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Editorial

In this issue of VOICES we present news on the latest technology and social concerns with workable solutions.

Flexible Electronics: A Revolution in the Making at IITK is the best news one would expect from the institute about recognition of its leadership in development of a cutting edge technology. A precursor to it was the research initiated in Samtel Center a few years back and reported in VIOCES-1 as The State of Electronics in India. In a related subject Shivanand traces the origin and implications of speed and miniaturization of chips in Moore’s Law and Indian Contribution to its Longevity.

कविता: डा. अरुण कुमार शर्मा एक बेड़े के माध्यम से वन संरक्षण के प्रति समाज का सरोकार याद दिलाते हैं। रिश्ते, हवाई अड्डे से में देखिये खोखली आत्मीयता से एक प्रत्यक्ष दर्शन का अनुभव - डा. भारत लोहनी, सब मन भावन होने के बाद अनमना पन क्यों सुनिये राज सेठ से - क्या ढूंढ रहा है मन नू, श्रवण कुमार उमलिया की गज़लें - मुखोंटे और खामोशी.

Fibber on the Roof A new format of poem by Pranab Kumar Prusty.

Dr. H C Verma shares how to construct a science lab for school level at a minimum possible cost with household material in Invoking Passion for Science, and Anil K Rajvanshi shares his practical experience in Sustainable Living.

Taking IITK from Good to Great has a personal view of Ashok Gupta on possibility of some improvements.

Apna Skools: Promise of Hope tells about Vijaya Didi and her zeal to uplift children of brick kiln workers and rag pickers. And, a few Award Winning Photographs from students and alumni in the end.

Take a short memory trip in the main corridor through Knowledge Corridor.

Arun Srivastava (BT/EE/1972)
Editor
August 2015.
Expand Your Universe  
Connect with VOICES

Been There Done That  
Share Your Creativity and Experience with Alumni and IITK

Everything printable (except politics and religion) is welcome. If you can talk about it, you can also write it for sure. Happenings in halls of residences, mess, lectures, tutorials, play grounds, cultural clubs and festivals, interaction with faculty, issues in senate, outings in Kanpur, vacation, journeys, exams and quizzes, creative explosions, eccentrics vs. genius, and current happenings on the campus, the list is endless, and so must be our collective memories.

The E-magazine is in English and Hindi. Please send your original writings, poems, photos, drawings, etc. to: editiitkemag@yahoo.in; gupta@iitkalumni.org

Due credit will be given for each piece to its author. If the matter was published elsewhere previously, the writer should mention it along with a statement that there is no copyright issue if it is published in the AA e-magazine.

Sole responsibility for ensuring originality and correctness of information remains with the author. Submissions should be in plain text or an easily editable format. Photographs and sketches should be submitted in the jpg/jpeg format limited to 200 KB.

This is a free publication of the Alumni and no payments are made for any contribution.

The previous issues of VOICES can be read at


Voices is grateful to all its contributors for making one more issue possible.

Editor - Arun Srivastava (BT/EE/67XXX)

August 2015.
Knowledge Corridor

Arun Srivastava (BT EE. 67XXX)

This corridor (also on cover of this issue) was main entrance to the institute from Halls 2, 3, and 5.

There was no boundary wall anywhere in the academic area and hostels up to the late seventies. The knowledge corridor (as I would like to call it) connected all the buildings existing in 1967 between library and western lab (WL) on east west route and workshop at the opposite end of its origin near Hall 2. Faculty building on one side was under final stages of construction and lecture halls L1 to L7 were fully functional on the other side.

The only other independent and functional building was science block. Most of the labs including physics and chemistry were housed in workshops.

Rooms on ground floor at the entrance of WL going to workshop were used for tutorials of physics and chemistry. Civil engineering labs and electronics store were on ground floor of the corridor in the attached photo. On the floor above there were electronics labs where we made our projects. On the right end (going towards lib) of the WL extension on ground floor was our computer center with an IBM 1401 and an IBM 1620. Just above it there was a closed circuit TV Center and language lab. Solid state lab was also on ground floor.

Doordarshan came in Kanpur much later in 1974, and Delhi had a very short black and white broadcast in the evening in the sixties. IITK had its own TV programmes largely managed by students who operated the cameras and consoles too. I would read evening news sometimes after collecting it from papers and radio.

Large rooms on upper stories of the WL Extension were used for fourth and fifth year lectures and small rooms were math tutorials. At south end on top floor of WL Extn we had a canteen where top class tea was served in mini tea pots and separate pots for milk and sugar even for one cup at a small fraction of a rupee. The aroma of tea percolated in the entire corridor leading to it and the canteen was patronized by faculty and students alike.

On one side of the lib on ground floor near stairs we had a hall for TA 101 drawing class with drawing boards, and Dr. M Anandakrishnan was our instructor. The other side had Math Dept. A part of second story of the lib had HSS Dept.

There was no air-conditioning anywhere except lib and CC although lecture halls were equipped for it. We got our independent Computer Center in third or fourth year around 1970 perhaps with a new IBM 360 occupying almost all central hall on its ground floor. We used the upper hall as a free study since it was air-conditioned, and had plenty of rough paper in dust bins from rejected programs and computer cards.

A pack of ten Charminar cigarettes at panwala in the shopping center cost 10 paisa and it was the favorite of intellectuals wearing kurta on bell bottom pants sporting long manes with heavy sideburns. Imagine.

Some guys would become so emotional while leaving the institute after five years they would jump into the spray pond to drown their sorrow. It was in those days we fell in love with IITK and it endures to date.
Flexible Electronics

A Revolution in the Making at IITK

With inputs from Prof. Monica Katiyar (BT/MetE/1987),
Chief Coordinator FlexE Centre, IITK.

At the heart of this revolution lie two significant capabilities: Designing products that are flexible and form fitting, and their manufacturing by printing based processes. A combination of the two may lead to roll-to-roll high throughput manufacturing just like a newspaper press. This revolution is being driven by use of new materials and methods of manufacturing. This break from the past has provided an opportunity to those who missed the “microelectronic bus” earlier. There are no well-established players in flexible electronics at the moment.

The Indian industry must make use of this opportunity to get a foothold in the emerging market for large area flexible electronics. The electronics emerging from this will be fabricated on substrates that are plastics, paper, textiles or metal foils. The products will be much more affordable than the silicon based ones and if required, even disposable. They find applications in distributed energy production through organic solar cells on windows and
roofs, disposable sensors for air and water quality management or lab-on-a-chip for health monitoring, security packaging of medicines to check circulation of fake drugs, wearable and lightweight electronics on textiles as a soldier’s gear, airport baggage handling, labeling of books in libraries or answer scripts in a large scale examinations, flexible displays and lighting just to name a few.

According to global industry sources, the flexible electronics market in 2011 was USD 1.8 billion and projected to be USD 19 billion in 2018. Much of the activity today is concentrated in the USA in North America; Germany, Finland and Denmark in Europe; and Korea, Taiwan and Japan in East Asia.

To realize these objectives, FlexE Centre at IITK has been conceptualized as a platform having state of the art infrastructure and a competent team, named as FlexE Team. The team will serve as the link between the knowledge generation activity of academic partners and prototype and product building activities of industrial partners.

Prime Minister Narendra Modi launched a unique National Centre for Flexible Electronics under the Digital India program in New Delhi on Wednesday, Jul 1, 2015. The Centre is being established jointly by the department of electronics and information, and IIT-Kanpur to lead development of electronic products that are flexible, bendable and can be printed like newspapers.

The setting up of the Center is aimed at research work and developing large area flexible electronics that will serve as a foundation stone for development of domestic industry under the vision of 'Make In India'.

To ensure the success of the flexible electronics project, IITK is entering into partnerships with the industry so that prototypes of the products developed could be commercially produced. IITK is looking for international collaborators to accelerate the pace of research and commercialization.

The Centre will work on several different domains to bring them out as products. The domains are: organic solar cells, disposable sensors, smart cables, flexible displays and lighting. The institute has been given five years for the development and demonstration of prototype flexible electronic products.

