT to shoot what would turn out to be a high grosser box office hit- Jawani Diwani. We saw it in 35 mm on Friday evenings in the Convo. We saw it in 16 mm in our hostel's volleyball court late at night after a hostel function. We saw it on Sunday evening on a B&W 21" TV made by ECIL. We saw it because it was shot in our IIT. It tickled our funny bones to see exotic pies being served to college students in our very own staff canteen. The pies were to be used for a slapstick scene- a pie fight, much like our water fights in the hostels. We saw this movie again and again even if we had to suffer the sight of seeing Randhir Kapoor as a student, though he looked older than most of our Profs. Jawani Diwani lived up to the formula expectations of that time. The non-glam boy (they actually called Daboo a boy!) meets girl (Jaya, not yet a Bachchan), storyline struck a chord too. She was much like what we unfairly referred to as an "IITan female". They run around trees near Powai lake singing,would you believe it, -gilli gilli appa, gilli gilli appa, gilli, gilli, gilli! There are songs, villains, fights (where a hero loses in one reel and recoups and wins over 25 guys in the next reel) and a happy ending where good finally triumphs over evil.

Fast forward by 40 years. Replace Randhir Kapoor with Ranbir Kapoor. It's the same clan of famous showmen who have been gyrating, pelvic thrusting and romancing since 4 generations. Yes, the title has to change too. Jawani Diwani v 2.0 is now Yeh jawani hain Diwani. But, fortunately, the change is much bigger than that. For one, this is an offering from the Karan Johar stable, notorious for embellishing every frame with high class costumes, sets and locales. Manali, Paris and Udaipur look their best when you've sunk yourself into a comfortable leather-upholstered push-back seat in a multiplex with a tub of pop-corn and a Pepsi on your platter. That's the new formula that has evolved for current film makers.

Film viewing is now a composite experience. Much like the case where one does not inhabit a restaurant for the sheer quality of the food (Eg: quality of idlis in a Kamath restaurant) but rather extends his/her patronage to the ambience, crowd, good feel and an "experience", the average discerning film goer of today chooses a parking spot, quality of pop-corn and effectiveness of a Dolby surround sound system over dialogues and Deepika Padukone. Today, movie goers seem to take well to a film that's a light romantic comedy- one that can be enjoyed after a hard day's work, where you can sink into a comfortable seat and switch off your mobile and your mind and where you don't have to decipher plots

and decode songs written by Majrooh. Fortunately, the film lives upto the current day mantra and does not disappoint. These are Facebook times and we "like" this.

For those who look for a plot in a movie- something like a "story angle", there's a feeble one here in this movie. Bunny (Ranbir Kapoor), Avi (Aditya Roy Kapoor) and Aditi (Kalki Koechlin) are 3 buddies

He is either a dimwit tube-light who has no head to trip over some heels, or his heart is in formation mode. While she is about to declare the L word, he makes a mention that he does not want the night to end.

from school- birds of a feather who flock together. Fun loving and wild. They are off to Manali for a trek and are joined at the last minute by an unlikely Naina (Deepika Padukone). Naina was the "muggu" in their class. She wears specs and is constantly buried in medical text books because she's training to be a doctor. Naina is lonely, feels isolated and wants to break free and "enjoy" life. In short, she wants to discover herself. Attempts to camouflage a pretty Deepika as a prim, proper nice-girl-who-doesn't do-bad-things are half convincing. One can sense that the huge thick lenses will get off soon and our happy-go-lucky Bunny will discover that he has a heart too, apart from a crazy ambition to "see the world". After a series of escapades including a slapstick scene of this foursome escaping from an angry mob, we find Ms. Prim-and-proper thawing a bit and indulging in some fun and masti. Handsome lover-boy takes time off from some frenzied dancing now and then to observe this transformation. Ultimately, some 16,000 feet above mean sea level, love blossoms, but at an unequal pace. She falls first. Head over heels. He is either a dimwit tube-light who has no head to trip over some heels, or his heart is in formation mode. While she is about to declare the L word, he makes a mention that he does not want the night to end. A subtle suggestion that he's just a little in love. A revelation that Bunny has got admitted to Northwestern University for a course in journalism is made seconds before Naina is to reveal the contents of her heart. As a result, she holds back this info since Bunny is clearly on the path to realize his dream of travelling all over the world. The night ends soon and an interval is announced in order to pretend that a 10 minute bio break moves at the pace of 8 years backstage.