"The institute has grabbed the opportunity of setting up the flexible electronics Center where this upcoming technology will be transformed into products." IIT-Kanpur director Prof. Indranil Manna proudly announced.

"Apart from engaging in the development of prototypes in flexible electronics, IITK will also be responsible for developing the manpower for this "new age technology". We have competent people who were among the first to begin working on flexible electronics in the country therefore, we have hands on experience to go ahead and roll out the prototypes of such electronic products," said Prof Manna.

He added that both the Union government’s department of Electronics and Information Technology and IITK are jointly setting up the Flexible Electronics Center with a sum of Rs 133 crores of which Rs 20 crores have been pledged by the institute.

Terming the Rs 113 crores funding by the Central government as "unique", Prof Manna said never in the past over Rs 100 crores have been given by
the government to a single project as in the case of Flexible Electronics Center. "The Prime Minister is himself taking interest in the new age technology and IITK is motivated to do well" he added.

An eight-member team has already been working on flexible electronics to realize prototype products. While the team is headed by Prof Monica Katiyar; Prof Deepak Gupta, Prof YN Mahapatra, Prof S Panda, Prof Ashish Garg, Prof Baquer Mazhari, Prof SSK Iyer and Prof Anshu Gaur are other important core team members. The team members are senior faculty from four different departments of IIT-K and have come together to work on this new age technology.

Prof Monica Katiyar said the team is being expanded and about 55 people having expertise in this field from industry will be hired. Chief operating officer for the Centre, Dr Sudhindra Tatti, has already been hired, she added.

The model proposed for rapid development is a foundry-like structure. A flexible electronics based product is likely to have one or more of elements, such as transistors, memories, diodes, passive components, sensors, actuators (displays, LEDs, loudspeakers), power generation sources (photovoltaics) and energy storage elements (batteries).

To attract quality manpower, it is envisioned to use industry participation and deputation of its personnel to the FlexE Team with attractive options to acquire higher educational degrees. The team would need a variety of expertise such as in device development, systems integration, electronics prototyping, materials and equipment support. Accordingly, the size of the team determined is approximately 60 persons, led by professionals of considerable experience and specifically hired to operate the center.

Microelectronics is implemented on single crystal silicon wafers. Over time, its manufacturing has followed the concept of decreasing feature size (from microns to nanometers) and increasing substrate size (from 2” wafers in the 1960s to 12” today) to develop increasing complex ICs at competitive prices. Manufacturing in this segment of industry in our country is nearly non-existent.

However, there is another set of products within microelectronics that are built not on crystalline silicon, but on glass and are equally large both by production volume and revenue. These, for example, include displays/television, lighting and photovoltaic modules. A television screen is made of pixels that are only tens of micrometers; thus making of a television is in the domain of microelectronics. However, the sizes are in excess of 40-60 inches. Further, to achieve lower costs, several screens of television are made simultaneously on a single glass plate. Thus, the size scale on which this segment of microelectronic industry works is in meters. Similarly, photovoltaic panels based on thin film of amorphous or polycrystalline forms of silicon are made in sizes that are in meters. Microelectronics on large area substrates leads to Large Area Electronics.

The limitations faced in the scaling up of substrate size in the manufacturing of large area electronic systems can be overcome by printing organic and inorganic materials on flexible substrate based manufacturing platforms which lead to lower production costs.

The winning combination of features that characterize this pervasive electronic based
intelligence, also referred to as ‘electronics everywhere and for everybody’, are:

a) **Flexible** substrates such as plastic, paper, textiles and metal foils for all possible forms,

b) **Printable** circuits in large area possibly in roll-to-roll fast manufacturing processes similar to mass printing of newspapers,

c) **Affordable**, i.e., low cost functionalities

d) with performance just enough and appropriate for a particular application

e) **Disposable** after its designated duration of usage with possibility of recycling of components

From the environmental perspective, flexible electronic products have the potential to be environment-friendly and biodegradable. In addition, lower power consumption and light weight make them attractive alternatives for military, space and transport sectors.

In contrast to conventional electronics, which involves capital intensive and complex fabrication facilities, manufacturing in flexible electronics is likely to need less capital and will be much simpler – which is ideal for distributed production.

**Major Applications of Large Area Flexible Electronics**

**DISPLAYS**

Fields of displays photo voltaic, lighting, health care and transport are going to be revolutionized in the next 5-10 years due to the adoption of printable and flexible electronics.

The flexibility and the thin form factor may add to the appeal of such displays from a consumer’s perspective.

**PRINTED BATTERIES**

Smart objects such as RFIDs, stand-alone sensors, etc. require a power source which should be thin, flexible and congenial to design requirements. Printed batteries meet these challenges. In addition the common markets, they cater to the needs of niche markets such as anti-wrinkle plasters.

**PHOTOVOLTAIC APPLICATIONS**

Solar cells on the outer surface and white LED’s on the inner surface is attractive for buildings. Their low weight and flexible nature make their deployment easier and less costly.

**INTEGRATING FLEXIBLE ELECTRONICS IN FABRIC**
One application is a battery charger integrated in clothes – very useful for defence applications and recreational activities.

PACKAGING TAGS

A temperature sensor integrated with a timer can be used for monitoring perishable goods and pharmaceutical products. This smart packaging can collect data and wirelessly communicate to a wider target audience. Such smart packaging will allow the user to walk through with their trolley whilst a scanner reads the goods and totals the amount, charges it to the customer’s account and adjusts the shop’s inventory.

SMART LABELS & PRINTED RFID

These include tens of thousands of items in retail stores, baggage sorting at airports, couriers, tickets, letters, perishable items such as milk, fruits and meat, etc. This has given rise to the concept termed as ‘internet of things’ in which objects made intelligent by fixing labels on them, allows them to be queried, sorted, sold or controlled during transportation.

LARGE AREA FLEXIBLE SENSORS

Sensors integrated with printed transistors on flexible sheets can be used as artificial skin for robots with ability to sense pressure, temperature and chemical environment.

Wide Application of Flexible Electronics

ENERGY:
- Distributed energy production through organic solar cells on windows, roofs, and indoor objects in buildings.
- Efficient indoor lighting panels on walls and ceilings integrated with the architecture of the building.

ENVIRONMENT:
- Disposable sensors and electronics for environmental monitoring, e.g. for air and water quality.
- Large scale distribution of sensors and their deployment at the point of use.

HEALTH:
- Disposable lab-on-chip for testing.
- Packaging of medicines.
- User controlled diagnostics.

DEFENSE & SECURITY
- Wearable electronics in soldier’s gear.
- Defense inventory control.
- Light weight large area probes and sensors for unmanned mission.

COMMUNICATION & TRANSPORTATION
- Railways inventory, ticketing and listing of passengers and parcels, and component monitoring.
- Airport baggage handling and locating objects within a large set.

EDUCATION
- Plastic electronics for books, notebooks, magazines.
- Labelling of books in libraries, answer scripts in large scale examinations.
- Design of innovative test formats and certificates.
Moore's Law and Indian Contribution to its Longevity

Shivanand Kanavi

The only correction to Moore’s Law is that nowadays the doubling occurs every 18 months, instead of one year. As for cost, when transistors were commercialized in the early 1950s, one of them used to be sold for $49.95; in 2015 a chip like the 18 Core Xeon Haswell EP, which has 5.5 billion transistors, costs about $4,000. In other words, the cost per transistor has dropped by a factor of 70 million.

This is what has made chips affordable for all kinds of applications: Personal computers that can do millions of arithmetic sums in a second, telecom networks that carry billions of calls, and Internet routers that serve up terabytes of data (a terabyte is a thousand billion byte).

The reduced costs allow chips to be used in a wide range of modern products. They control cars, microwave ovens, washing machines, cell phones, television sets, machine tools, wrist-watches, radios, audio systems and even toys.

In the not too distant future, the Government of India may consider the idea of providing a billion Indians with a chip-embedded Aadhar card carrying all personal data needed for public purposes. Already credit cards, debit cards, driving licenses etc in India carry chips.

According to the US Semiconductor Industry Association, the industry produces a billion transistors per year for every person on earth (seven billion inhabitants!) The global semiconductor industry is estimated to be a $300 billion-a-year business. Electronics, a technology that was born at the beginning of the 20th century with the discovery of the electron, has today been integrated into everything imaginable.

The Nobel Committee paid the highest tribute to this phenomenal innovation in 2000 when it
awarded the Nobel Prize in Physics to Jack Kilby who invented the integrated circuit, or the chip, at Texas Instruments in 1958. Considering the breath taking advances in power of chips and the equally astonishing reduction in their cost, people sometimes wonder whether this trend will continue forever. Or, will the growth come to an end soon and the so-called Moore's Law cease to be valid?

The Institute of Electrical and Electronics Engineers, or (IEEE as 'I-triple E') -- the world’s most prestigious and largest professional association of electrical, electronics and computer engineers -- conducted a survey among 565 of its distinguished fellows, all highly respected technologists.

One of the questions the experts were asked was: How long will the semiconductor industry see exponential growth, or follow Moore’s Law? The results of the survey, published in the January 2003 issue of IEEE Spectrum magazine, saw the respondents deeply divided. An optimistic 17 per cent said more than 10 years, a majority -- 52 per cent -- said five to 10 years and a pessimistic 30 per cent said less than five years. More than 10 years after the survey, the law still seems to be going strong.

**Printing technology and chip-making**

The chip-making process, in its essence, resembles the screen-printing process used in the textile industry. When you have a complicated, multi-colored design to be printed on a fabric, the screen printer takes a picture of the original, transfers it to different silk screens by a photographic process, and then uses each screen as a stencil, while the dye is rolled over the screen. One screen is used for each color. The only difference is in the size of the design.

With dress material, print sizes run into square meters; with chips, containing millions of transistors (6 core i7, for example, has 1.2 billion transistors), each transistor occupies barely a square micron.

How is such miniature design achieved?

There are all kinds of superfine works of art, including calligraphy of a few words on a grain of rice. But the same grain of rice can accommodate a complicated circuit containing about 3,000 transistors!

How do chipmakers pull off something so incredible?

In a way, the chip etcher’s approach is not too different from that of the calligraphist writing on a grain of rice. While the super-skilled calligraphist uses an ordinary watchmaker’s eyepiece as a magnifying glass, the chipmaker uses very short wavelength light (ultraviolet light) and sophisticated optics to reduce the detailed circuit diagrams to a thousandth of their size.

These films are used to create stencils (masks) made of materials that are opaque to light. The masks are then used to cast shadows on photosensitive coatings on the silicon wafer, using further miniaturization with the help of laser light, electron beams and ultra-sophisticated optics to imprint the circuit pattern on the wafer.

The process is similar to the good old printing technology called lithography, where the negative image of a text or graphic is transferred to a plate covered with photosensitive material, which is then coated by ink that is transferred to paper pressed against the plates by rollers. This explains why the process of printing a circuit on silicon is called photolithography.

Of course, we are greatly simplifying the chip-making methodology for the sake of explaining the main ideas. In actual fact, several layers of materials -- semiconductors and metals -- have to be overlaid on each other, with appropriate insulation separating them.

Chipmakers use several sets of masks, just as newspaper or textile printers use different screens to imprint different colors in varied patterns. While ordinary printing transfers flat images on paper or fabric, chipmakers create three dimensional structures of micro hills and valleys by using a host of chemicals for etching the surface of the silicon wafer.

The fineness of this process is measured by how thin a channel you can etch on silicon. So, when someone tells you about 45 nanometer (nanometer is one millionth of a millimeter)
technology being used by leading chipmakers, they are referring to hi-tech scalpels that can etch channels as thin as 45 nanometers. To get a sense of proportion, that is equivalent to etching over 2,000 parallel ridges and vales on the diameter of a single strand of human hair!

In 2010 most fabs used 45 nanometer technology; in 2015 many leading fabs have commercialized 22 nanometer technology and are experimenting with 14 nanometer technology in their labs.

What does this mean? Well, roughly each new technology is able to etch a transistor in half the surface area of the silicon wafer than the previous one. Lo and behold, the ‘secret’ of Moore’s Law of doubling transistor density on a chip!

Why Moore's Law must end

What are the problems in continuing this process? Making the scalpels sharper is one. Sharper scalpels mean using shorter and shorter wavelengths of light for etching. But, as the wavelength shortens we reach the X-ray band, and we do not yet have X-ray lasers or optics of good quality in that region.

There is another hurdle. As circuit designs get more complex and etching gets thinner, the masks too become thinner. A law in optics says that if the dimensions of the channels in a mask are of the order of the wavelength of light, then, instead of casting clear shadows, the masks will start ‘diffracting’ -- bands of bright and dark regions would be created around the edges of the shadow, thereby limiting the production of sharply defined circuits.

Moreover, as the channels get thinner there are greater chances of electrons from one channel crossing over to the other due to defects, leading to a large number of chips failing at the manufacturing stage.

Surprisingly, though, ingenious engineers have overcome the hurdles and come up with solutions that have resulted in further miniaturization.

At every stage, engineers have had to fine-tune various elements of the manufacturing process and the chips themselves. For example, in the late 1970s, when memory chipmakers faced the problem of limited availability of surface, they found an innovative answer to the problem.

“The dilemma was,” says Pallab Chatterjee, “should we build skyscrapers or should we dig underground into the substrate and build basements and subways?” While working at Texas Instruments in the 1970s and 1980s, Chatterjee, a distinguished alumnus of IIT Kgp, played a major role in developing reliable micro transistors and developing the ‘trenching’ technology for packing more and more of them per square centimeter. This deep sub-micron technology resulted in the capacity of memory chips leapfrogging.

Another person of Indian origin, Tom Kailath, an emeritus professor of communication engineering and information theory at Stanford University in the US, developed signal processing techniques to compensate for the diffractive effects of masks.

A start-up founded by him successfully commercialized Kailath’s ideas. Kailath’s contribution was an instance of the cross-fertilization of technologies, with ideas from one field being applied to solve problems in a totally different field. Well known as a leading academic and teacher, Kailath takes great satisfaction in seeing some of his highly mathematical ideas getting commercialized in a manufacturing environment.

Another leading researcher in semiconductor technology who has contributed to improving efficiencies is Krishna Saraswat, also at Stanford University.

“When we were faced with intense competition from Japanese chipmakers in the 1980s, the Defense Advanced Research Projects Agency, DARPA, a leading founcer of hi-tech projects in the US, undertook an initiative to improve fabrication efficiencies in the American semiconductor industry,” says Pallab Chatterjee. “We at Texas Instruments collaborated with
Saraswat at Stanford, and the team solved the problems of efficient batch processing of silicon wafers.”

One of the ways diligent Japanese companies became more efficient than the Americans was by paying attention to ‘clean-room’ conditions. Pallab Chatterjee and Krishna Saraswat spotted it and brought about changes in manufacturing techniques that made the whole US chip industry competitive.

**The devil is in the interconnects!**

One of Krishna Saraswat’s main concerns today is to reduce the time taken by signals to travel between chips and even within chips. “The ‘interconnects’ between chips can become the limiting factor to chip speeds, even before problems are faced at the nano-physics level,” he explains.

Clearly, semiconductors have broken barriers of all sorts. With their low price, micro size and low power consumption, they have proved to be wonder materials.

Did India miss the electronics bus? Yes, it certainly did during 1970 and 2000. There is the apocryphal story of Robert Noyce coming to Delhi and staying for two weeks in 1969-70 trying to convince the Government of India that they should let Intel build a chip fab here. Not surprisingly, he was turned away!