Bunny is now a hot shot cameraman working for a leading TV channel doing travel shows and he shows us the Eiffel Tower. Naina, gracefully un-aged even after 8 years, remains unmarried. They meet again in Udaipur, for Aditi's wedding, and start falling in love all over again. This time, it's a bit more convincing since you've unburdened in the loo, digested the pop corn and called home to find that the kids are back home and tucked-in-bed. Receptive tentacles open up to believe that you can love in freezing Manali and a sweltering Udaipur. Songs rage on merrily like a Chitrahaar wire gone loose. But times are different now.. Some lyrics make sense- the rest are written by wannabee Anand Bakshis. Music accompanies some of them, while a drummer here and a clarinet-er there forgets to run at the pace of the cameraman. Starts with a "background" score, but a Diro who forgot to say" Cut it' may end up taking flak that hero lip-syncs in one scene lip-locks the Padukone kissers while song

is still humming and pretending to be sung. The 'he loves me-he loves me not' suspense is made to evolve, but the discerning movie-goer knows the end result. Of course he loves you silly girl, because this is a movie that is gravitating towards a happy ending, albeit with some "natural acting" and an old timer Farooq Sheikh who regales us by drinking something called "rooh-afza"!

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The movie leaves you happy and smiling and the gujjus announce the end with a "paisa vasool" stamp. But the movie still begs the question why the opening scene was a raunchy dance by Madhuri Dixit who wants to travel from Mumbai to Delhi via Agra! No relevance and no connection to what happens later. Aha! Did she mean Viagra? Was she competing with Sallu's Munni and Zandu balm? Or her own titillating choli in Khalnayak? Fortunately, you've switched off your mind as you do in movies nowadays. You're just basking in trends that have your answer buried deep somewhere in the recesses of a popcorn that you just ate off.

Does this movie have a "takeaway"? Yes, 2 actually. We have a Kapoor who knows how to act and another Padukone with a feather in her shuttlecock.

Rating: **4 stars out of 5** if you're a five-point-someone. If your CPI is more than 6.5, don't see this movie. Try to make rocket fuel all over again.

Responsible Volunteering

Be a Child Safe Volunteer

Ashima Goyal Siraj

I spent a very troubled day yesterday when a friend asked me to send her some articles on volunteering in orphanages. Sometime back, I had read an article on how the whole idea of overseas volunteering was being exploited by some business operators to earn profits. The operators would organise volunteering visits or projects for foreigners in orphanages and, after seeing the poor state of children, the volunteer, in all good faith, leaves a donation. The donation, instead of being used for the children, is then pocketed by the owner.

So I set out to find articles on the same topic to forward to her.Little did I know that there will be no end to it once I start. NGOs, media, and personal blogs- everyone had something to say on the 'orphanage trade'. Most referred to the UNICEF report on rise in orphanages with a rise in tourism in Cambodia. While the official study is done only in Cambodia, the situation is not likely to be very different in other developing countries. The report brings to light various hard facts like, since 2005, orphanages in Cambodia have increased by 75%- a number coinciding with the growth in tourism. What's even more shocking is that only about 1/4th of the children living in the orphanages are actually orphans. Many have been separated from their families.

Why? Why should children be separated from their family? Why should a rise in tourism have any correlation to the rise in the number of orphanages?

Volunteers want to volunteer in orphanages. Volunteers want to do something for the war-torn country. The business operators see an opportunity. They open orphanages, find 'orphans',get volunteers and then solicit donations.

It's just a demand and supply equation- an equation that is exploiting both, the volunteer's best intentions and the local family's poverty. An article goes further to say that in the worst case, children are 'rented' or 'bought' from the family because they can earn money by pretending to be poor orphans.

At first I was fairly shocked to read all these articles. But then, I thought, in Cambodia (like in many other developing countries in Asia and Africa), poverty is widespread. In many cases, if the child is with the family, s/he will be engaged in child labour, be malnourished and most likely have a low life expectancy. If the orphanage can provide education and food to the child, then probably that is what the parents thought was best for the child. But then, I saw the Aljazeera film which showed how the children are abused and kept in 'deliberate poverty' in the orphanages.