However, later developments in chip design technology have allowed for fabrication and design to be separated. It is notable that technologists of Indian origin like Suhas Patil (IIT Kgp), Prabhu Goel (IIT K), Raj Singh, Rajeev Madhavan etc. have contributed to this separation of VLSI (Very Large Scale Integrated Circuits) design software from chip fabrication.

Now cutting edge chips are being designed for the world in Bengaluru, Pune and Hyderabad while they may be fabricated in South East Asia, Korea, Taiwan or China. In technological terms if not in business terms, we seem to have caught the electronics bus at the next bus stop, since 80 per cent of the cost of the chip lies in design and testing.

IT industry veterans like F C Kohli are not satisfied with it. Kohli advocated developing appropriate courses in IITs and other engineering colleges to develop the human resources for high end chip design and testing since the 1980s and 1990s.

Kohli emphasizes that India needs to produce about 6,000 M Techs (four to five times the current output) every year in VLSI design to reach the sophistication of Israel, which is a leading player in the field.

If a modern-day cell phone were to be made of vacuum tubes instead of microchips, it would be as tall as the Qutub Minar, and would need a small power plant to run it!

While chips have become ubiquitous, Moore’s Law has remained a self-fulfilling prophecy even 50 years later. Not bad for an industry where the time scale is not measured in decades and centuries, but in annual quarters!

Shivanand Kanavi, (IIT K, MSc-Phy, 1974) is a senior journalist and author of "Sand to Silicon: The amazing story of digital technology" (2004, 2007) and "Research by Design: Innovation and TCS" (2007) and former VP, TCS. He tweets @shivanandkanavi and blogs: http://reflections-shivanand.blogspot.in/

(Excerpts of this article appeared in Rediff.com, Prajavani and Business India)
एक पेड़
अरुण कुमार शर्मा

मैं एक पुराना पेड़
सहस्त्राब्दियों पुराना, किन्तु भरा हरा, सस्त्मृत,
अभी तक मेरे अंग-प्रत्यंग, आंदोलित -
होने को पन्नवित, कुसुमित और सुवासित
मिश्री, पानी, हवा और अन्न से
खड़ा किया गया मैं
स्वयं से उत्पन्न, स्वयं के लिए मैं।

मेरे नीचे बैठ
सूखे पत्तों और धार के अपारित आसन पर
सुजाता और अन्य ग्राम बालक बालिकाओं ने
प्राप्त किया मैत्री, करुणा और प्रेम का जान
उससे जिसे दिखाया उन्होंने ही भर्मों से संबोधी तक का
खोर खिलाकर मांगा जिसे मृत्यु से वापिस।

मैं साक्षी
कटते हुए वर्णों का, उनकी मृत देह पर
लहलहाती खेती का,
दुभूषणों का, चांदों का, क्रंडन और उत्तरों का
भूखा पेट प्राणीलोगों द्वारा चलाये हुल का
मानव पर मानव के अत्याचारों का, युद्ध का,
भक्ति का
प्रेम और साम गानों का, कथा, पुराणों का,
मानव के विलाप, आनंद, महानता और ओछपन का
किन्तु मैं साक्षी हूँ सब पर अपने आशीर्वादों का
क्योंकि बुद्ध और अंगुलीमाल, निर्माणा और राम
सिंह
मेरे सबके लिए अस्तित्व में हैं।
सांध्य को मेरी गोद में लौटते सभी खग
गा-गाकर, कभी-कभी चीखकर,
मुझसे सबके लिए महामृत्यंजय मांगते हैं -
सबके लिए।
मैं सूखता, खिलता गमकता खड़ा हूँ
थोड़े से बचे वन-प्राणियों के साथ
मेरे साथी, परिवार-जन, वंशज मारे गए सब
सड़कों, भवनों, कारखानों, रेल और धुएं से युद्ध
मेरे हार कर
देखने को अपना और मनुष्य का अंत
किससे?
इन गाँव वालों से
जो मना रहे हैं नागपंचमी
अपने शिशुओं से चुरा कर पिलाते हुए दूध सपों
को
मिश्री, पानी, हवा और अन्न के प्रभाव से।

इनकी पुस्तकें, ऋधार्य, प्राध्यात्मिक, प्यार प्रदर्शक
और आशीर्वाद
जिन्हें ये अपने बच्चों से अधिक चाहने लगे हैं
भयंकर आग लेकर आ रहे हैं
और ये भोज्य मानव अपने बनाए संदेशवाहक,
अवतार और इश्वरपुत्र पर
अपने बच्चों को ढा रहे हैं।
ये धरती के लिए लड़ रहे हैं
और इनका विज्ञान धरती को जीवन के लिए
अयोग्य बना रहा है।

जिस दिन ये अपने स्वयं के लिखे वेदों,
बाइबलों और कुरानों के लिए
अपनी स्त्रियों और दूरधुरे शिशुओं को निछावर
kर देंगे
में सिद्धी, पानी, हवा और अग्नि हो जाऊंगा।
और फिर नई पृथ्वी, नए मानव, नए देवता, नए
स्वर्ग और नए नरक
को अंतर में लेकर जन्म लूंगा।
लेकिन में और जीना चाहता हूँ?
क्या तुम वेदों, बाइबलों और कुरानों की
कुलहाडियों से मेरी रक्षा कर सकते हो?

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रिश्ते, हवाई अड्डे से
भारत लोहनी

हवाई अड्डे में
मेरे सामने
बैठा वो आदमी
कानों में खोस हेडफोन
मोबाइल पर बतियाता आदमी
अपनी बातों में तल्लीन
कभी खुश, कभी ग़मगीन
कभी हँसता है, कभी बोलता है
कर-कर इशारे हाथों से
हवाओं को टटोलता है
....
कभी जोर से बोलता है
डांठता है, चिल्लाता है
पटक-पटक हाथ, जंघा पर
अपना रोब दिखाता है
अभी मुझे उसकी मिठी हुई है
भवें भी टेंदी हो, तन गई है
अब मन की उसकी, न हुई तो
चुट्टी किसी की, पक्की हो गई है
....

अभी डरा सा है वह
शरीर उसका दुबक गया है
येस सर, येस सर, जी जी, जी जी
बस यही बोल रहा है
मुझे आगे-पीछे हिल रही है
पीठ उसकी सिकुड़ गयी है
गुलामी उसके चेहेरे से
साफ़ झलक रही है
अब वह बस हृं-हृं
 हृं-हृं ही कह रहा है
अनमना सा, सुने को
अनसुना कर रहा है
बीच-बीच में घूमा आंखे
आंखे तर कर रहा है
लव यू, लव यू
कह कर, झट
फ़ोन कट कर रहा है
सामान की लिखाई लिस्ट से
तो लगता है ये ही
पक्का ये फ़ोन आया था
उसके अपने घर से ही
....
कैसा है मेरा बच्चा
अब वो बोलता है
क्या-क्या हुआ स्कूल में
वो हर चीज़ तोलता है
काम खत्म कर लेना
जब मैं घर आऊंगा
जो भी कहेगा फिर
tेरे लिए लाऊंगा
....
कैसी हो, मिलती भी नहीं
कभी फोन तो किया करो
मैं ही बस याद करता हूँ
कभी तुम भी तो किया करो
बीच-बीच में फोन को
वो चूम सा रहा है
भूल कर खुद के सामान को
पागल सा घूम रहा है
फोन खत्म करते ही
कॉल डिलीट करता है वह
deखा तो नहीं किसी ने
चोर नजरों देखता है वह
cभी उठ जाता है कुर्सी से
हनसता है, हा हा कर
cहता है, दे ताली
सामने हत्येली फैला कर
cूं मशगूल है बातों में
जैसे दुनिया है बेकार
cहेट फोन पर है उधर
cोई बचपन का यार
....

अभी वह उदास है
मजबूरी कुछ खास है
दवाई खाई या नहीं
यूँ वह पूछता है
अपने बड़ों से दूरी का दुःख
उसके चेहरे पर साफ़ दिखता है
आँखे नम हो रही हैं
सर हाथों में आ गया है
अपना ख्याल करना,
अपना ख्याल करना
बस यही दोहरा रहा है
....
रिश्तों के मकड़जाल में
फंसा हुआ ये आदमी
हर रिश्ते के लिसाब से
खुद को ढालता आदमी
रिश्तों की दोरियों को यूँ
पकड़े हुवे हैं
जैसे हवाई अड़का
मेरे शहर से
ओर शहरों से
जोड़े हुवे हैं

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क्या ढूंढ रहा है मन तू

राज सेठ

रड़या बादल, धरा और अम्बर
मांझी-नैया, धैर्य समुन्दर
सुकून कौन सा, ढूंढ रहा है मन तू

जात-पात, और धर्म-ईमान
किसम-किसम के हैं भगवान
पूजा कौन सी, ढूंढ रहा है मन तू

मस्त पवन, थिरकती नदिया,
पंछी-परंदे, कुह-कुह बोले कोयलिया
पंछी फिर भी कैसा, ढूंढ रहा है मन तू

मात-पिता, बंधु-बांधव, अर्धगनी
पुत्र-पुत्री, अपार मित्रों की मण्डली
कैसा मित्र फिर भी, ढूंढ रहा है मन तू

खिलती-कलियाँ, महके गुलशन में
पात-पात भीरि-तितली, चहकें उपवन में
बगिया कौन सी, ढूंढ रहा है मन तू

धन-दौलत, घर और गाड़ी
मोबाइल लैपटॉप, सुविधा सारी
सुविधा कौन सी, ढूंढ रहा है मन तू

सूरज-चंदा, टिम-टिम तारे अनंत
बसंत, गीर्म्य, शरद और हेमंत
ऋतू कौन सी ढूंढ रहा है मन तू

कविता भी सारी सिकुड़ गयी,
अक्षर भी सारे निचुड़ गए
शब्द कौन से, ढूंढ रहा है मन तू

राज सेठ (67xxx BT Elect.)

15 मार्च 2019 rks_mayur[AT]hotmail.com
मुखोंटे
श्रवण कुमार उमलिया

मुखोंटों के सिरफ़ कारोबारी से लगे हैं लोग भी,
अब यहाँ पर इश्तिहारी से लगे हैं लोग भी.

इस शहर के नाम कर दे फिर कोई वीराणियों,
बेगार की अब पत्नीपाती से लगे हैं लोग भी.

टूटने और बिखरने का अब न कोई ज़िक्र छेड़ो,
मुफ़िलियों की गायबुगसारी से लगे हैं लोग भी.

कौन देगा साथ, हम किससे यहाँ उम्मीद बांधे,
ज़ुल्म की इक्की थानोंदारी से लगे हैं लोग भी.

भूख की इन बस्तियों में प्यास लेकर जी रहे,
झुठे बादों की खुमारी से लगे हैं लोग भी.

जिन पे था दारोमदार, आज के इस दौर में,
भिखारियों की रेज़गारी से लगे हैं लोग भी.

देश के हालात पर अब कौन रोगिया 'श्रवण',
अब यहाँ पर गैरज़िम्मेदारी से लगे हैं लोग भी.

***

ख़ामोशी
श्रवण कुमार उमलिया

हो गयी झोपड़ों की जुबान ख़ामोश,
अण्घुकों में रोशनी की अज़ान ख़ामोश.

इस शहर में हादसों को देखकर,
गूंगे आंगन हैं और मकान ख़ामोश.

चेहरे हैंसते हैं फिर भी छलनते हैं,
दिल में ज़ख़्मों के निशान ख़ामोश.

इस तरह सबने तराशा है हमें,
ओठ पत्थर के और बयान ख़ामोश.

बिकने वाला है अब इनसाफ यहाँ,
झटूट माकूल और ईमान ख़ामोश.

इस कदर तेज़ आंधियाँ हैं यहाँ,
टूटे पंखों में हर उड़ान ख़ामोश.

प्यार के बढ़ते यहाँ प्यार नहीं,
लहरें उठती हैं पर उफ़ान ख़ामोश.

***

श्रवण कुमार उमलिया
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Fibber on the Roof

Pranab Kumar Prusty

The Fib is a form of poetry that has its origins on the internet. The general rule is to write a six line, 20 syllable poem with a syllable count by line of 1/1/2/3/5/8, i.e. the classic Fibonacci sequence. Here are some fibs hastily strung together, meant to be taken in the same light spirit that they were written in.

“Art
must
serve a
purpose”, they
sat and chanted all
day. Final year art project.

One
small
step for
man, one long
queue at the theme park
Futurama, light of my life.

To
bee
or not
to bee, that
is the first question,
each day in the Nietzschean hive.

One
long,
rude shock.
Funny thing,
Paris syndrome.
Reality, the bitter pill.

Knock,
Knock.
Who’s there?
It isn’t
funny anymore.
Let me out of the basement, please.

Pranab Kumar Prusty,
Second Year, B.Tech, AE
Invoking Passion for Science

In The Most Economical Lab at IITK

Prof. H. C. VERMA does it again. Maximum price of a demo is Rs 30/- and most of the apparatus is from household waste which costs nothing. Yet the concepts they explain are useful up to B. Sc. level. Such laboratories can be promoted as a science museum in every town.

We can start off with such a project for the city of Kanpur inside IITK as a joint project cutting across several batches.

Over 300 such experiments can be put on display at a short notice. Space is a constraint not the apparatus. Each experiment leaves an indelible impact on young minds through a live and interactive approach while depicting highly abstract concepts of physics which are difficult to understand with only text and diagrams. Once a phenomenon is seen live one can fall in love with the subject. Prof. Verma has truly found the most appropriate way of projecting his passion for science on a pupil. The spontaneous, “VOW! How is that possible?”, is just a beginning of a journey into the world of scientific research naturally.

If you would like such labs to be replicated at the most economic cost anywhere else, please contact
Prof. Verma at hcverma@iitk.ac.in

Some Experiments in Dr. Verma’s Lab

A laser beam when interrupted by a hair in its path is projected as a dotted line, but the same beam appears as a scattered dot when it is aimed at the same surface uninterrupted.

Double refraction from interface between air, glass, and water.

Total internal reflection from water surface. A real ray diagram realized inside an ordinary bottle using an ordinary torch.
Rainbow colours (VIBGYOR) inversed.

Controlled submersion of a submarine by change in ambient pressure.

Three bottles partially filled with liquid are interconnected with a pipe at their base. How many caps should be opened to equalize the liquid level in all of them?
An inductor coil is wired in series with a lamp. Will the lamp glow more or less when some bicycle spokes are inserted in the core of the coil?

Why the aluminum disc (near the palm of hand) is floating in the air? Will a thicker disc of equal diameter travel vertically less or more when the electromagnet is switched on?
### Sustainable Living

**Anil K Rajvanshi (BT ME 1972)**

I live in Phaltan, a rural town in district Satara, Maharashtra, managing Nimbkar Agricultural Research Institute (NARI), an NGO. We work in the areas of agriculture, renewable energy, animal husbandry, and sustainable development.

I am sharing our experience of the last 30 years in sustainable living.

In 1984 I designed our house. It has 18” thick stone walls for introducing a very large thermal lag against the ambient temperature. Passive cooling is gained in summer with old jute sacks on roofs, wetted with water twice a day. They cost ~ Rs. 15/m². Evaporation cools and controls 80% of solar heat load entering the house. At 40-45° C outside our house remains at a comfortable 25-30 °C. Besides, we also close all windows and draw the drapes over them to block heat from hot air and radiation. The trees and foliage surrounding the house also help.

The sacks get worn out in a couple of years with salts and other residues left behind by evaporation. They are used as mulch in the garden or burnt in our boiler for bath rooms. We have a grate-type multi fuel boiler with about 10 m high chimney. The chimney provides an excellent draught which completely burns the wood and other fuel leaving little ash behind, which is used as fertilizer either directly or through a composting pit.