Some people questioned that there is no

police check for volunteers and that they are allowed to freely interact with children, while in developed countries like US, UK, Australia and N.Z., any person working with children has to go through a police check. As a resident of a developing country, I can surely say that police checks are not a possibility here. Let alone the volunteers, even the staff of NGOs working with children do not undergo a police check. The most that the NGOs can do is to get references from former employers. I am myself guilty of volunteering with many NGOs working with children and not having undergone a police check. But yes, in every NGO where I have volunteered, my first interaction was with the staff and only then was I allowed to interact with the children.

Another issue pointed out is that volunteerism projects may have adverse emotional and psychological effects. Many volunteers want to give all the love and care to the children, thus building strong emotional bonds. However, when they leave, these bonds are broken and the children are once again left alone. As a volunteer, I can understand the urge to work 'hands on' with the beneficiary; but I can also reason out with myself that, maybe, my skills will have a greater impact if I work with the staff. For example, instead of myself keeping the children engaged in games and activities for a couple of days that i volunteer, I think it would be better to train the staff member in the art, since the person works with those children every day. Don't you agree?

The reports and articles are not to dissuade the volunteer but to emphasize that, in countries where systems are not so strong, it is largely the organisation's and volunteer's responsibility to ensure child safety. We cannot get rid of all the unscrupulous elements in society, but we can identify and avoid the traps. Better and more responsible

volunteering is as much of our responsibility as it is of the organisation we volunteer through and volunteer for.

References:

1. UNICEF: A study of attitudes towards Residential Care in Cambodia -
2. Thomas Perry: Voluntourism Traps by Thomas Perry
3. Human Sciences Research Council: Inside the thriving industry of AIDS orphan tourism
4. Aljazeera : Cambodia's Orphan Business
5. The Independent: Cambodia's orphanages target the wallets of well-meaning tourists
6. Friends-International: Childsafe Campaigns

Other links of interest:

www.hopewasherefilm.com/#about

Ashima Goyal Siraj

Ashima Goyal Siraj (Btech 03, EE) is passionate about volunteering and has been working actively with non-profits to encourage volunteerism. She runs small projects aimed at reaching out to the stranger like anonymous letters of love, gifts by hand that are left for people to pick up! She shares resources on volunteerism both for organisations and individuals at www.VolunteerWeekly.org.

The KDJ Effect

Pramod Nanadikar

I don't know why I felt like writing down this memory after all these years (although I can remember it as if it happened yesterday). Maybe having been bed-ridden for a couple of days (or getting old and sentimental :-) has something to do with it. Anyway, KDJ fans like me (and folks who took the Boolean algebra elective) might remember and share the sentiment...

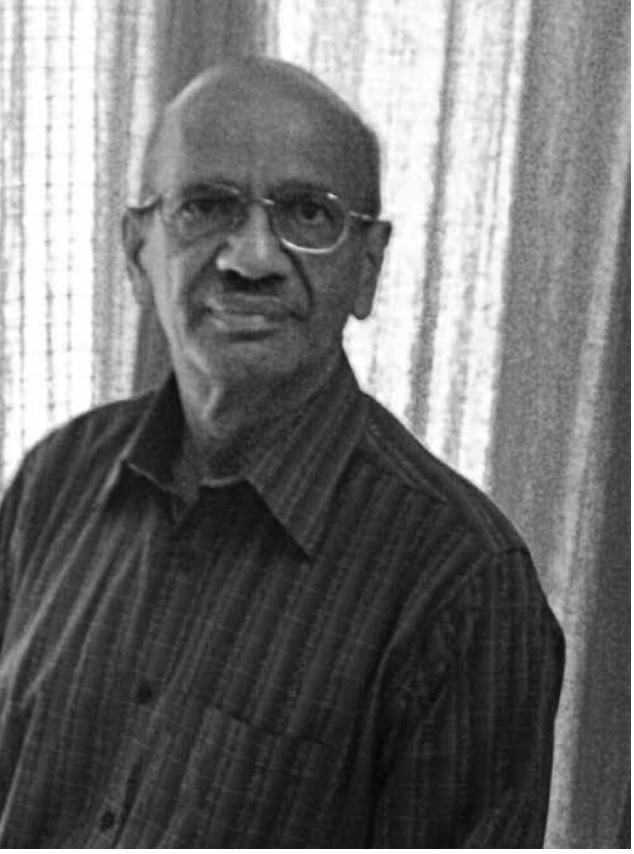
In my memories of our IIT days, Prof. K. D. Joshi's (aka KDJ) lectures, and in particular, the Boolean Algebra elective that he taught us, have a special place. To begin with, it was the way he explained the objective of the elective in the first session; he gave us 5 distinct puzzles and told us that at the end of the elective we would be able to solve these puzzles using Boolean Algebra (He also laid down the criteria for getting a 'P' in the elective but linked to that is a hilarious anecdote that deserves a separate write-up!). Here's one lecture that I will never forget.

After teaching us power set Boolean algebra, discussing isomorphism and giving examples of isomorphisms between Boolean algebras, Prof. Joshi gave us a result - “Every Boolean algebra can be shown to be isomorphic to a power set Boolean sub-algebra.” This is known as Stone's Theorem, he said. The matter would have probably ended here and KDJ would have moved to some other topic had not Harishankar asked a question

KDJ’s passion for mathematical rigor was legendary. Harishankar’s question was answered with full rigor.

- "Sir, does the isomorphism have to be with a power set boolean subalgebra? Could it not be a power set algebra itself? Surely that would be a 'stronger' result?"

Prof. Joshi's reaction was somewhat uncharacteristic - "Well, yes. That would be a stronger result. My knowledge might be dated. One would need to go through mathematical journals...Maybe someone has managed to prove that". He seemed almost disinterested to discuss it further. He then paused for a few seconds, and not able to control himself any longer, turned and said - "There's a very good reason why it cannot be a power set boolean algebra. And it has everything to do with power sets" (or words to that effect). Gone was the disinterested tone; Prof. Joshi was his emphatic, precise self once again. He then proceeded to prod us about power sets, wondered whether we had cleared the JEE or whether we were direct entrants when we could not answer some question (I forget the exact question. KDJ's wit was another enjoyable part of his lectures). Finally he asked us to prove that a set cannot be put into one-to-one, onto corre-



spondence with its power set. Oh that's easy, some said - if a set has n elements, the power-set will have 2n elements so one-to-one onto correspondence is not possible. "Haven't you come across infinite sets?" asked Prof. K. D. Joshi. "You need to prove it for any set; finite or infinite". The class was about to end. "I will give you one hint" said KDJ dramatically before taking his exit - "Think of The barber".

While the reference was clearly to Bertrand Russell's Barber paradox, I could think of no way to use it. Neither apparently could anyone else because in the next lecture, none of us were ready with a proof. Prof. K. D. Joshi then proceeded to give a beautiful proof where the Barber's paradox was present in its full glory. Assume (he said) that a bijection h (one-to-one, onto function) exists between set A and its power set P(A). Consider an element x in A and its image h(x) in P(A). h(x) is a set of elements in A and x can either be a member of h(x) or not.

Now define a set Y of those elements of A that are not members of their images (i.e. all those x's who are not members of h(x). See the relevance of KDJ's hint?!). Clearly Y is a subset of A and hence a member of P(A). Now under the bijection, Y must have a pre-image, say y. Is y in Y? Contradiction either way! Conclusion? The assumption regarding existence of h is invalid.

"You will not come across such beautiful proofs in Analysis". Prof. Joshi, perhaps unwittingly, disclosed his preference for discrete mathematics. While my knowledge of Mathematics was not (and is not) deep enough to comment on that aspect, I think I could sense and share his genuine pleasure at coming across a gem of a proof.

The finale, in a sense, was equally satisfying. Prof. Joshi then proceeded to define a boolean algebra over a countably infinite set (I think it was over a countably infinite set of polynomials but I could be wrong.). Clearly, the cardinality of any infinite power set will be higher than aleph null (the cardinality of a countably infinite set) and hence an isomorphism with the entire power set is out of question in this case. Hence there exists at least one Boolean algebra that cannot be put into one-to-one correspondence with a power set Boolean algebra and hence a stronger version of Stone's theorem is not possible. KDJ's passion for mathematical rigor was legendary. Harishankar's question was answered with full rigor.

Thank you Prof. Joshi for a memorable lecture and thanks Harishankar for asking that question.

Vignettes of H6

S. Muralidharan

You are the company you keep, they say.