Phaltan is 800 m above sea level and 100 km south-east of Pune or 300 km south-east of Mumbai. It has a very mild climate. Still, some times during winters the temperatures can drop to 7-8° C. Our house is not heated. We close the windows and wear warm clothes and socks to keep us warm and comfortable.

All our kitchen waste is composted in a pit (dimensions of 1 m X 1 m X 1m). In 2-3 months it provides excellent fertilizer for the garden.

We never waste any food. Whatever we take on the plate is consumed. The leftovers are either used the next day or fed to our two dogs and 3-4 cats. There is no special food for the pets. They share our meals.

Our house is located on a 2-acre plot with trees planted by us. Their leaves rot in the soil during rainy season and provide a nice mulch. The dead branches and some other trees provide wood for the boiler. We get surplus wood from our garden to sell and supplement our income.

When we had purchased this land in 1981 it was completely barren and the quality was so poor that there would be cracks big enough for a whole sheep to disappear in them. We planted about 30 different varieties of trees. With time they have grown into a tropical forest. There are about 40 types of birds living in our garden or migrating through it. The leaf litter from the trees and compost fertilizer have improved the soil and it has become springy and very fertile.
Most of our groceries and vegetables are available within 10-15 km of our home. The eggs are from free ranging chickens, milk from cows across the road, and vegetables and groceries from the local market. Most of these things are grown in Phaltan area. We use safflower seed produced in the Institute farm for crushing in the local mill for cooking oil. It is fresh with no chemicals. We enjoy fresh fruits from our own garden.

We have few clothes and they are worn till they get torn then used as dusters and wipes. After turning to tatters they are fired in the boiler.

I wear mostly khadi or cotton spun in cottage industries. I buy cloth for my bush shirts and get them stitched in Phaltan. This makes the shirts much cheaper than the ones purchased in markets or malls. Khadi is a very comfortable material and it makes excellent duster after wearing out.

Papers are used on both sides and the waste is fired in our boiler. Thus everything is recycled.

We use electricity sparingly – which till recently was facilitated by the Government of Maharashtra with 3-4 hours of power cut every day! We have battery-powered inverters in offices and at home which supply enough juice during power cuts for lights, fans and computers. No TV or refrigerators run on them. During power cuts we walk, talk or read. It provides a good quality time to catch up on reading and discussions. Sometimes I think this is for the best as 24-hour electricity with TV and other electronic media running continuously causes distraction.

We do not travel much instead communicate by phone and internet which is a very energy-efficient way of keeping connected. With the availability of broad-band internet connection both at home and in the office, it is an excellent communication and information medium.

We bring most of our groceries and vegetables in cotton carry bags which reduces plastic waste. Nevertheless, we cannot get away from plastic as most of the things are already packed in it and this is the biggest nuisance we have to endure.

We have no way to recycle it. Presently we take the plastic bags and bottles to the local garbage dump from where they ultimately go to the town recycling center. The technology for recycling of plastics in rural areas is not available and it is very much needed.

We are teetotalers and drink boiled water. It is not only healthy, it also helps the environment by reducing waste materials. Bottles and cans of soft drinks cannot litter our garden.

Our shopping is limited to bare essentials. We still use our 25-30 year old refrigerator and try to get most of our gadgets repaired rather than discarded. This reduces the garbage and at the same time it is light on the pocket. However, India is rapidly developing into a throwaway society, hence it is becoming difficult to get the old gadgets repaired.

The main external inputs we use are electricity, petrol for mobility and LPG for cooking. Our per capita energy consumption (from last 2-3 years data) is 14.5 GJ/yr. for electricity (both in offices and home), 10.8 GJ/yr. in transport (mostly for petrol for 2 cars) and 2.1 GJ/yr. in cooking gas. Thus we personally consume 27.4 GJ/person/year of energy. To this should be added the energy in India’s infrastructure which comes to about 10 GJ/person/year. Thus our total commercial energy consumption is 37.4 GJ/person/yr. Contrast this with about 306 GJ/person/year that an average U.S. citizen uses. In 1/8th the energy used by an average American we can live quite decently in a modern industrial society.

We use fans and CFL’s with evaporative roof cooling system to keep our energy consumption low in offices and home. AC’s in bedrooms and offices are hardly used. Last 10 years data shows that AC was used for only 15-20 days in a year.

We travel between 15-17 thousand km/yr which limits energy usage on land transport.

If air travel is added to the above energy the consumption increases drastically. With the energy norm of 1.3 MJ/passenger-km for air travel a trip to US from Mumbai consumes 28.3 GJ/person of energy while each domestic air
travel consumes ~ 3GJ/person. Last year we made 4 domestic and one foreign air travels to make our total energy consumption as 86 GJ/person. It is still less than 1/3rd the energy consumed by a U.S. citizen. Though our air travel is quite limited still it is the biggest user of energy in our case. Interestingly one earth is sufficient to provide every person this much of energy consumption.

Our average water consumption is 180 liters per person/day for household purposes. This is almost one-fourth that used by a U.S. citizen.

Thus a satisfying and decent life style can be maintained in much less energy and water usage as compared to that in western societies and this is a lesson for our leaders who are hell bent on following the Chinese and US patterns which are unsustainable. We can make the life style even more sustainable by producing electricity, liquid and gaseous fuels from agricultural residues so that our household gadgets and mobility machines can run on locally produced fuel. Similarly electricity production from solar energy can further help in this process.

However both these things will require a community effort together with certain policy changes by the Government of India. Nevertheless, if all of us become internally secure through spirituality then it can help us reduce our greed for materials and resources and help us in living sustainably. With proper planning and enlightened policy of the Government, Indians can enjoy a very high quality of life without becoming over consumptive.

_____________

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This article is an excerpt from the book “Nature of Human Thought”. ©Anil K Rajvanshi. April 2015.
We are proud of our alma mater and the significant contributions made by its large number of alumni and faculty in various spheres of life. However, in the recent years, IITK has been facing challenges that need to be addressed if it were to remain as a premier institute of higher education. Some of the challenges have emerged as a result of:

- Faculty shortage
- Increased student enrolment
- Improvements in competing institutes
- Pressure of rankings
- Student disengagement
- Demand for greater social responsibility on institute
- Increased pressure on infrastructure
Questions are being asked if the whole IIT system has lost its way due to increased power of JEE coaching industry and placement of IIT graduates in non-technical fields. IITK that used to be the “place to be in” seems to be slipping the ladder and only a handful of top 100-JEE rankers, if we are lucky, choose to attend it. This is happening in spite of the fact that IITK is consistently ranked as the top engineering school in the nation.

In this report an analysis some of these challenges is presented and ideas on how to address them are developed so that we can take IITK from good to great. Hopefully, these ideas will encourage discussion and action.

**IITK Slipping the ladder?**

Whether we like university rankings or not, they are becoming part of academic lives. Ministry is paying attention to these rankings and demanding action from institute administration. Even if we may not be convinced of the absolute values of the ranks, relative ranks among universities can be a source of learning and offer clues for improvement. According to Times Higher Education Rankings powered by Thomson Reuters of Indian universities in Asia, IITK did not rank in the top 100 in 2015. In 2013, it ranked #55 behind Punjab University and IITKgp.

Interestingly, 90% of the ranking values are in the hands of faculty output. IITK has 40 faculty chairs and 25 research fellows – most supported by alumni. Is IITK demanding enough from its faculty? Are we rewarding faculty for behavior “A” while hoping for behavior “B”? IITK may benefit by examining what others with a higher ranking are doing differently?

**Mumbai is New Kanpur: How to Attract Top JEE Rankers to IITK**

IITK, consistently for a decade, has been ranked among top engineering colleges in India by India Today-Nielsen Survey.

But then why do so few top JEE rankers choose IITK? In 2015, only 2 out of top 100 chose IITK while 65 chose IITB. In 2014 also only 2 chose IITK. In 2013, there was no one among JEE 100 who chose IITK.