I kept all sorts of company. More so prior to moving into H9 in July '71. I was in H6 during 70-71 and had less than a handful of my own classmates for company. I made up by getting to know a few from Chemistry, Geology, and Engineering. While at H6, we PGs led our lives as if in a ghetto, mentally isolated from the vast throng of undergrads. Ghetto mentality was reinforced by having been assigned wings and rooms that no one else wanted, namely ground floor of the first and last wings. The former was too low and liable to receive visits from snakes (my window was hardly a foot above the lawn outside) and the latter too close to the boundary wall and liable to be visited by those looking for a quick pick of something valuable. I remember one of my most placid classmates surprising one such visitor in the act of making off with his belongings.

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The Geologists

I will always remember the Geologists for they were like Tweedledum and Tweedledee, only there were four of them instead of just two (what does that make them? Tweedle suffix i with i taking a value from 1 to 4? Or would it be the pair TD&TD and anti-TD&TD?). They were also the guys who introduced me to my first ever Hindi movie, Johnny Mera Naam. I did manage to put them off quite a bit, frequently asking what was going on, who was saying what and why, what the songs were all about, etc. L, their éminence grise, told me to shut up and promised to explain all on the journey back which would involve a long trek from Ghatkopar station for we were sure to miss the last bus. The other three were S (aka Lambu) who thought his shoes smelled sexy, Y, the robust and no-nonsense Jat, and the quiet, gentle and withdrawn S.

They were all from Delhi and bemoaned the highly skewed ratio of boys to girls on campus as well as the latter's studious disposition, which was contrary to what they had been led to believe of Bombay and its girls. When you got to know them, jolly fun lot they were in their own way, so long as you didn't mind the conversation veering at some point towards sexy smells of footwear and how Y's wholesome "Jat-ness" was being wasted. They did everything together. That sounds a lot worse than it actually was, for those may have been heady days of Free Love, but they were also innocent times. I don't know what happened to them after we parted company in May '72. I accidentally

bumped into L in Nagpur circa 1975. He was then with Western Coalfields in Chhindwara and claimed his problems involving women continued; only this time it involved "bhabhis" and keeping each one a secret from the others! I wonder what happened to the other three, especially the man with the smelly-shoe fetish.

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The Chemists

There were a sprinkling of Chemists in H6, just like us Physicists. N was from Bangalore, from an affluent family and was not sure what he was doing at IIT. He went on to join a bank and I met him decades later at his office opposite VT station, where his bank was located. Soon thereafter he migrated to New Zealand in search of a better life. R was also from Bangalore, played cricket with modest skill but thought otherwise. My classmate B (who now looks for water on the moon and other pieces of floating rocks) who played for H3 did not think much of R's cricketing abilities. Then there was K, my closest friend among the Chemistry guys. K was friendly, chatty, even garrulous at times, and always funny and very unlike Kafka's eponymous protagonist. He was confidence personified. About that time there was a magazine article on the wayward life of a Hollywood actress listing her proclivity to jump from man to man. K was convinced that once she found him, there would be no further man-hopping. There was a small matter of her finding him (or vice versa), but he was confident it would happen once he hit the friendly shores of the US of A. As it happens they never found each other, she went on to an early death due to excess, and he is now a respectable researcher.

K was generous and would invite us to make sudden visits to his home in Sion for meals. His poor mum was always willing to indulge her son's friends, no matter what time of the day or night. Soon after joining IITB, he had a hernia surgery which he referred to as "Hiranya", and which had me stumped for a while. He wore very tight trousers - even for those days - and thought he was irresistible to the females of the species. As far as I know, he failed to cut any ice with the ladies in his class or any other class for that matter. He probably did in the USA, whither he went after passing out in 1972. I lost touch with him after leaving campus. K was in possession of a vast repertoire of expletives and slang words in Tamil which he proceeded to teach the non-Tamil speaking population of his class as well as anyone who showed an interest. I finally managed to Google him up recently and it was as if we had never lost touch in the intervening 41 years!

S was the tall guy who was nice and D the short guy who was nice. The latter, it was rumoured, was the object of the attentions of one of his classmates, but I am not sure if it was the real thing or a case of "campus goggle" (not unlike the phenomenon of "beer goggle") which, as you may know, is a phenomenon of proximity breeding familiarity. He would go all red in the face when asked about that. I wonder where they are now. The attraction was said to have been based on cerebral appeal which, in K's case, ought to have been a bit lower down.

The Undergrads

There were numerous undergrads in H6; thin ones, stocky ones, big ones, small ones, the short, the tall, the boyish, the grown up, the innocent and the worldly. Everyone liked the song "Venus" or so it seemed, for it blared from the stereo system morning, noon and night. Everyone seemed curious about the PGs being housed in their hostel, but after the initial period of so-called "ragging", they generally gave us a wide berth. That is, until they would come quietly and one by one, to seek an introduction to the girls in Physics & Chemistry departments. You see, the male female ratio was a bit better in the MSc classes with three or four women in a class of under 20.

N in my wing - the only undergrad in my wing - was one such. He was a sweet fellow from Hyderabad who seemed to be going backwards at IIT. Smart enough to get in, he seemed too lazy to care thereafter. He told me that he rarely attended classes, that things were coming to a head with the administration and he did not know how to deal with that. He was concerned that he would break his mum's heart should his stay at IIT be cut short precipitately. I bumped into him in Hyderabad in August '72 in the company of the most gorgeous girl. He said he had not returned to campus which was why he was in Hyderabad and not on campus. I thought that if I had a gorgeous girl like that, then I was ready to spend an eternity in Timbuktu, but kept the thoughts to myself.

M was a TamBram (Tamil Brahmin), born and raised in Bombay and fluent in Tamil, Marathi, Hindi and English. His family owned an automotive garage in Sion. He would turn up at H6 in a variety of cars in various states of repair. My favourite was a 1936 Sunbeam Talbot drop-head coupe. Maybe it was 1933. The important thing was that it was a Sunbeam and it was of pre-war vintage. It badly needed "painting and denting", but when M brought it to the hostel, the engine had been fixed and it was running beautifully. So one day he invited me to join him on a drive to the city to see a movie. After a drive with the sun in our eyes and the wind in our hair, we lunched at Samovar at the Jehangir Art Gallery. Thence to a movie at the nearby Regal. I can remember so many details of that trip, but cannot for the life of

I thought that if I had a gorgeous girl like that, then I was ready to spend an eternity in Timbuktu, but kept the thoughts to myself.

me recall the name of the movie.

A quick cup of chai after the movie at an Irani restaurant on MG Road and we were on our way back. The day had cooled down and there were many people about on the Marine Drive and they were all gawking at the Sunbeam, which not only had graceful flowing lines and was a classic beauty, albeit in need of restoration, but could also put on a turn of speed with a throaty roar.

On Hughes Road, just before the Kemps Corner flyover began, a very stylish young lady in a Fiat took a keen interest in the Sunbeam. We were convinced it was the contents of the car and not its form that the young lady was enamoured of. M was caught napping, or gaping, and lost the race up the flyover which the girl in the Fiat took easily while we wheezed our way up. The Sunbeam may have been quick in its day, but 40 years on it was no match for even the mass-market car of the day. We didn't give up and gave chase up Peddar road. After letting us draw level at Cumballa Hill, with a wave and a

smile the young lady pulled ahead almost exactly in front of Homi Bhabha's bungalow "Kenilworth", never to be seen again. Ever.

It was getting dark. M was familiar with the Eastern Expressway, but rarely, if ever, ventured onto the Western Expressway. I never ventured anywhere anyway, neither East nor West. Up to Bandra, and even the airport was no problem. He knew we had to turn right somewhere around Andheri and head towards L&T and then a left in front of their factory to get to Powai Road. Where exactly was that first right off the highway?

First the streetlights ceased to be. Then the four lanes became two and then just one without even a median marker line. Having built up a head of steam, so to speak, M was loath to stop to ask for directions. Then the city haze began to fall lower and lower in the horizon and was beginning to fade altogether. It was then that I prevailed upon him to take outside help, which he did. Seems we had left Bombay quite some way behind. We retraced our way back and got to the hostel, missing dinner. So it was RK to the rescue once again.

M parked the car in the H6 driveway and, to facilitate an easy start the next morning, revved the engine to the accompaniment of a throaty roar. No one in H6 seemed to take any notice.