When students who actually joined IITB over other IITs were asked to explain their choices, some of the reasons were:

* > Influence of Coaching Institutes: “Their advice was of paramount value to students particularly in lack of any other creditable source of information.”

* > Peer Group Pressure: “… I wanted to join IIT Bombay because several of my top ranker friends were going there.”

* > It is Time to Chill & Get a Good Job: IITB seem to offer more pleasant environment for students to chill!”

* > Placement Possibilities: Students in Kanpur are generally deprived of international companies at the time of placement

* > Better Student Experience: “There is flexibility in terms of faculty interaction and getting projects. You may also get good internships. IIT Bombay is the most liberal with changes in branch of study.”

Better marketing of IITK internally to faculty and students as well as externally.

It appears that IITK has reputation for rigorous academics and that is OK. The problem is that part of this perception about IITK is due to its outdated grading policy. In other IITs some variation of grading system where grade of A=10, A-=9, B=8, B-=7, C=6, C-=5, D=4, D-=3, E=2, F=0 has been adopted. At IITK there are no intermediate grades between A and B, B and C, C and D and D and F. It is recommended that IITK should consider changing its grading system in line with other IITs.
Organize campus visits by top JEE rankers where institute could showcase itself.

Use Noida office for placement if companies do not wish to travel to Kanpur.

Conduct workshops and short courses on enhancing soft skills of students including written and spoken English.

Make minor/major for the students real and not just on paper.

Showcase prominent alumni both in Core and non-Core fields – more like “Alumni Hall of Fame” so that students can see what is possible. This can also be used for creating IITK marketing literature.

Alumni could:

- Establish Alumni Scholar program where 10 top 100 JEE ranked students are provided additional scholarships (say Rs. 50,000/- per year), internship opportunities in India and Abroad, and research support during summers to work with faculty at IITK or elsewhere.
- Bring companies with alumni presence to recruit on campus or offer internships.
- Visit campus and discuss career options with students, critique resumes, conduct mock interviews and group discussions.

Become Student-Centric

It will be myopic, not to change with time and offer to students what they are looking for.

In 2011, I surveyed students and alumni of 2004 or later. Of the 692 respondents 39% said that alcohol was a very serious problem on campus and 42% said the same thing about use of drugs. 67% indicated addiction with the web. Some of these web-addicts may actually be using online academic sites for enhanced learning which they find missing in the classrooms.

An e-mail from an alumnus (professor) at Ohio State University stated, “My own experience with recent IIT students (not just IITK) entering the graduate program has been BAD (lack of hard work and commitment). Several of my fellow faculty members prefer students from other institutes in India.” What can we do?

Placement

Campus placement in 2013-14 was about 76% -- down from its highest rate of 90% in 2010-11. Of the 2500 companies invited only about 180 show up in Kanpur. IITK needs to take students to its Noida extension for interviews and improve their soft skills and English communication. Companies not visiting may be approached through the alumni in there. Public Sector Undertakings and CSIR labs may be other employers to focus on.

Responsive Administration

In the survey that I conducted 83% respondents felt that the administration does nothing to resolve students’ concerns. There is a Students’ Ombudsman’s office with a faculty member as in-charge. No details of policies or procedure of this office are provided. My survey revealed that only 20% are likely to go to such counseling service whereas 58% indicated that they would not approach them. 25% found the service effective. Students and alumni have raised issues in past about maintenance of confidentiality in the cell. Head of the counseling service should be trained in the science of counseling and sensitive person.

The current Anxiety Helpline is not managed professionally. This has to be managed by a professional counselor that students can use comfortably any time of day.

IITK leads all IITs in number of suicides. It has been established that only 10% of the depressed people commit suicide and depression is treatable. Early detection of students at risk and proactive assistance to get over their problem is the key to success. Peer to peer monitoring and mentoring has been found to be the most effective intervention in preventing suicides. Faculty and students should know by training how to identify signs of distress. Wing Monitors in each hostel may be trained to observe signals.
emanating from a student that might provide clue for concern.

Alumni can certainly assist the institute in fund raising to strengthen the Counseling Service.

Concern for Welfare of Physically Handicap Students

IITK is required to recruit 3% of its freshmen from physically disabled category. Roughly 100 physically disabled students are on campus. I was unable to find any information on IITK, DOSA, or Counseling Service websites if any special accommodation or assistance is being provided to physically handicapped Students so that they can compete with other students or live with dignity. IITK, after 50 years of its existence, is now building ramps for physically disabled students to be able to reach lecture halls.

If there is no such fund available, alumni may be requested to create such a fund.

Sexual Harassment Policy

An alumnus wrote to me on November 17, 2014, “Over the past few years, several unfortunate events have happened in the campus, and they never come up for public discussion.” I would also suggest that the IITK Ordinance Number 9 (Conduct of Discipline) be updated to clearly include “Sexual Harassment /Molestation” with appropriate safeguards (for safeguards, please refer to the Sexual Harassment of Women at Workplace (2013) Act). Similarly, Faculty/ Employee Handbook or Code of Conduct also needs to include a section on this important issue.

After the passage of the recent act by Indian Parliament the “Sexual Harassment at Workplace (2013)” makes it mandatory for IITK to spread awareness on what constitutes sexual harassment and how these issues are to be reported, handled and acted upon rather than wait for complaints to be filed with Women’s Cell.

Attracting Faculty

IITK for the first time in its history just recruited its 400th faculty. As per DOFA’s e-mail dated October 9, 2014, IITK has taken a number of initiatives for making the campus attractive for faculty: Some initiatives include: Spouse Employment Cell, Hall Guardian positions for faculty wives, full-day crèche on campus, faculty club, with facilities of games and sports, generous startup grant, for new faculty and giving new faculty Rs 25,000 per month additional salary for the first three years, increased travel funds for new faculty (Rs 3 lakhs in a block of three years).

If we take 100 additional faculty as target, it requires $3 million. Alumni can be engaged in raising these funds.

Are these efforts/initiatives enough? Professor Dheeraj Sanghi at IITK, does not think they are adequate. He points out:

- We are still not being aggressive enough. Faculty recruitment has to be everyone’s agenda for IITK to march towards excellence.
- The practice of re-employment of retired faculty may be pursued more vigorously.
- The number of visiting appointments is far from its potential. For regular faculty, IITK is amongst the highest paying institute in the country. We need to come up with a similar attractive package for visiting faculty from academia and industry.

Review of Chaired Professors

There are 40 faculty chairs and 25 research fellows at IITK. We need to ensure that their
appointment, review, and renewal is done in a transparent manner. Otherwise, these professorships will lose their power to motivate others to excel. Also, if we want chaired professors to excel in research and teaching, they should not be burdened with administrative tasks.

**Train Faculty to Deliver Demanding Curriculum with Care & Compassion**

With great courses and lectures from prominent university now available online, many students do not see reason to attend classes. Performance evaluation for teachers should assess them on the types of changes they have made in the curriculum or innovations they have introduced in the classrooms to create an active learning environment that students cannot find on-line.

**Alumni Engagement**

Prof Shailendra Mehta, Academic Director, Duke Corporate Education at IIM Ahmedabad shares insights from his research on ‘Why is Harvard Number #1 University in the World.” He says, “When alumni are in charge other alumni know that the money will be well spent so they also give a lot more. In fact, the moment Harvard was formally transferred to the alumni within 10 years its endowment tripled and in the next 10 years it tripled again. So within 20 years its endowment increased ten times.”

How do we engage alumni?

**Be Responsive**

Nothing has broken my heart more than reading an alumnus e-mail to IITK administration on which I was also copied along with several others. The subject was, “**Stopping all future contributions to IITK.**” : The message says:

“Over the years I have been searching for worthy projects at IITK to fund. I have had to write several reminders before I receive a proposal. Updates on Chair and Faculty Fellowship are never provided in spite of repeated requests. In January 2013, I requested a proposal on “A” and “B”. After several reminders I received a proposal for “A” which I have now funded, but have not received any timetable or status report for its implementation. I am still waiting for a proposal for “B”. There seems to be tremendous inertia for change, and nobody seems to be responsive to external input, especially from IITK alumni. After a careful consideration we have decided to **stop our contributions to IITK from this day forward** and direct our efforts to other worthy causes. I am proud to have graduated from IITK, but I am not proud to be an alumnus.”