S. Muralidharan

The self-styled "Cool Cat" of H9 joined the Banking industry in '72 and went on to found India's biggest Life Insurance company in 2001. Retired in 2011 and lives in Chennai. A jazz fan, he never missed a Mumtaz movie at the Convo, sometimes watching both shows.

Be Smart, Be Smarter or Be Smartest

LetItBee

Every single IITian who has cracked the JEE and enters the hallowed and revered portals of the IITs is undoubtedly smart. After passing through and "passing out", a "smart" punter who has graduated at the top of the heap tends to, or chooses to, work alone to solve "real world" problems. This is probably due to the self impressed conviction that since s/he is perceived to be smart, s/he ought to be able to tackle these problems single-handedly.

However, a "smarter" punter recognizes that the cumulative knowledge of the other "smart" colleagues around him/her exceeds the knowledge s/he possess, and ropes them in to solve the problem they are working on- leveraging them to arrive at optimal, practical and cost effective solutions.

The "smartest" punter assembles a team of "smarter" punters, assigns them a set of tangible goals and objectives, puts one of them in charge and then empowers them to "go for it". Having done so, s/he has the bandwidth to assemble other teams of "smarter" punters. With effective time management and by avoiding getting embroiled in minutiae, the "smartest" punter interacts with these teams of "smarter" punters regularly to ensure they stay on track and, if necessary, tweaks their goals and objectives in order to extract the desired results.

So the choice that every "smart" individual has, given their personality, inclination and preference, is to either work "solo"(which more often than not leads to a "career limiting" plateau) or function as a "smarter" individual. Choosing to become a "smarter" individual could set the stage to rise up the ranks and become the "smartest" kind of person, who is undoubtedly a very able leader.

LetItBee

Thank You
Flavour: ICE SPICE

There are only two sections that have unfailingly appeared in every single issue of FUNDAMATICS. The Editorial and the Thank You section. The start and the end. After all, these are ceremonial pre-requisites of every magazine. This is the 7th time we're saying "thank you" in Fundamatics. But unlike the first 6 times, we are making a departure from our previous convention. Two departures actually. One, this thanks comes from the bees, all of whom are being named for the first time. A case of bees coming out of the closet. Oops, we meant bonnet. Or maybe, we meant the hive. Two, rather than thank coffeecups, googledocs, all and sundry as we do every time, we have decided to thank every single author (by name) who has contributed an article, submission, interview for the first 6 issues of Fundamatics. Our gratitude to our advertisers, readers and subscribers remains where it is. So does it for all who participated in a massive mail deluge (of Uttarakhandian proportions) in the aftermath of the news of Fundamatics winning 3 coveted national awards.

Reason why we are singling out authors: Fundamatics has won the prestigious ICE (in-house Communications Excellence) awards for a) Best magazine in educational institutions b) Most imperative content and c) Best Magazine overall (Gold). This last award was the big one. Biggest one actually. Handed over in a glittering ceremony to the youngest and the oldest member of our team. Tejas Suma Shyam and Ali Contractor are separated by 40 years. We drool over and fondly fondle the certificates and the trophies that now adorn our IITBAA office. Priceless embellishments that you won for us. And you won us much more. Pride, laurels, fame and a sense of achievement. And a resolve to excel further. With your continued support of course. Readers of the 4th issue may recall this prophecy in the "thank you" section which said:

Awards: We know you beckon us. Soon we will come galloping on a horse and take you away. You like us.

We didn't go on a horse. We went in a cab driven by Ajit Singh when it was pelting cats and dogs (ICE and awards actually), but we took away the awards nevertheless.

Alphabetically arranged, and out of the closet/bonnet/hive, the Fundabees Aishwarya Ramakrishnan, Akshay Mishra, Ali Contractor, Anand Prahlad, Arnapurna Rath, Ashima Goyal, Bakul Desai, Bhavini Pant, Cibi Chakravarthi, Damayanti Bhattacharya, Devdas Kamath, Jaya Joshi, Namita Lobo, Nihar Gokhale, Nilesh Jain, Nitin Kumar Singh, PV Krishna, Parasvil Patel, Paresh Chavan, Paresh Vora, Parul Gupta, Pooja Nagle, Rajan Shastri, Sandip Tarkas, Shirish Waghulde, Shreyas Navare,

Swaroop Vajrapu, Tejas Shyam, Vinay Karle say

Thank You

to the equally alphabetically arranged Ajay Phatak, Ajit Ranade, Anil Gandhi , Anil Gidwani, Anil Padhye, Anjana Meel, Ankur Pegu, Anubhav Mangal, Arun Dravid, Arun Firodia, Arun Jethmalani, Arun Kaul, Aruna Roy, Arvind Gupta, Arvind Kejriwal, Ashok Misra, Ashok Sreenivas, Ashvin Iyengar, Atul Vijaykar, Avinash Awate, Beheruz Sethna, Bharat Desai, Chetan Chitnis, Dan Mayur, Derek Monteiro, Dhananjay Saheba, Dinesh Verma, Edmund Carvalho, Gaurav Bansal, Gaurav Porwal, Gautam Barua, Gautam Naidu, Gautam Saha,Harish Badami, Harshwardhan Gupta, Hemant Kanakia, Hemendra Godbole, Hiro Chhatpar, Hrishikesh Deshpande,Inayat Sabhikhi, Jamal Mecklai, Janak Daftary, Jay Narayan Vyas, Jitendra Bhatia, Joan Chevalier, Kailash Mishra, Kashyap Deorah, Kirat Patel, Kishor Kulkarni, KN Teja, Kritin Joshi, Kumar (Speedy), M Sivaramakrishna, Madan Mohan Rao, Madhav Bokil, Madhu Reddy, Makarand Karkare, Manohar Parrikar, Manu Hinduja, Mike Pandey, Milind Joshi, Milind Yedkar, Mukta Ghate Farooq, Narasimhan, Nina Godbole, Nitesh Tiwari, Nitin Gupta, Poorna Chandra, Prachi Bhatnagar, Pradeep Anand, Pramod Choudhary, Prateek Sharma, Raghu Murtugudde, Raj Aphale, Raj Mashruwala, Ramchandra Guha, Ramesh Ukidve, Rajaram Desai, Rajeev Pandia, Rajendra Bhandari, Rajendra Gadgil, Ravi Upadhye, Rinti Banerjee, Rishi Sanwal, Rustom Kanga, S Muralidharan, SD Pandit, Sailesh Kapadia, Samir Dhume, Samir Kelekar, Sanjay Pol, Satish Agnihotri, Satish Hattiangadi, Satish Joshi, Satish Khot, Satish Kini, Saumil Majumdar, Shaji Farooq, Shailesh Gandhi, Shantanu Dixit, Sharad Saraf, Sharatchandra, Shekhar Kulkarni, Shirish Potnis, Shripad Dharmadhikary, Shruti Mahajan, Sidhartha Goyal, Soumitra Banerjee, Sourav Panda, Sreekumar N, Srikant Rao, Srikrishna Karkare, Subhash Tantry, Sudheendra Kulkarni, Sudhir Badami, Sudhir Sharma, Suhas Sukhatme, Sushil Rathi, Suyash Jain, Tara Banerjee, Uday Bhende, Uday Desai, Urjit Yajnik, Vasant Limaye, Vijaya Verma, Viral Acharya, Vivek Borkar, Vivek Joshi.

Announcement of the month: Join us for a celebration in Goa on 19th July. You got us ICE. We'll bring the soda and the rest. Cheers! Hic! ⬢

Creative Bees at Fundamatics

Illustration

Shreyas Navare
C'08, SJMSOM, H-13

Shreyas Navare: (C'08, SJMSOM, H-13), Mumbai, Senior Manager, Marketing and Corporate Communications at a private bank. He freelances as a Editorial Cartoonist for Hindustan Times. He has covered elections in 6 Indian states through the eyes of a cartoonist on behalf of HT. Shreyas has held many cartoon exhibitions, two of which were inaugurated by Dr. A. P. J. Abdul Kalam. His first solo international cartoon exhibition was held recently at Bangkok. His second exhibition was held at Nehru Centre recently. Cartoons featured in this issue are from the exhibition.

Design

Anand Prahlad
C'07, IDC, H-8

Anand Prahlad is an independent graphic designer and artist. When not designing books, magazines, corporate identities or illustrating, he is an active gardener, culinary expert and amateur musician.

He runs www.thenewvitruvianman.com, where he writes and illustrates articles on design, gastronomy and music. He is also launching www.magic-marinade.com, a brand new food blog, this July.

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