How hard it must have been to say, “I am not proud to be an alumnus.”

**Alumni on Board of Governors**

In all major universities there is alumni association representative on its Board of Trustees who can bring in voice of alumni mostly in terms of how alumni can help alma mater and vice versa; in fact they even have student representative. On IITK BOG we have ONE members from industry - that too an alumnus of IIT Delhi! Is there no IITK alumnus from industry worthy of being on IITK BOG? Why is it full of deans and professors? Why do we wonder about the lack of industry-academia collaboration?

With such a treatment to alumni should we really feel great about IITK and open our wallets......
Make Alumni Feel Needed/Important

It is not a big deal but certainly a nice gesture that institute keeps alumni on its mind and not just at year-end when it needs money. Institute recognizes alumni accomplishments by mentioning them in newsletters and giving them Distinguished Alumnus Award. Here are some additional ways besides including them in the BOG that institute could try.

Invite Alumni in Institute Functions & Attend Alumni Reunions

I am sure alumni will greatly appreciate an e-mail invitation to attend important functions such as convocation, Founders’ Day and Distinguished Alumnus Award ceremonies. Even if no one attends, at least alumni will feel good that they are being remembered.

Life-Membership Card as Gate-Pass

Life-Membership Cards of alumni should be recognized as gate pass for quick entry through IITK gate.

VH Rates

Again it is not a big deal but it reflects how much importance institute gives to its alumni. When staying in the Visitors Hall, the institute considers its alumni as Category-B guests rather than Category-A guests and levies almost 50% higher room rates. It is not that alumni cannot pay higher rates, it just shows that they are not as “important” as other guests.

Use of Library

Library facility should be made available to ALL alumni. In fact, it should be made available to alumni of all IITs as well as faculty and researchers in Kanpur.

Commitment to Community

IITK is the Jewel of Kanpur. Its mission also includes “inculcating human values and concern for the environment and the society.” In 2013, IITK has set up a committee for “Community Outreach Activities” to look at how it can contribute to community welfare. In the Annual Report a separate section on Activities undertaken to support Community Commitment be highlighted and budget allocated for Community Outreach Activities.

Other areas where IITK could engage may include:

Youth Employment

We have been told that since 2006, there is an Opportunity College to upgrade skills of unemployed local youth by IITK students and faculty. IITK needs to take up this College’s needs and share its accomplishment with alumni to further strengthen it.

IITK could require that all its contractors use at least 50% of their workforce from the neighboring villages. If the type of skills that the contractors are looking for are not available in the neighboring youths, they could be taught by Opportunity College or local ITIs.

Alumni may consider supporting these initiatives.

Workers Welfare - Enforcing Institute Office Orders on Contractors

Alumni are happy to note that due to their tireless efforts to expose unsafe work conditions at IITK and institute’s willingness to take the matter of safety seriously, in the last two years there have been no deaths at worksites. Yet the mystery is why contractors are still not complying with Institute’s orders to issue Kanpur based EPF and ESI account numbers to
workers? Other schemes such as adult education and health clinics could be opened.

**Adopt a School**

Although IITK provides partial support to Opportunity School, Prayas and other educational initiatives on campus, there is a need to engage in community development activities by adopting schools, not polluting the neighbors, and in fact engaging in the activities to improve the quality of life of neighbors in general.

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**Ashok Gupta**

(BT/ME/1972) is President, Alumni Association. Ideas presented here have been excerpted from a bigger report. That report was prepared in the personal capacity of the author as a concerned alumnus. Neither IITK nor Alumni Association has authorized preparation of this report and they are not responsible for its contents; the author is. Full Report with references and citations can be accessed at [https://drive.google.com/file/d/0Bxuw9kjVCOQTEIIQXh3VXE1ems/view?usp=sharing](https://drive.google.com/file/d/0Bxuw9kjVCOQTEIIQXh3VXE1ems/view?usp=sharing)

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Apna Skools
Promise of Hope

Hope is being able to see that there is light despite all of the darkness. - Desmond Tutu

Mrs. Vijaya Ramachandran, or Vijaya Didi, as she is affectionately known, came to IIT Kanpur in 1968 with her husband, Prof. R. Ramachandran of the Physics Department. She resides in the hearts of many people as the founder of 22 education centers for the children of migrant laborers in Kanpur, known as a network of Apna Skools, while also being closely involved with several other activities in the IIT Kanpur campus associated with addressing the endemic poverty that laborers face in India. Examples include the Opportunity School, and the Sahakari Samiti at IIT Kanpur. She was the inspiration behind Prayas at IITK.

Back in the 1970s, when she was leaving her house to get her son admitted in the Campus School, her household-helper’s son started crying, saying that he too wanted to go to school. Touched, she wanted to get him admitted as well. However, later, she found out that a few of the faculty members had an objection to servants’ children studying with their children in the same school. These events played a pivotal role in planting the idea of universalizing education amongst all children in Vijaya Didi’s mind.

One day, while returning from the (Opportunity) school, Vijaya Didi saw a group of poor children playing. These children were those of the construction workers employed for construction of a wind tunnel. They lived in jhuggis (temporary houses) near the tunnel. On being asked if they attended school, they replied “School?… school kahaan hai hamare liye?” Vijaya Didi was moved to see how deluded they were about the lack of education in their fates. With an aim to be more accessible, came the “Evening School” which she established in her house in collaboration with the Vivekanand Samiti, for children who worked. The Evening School would later go on to become what we now know as Prayas.

Today, Prayas has more than 100 children who come to study from surrounding areas and around 30 IITK students as volunteer-teachers known as Bhaiya and Didi to children.

Apna Skools, the Migrant Labour Project (MLP), is an arm of Jagriti Bal Vikas Samiti, a voluntary organization in Kanpur. It is a network of 22 schools for the children of migrant laborers at construction sites and brick kilns in and around Kanpur, U.P. Based on the month of the year when parents are employed Apana Skools serves anywhere from 350 to 750 children.
Activities of Apna Skool

Teaching

• Start with simple words that the children are familiar with, and then introduce alphabets. In addition to relying on blackboards, liberal use of charts and colorful picture cards, that are made by teachers and student.

• All centers follow books published by Eklavya, Hoshangabad. Additionally Apna Skool teachers, coordinators and volunteers design a course structure for Apna Skools combining ideas from the Eklavya educational material, U.P Board and NCERT.

• Video shows: Films (entertaining and educative) and documentaries about the importance of, and issues related to, education among children; health awareness, and rights of the workers are shown periodically at every center.

• Annual trips to zoos, museums, etc, are arranged as educational ventures.

• Apna Skool has an ongoing policy of admitting as many children as possible into mainstream schools. We arrange for their transportation, and take care of their fees and other related expenditures. At present there are 53 students admitted to various mainstream schools in Kanpur.

Health Care

• Regular immunization and vaccination programs are arranged with periodic counselling. Distribution of Vitamin A, B & C, roundworm and tapeworm tablets are undertaken on a regular basis. Every center is equipped with a first aid box and the staff are trained on its use.

• Children at all the Center are provided with nutritious hot meals every day. Nutrition includes rice & vegetables, lentils (both baked & sprouted), fruits & Kheer (once a week).

Vocational Training

Besides studies, other activities such as drawing, painting, music, dance and play-acting are regularly held. Vocational training programs, such as fabric painting, tiles painting, artificial jewelry making, embroidery and tailoring, are carried out for the more senior students in various centers during the months of May and June

Teacher Training

Every year, a week-long workshop is held for the overall development of teachers. Additionally, at the end of every month, detailed reviews and discussions are held with all the teachers. Discussions focus on the process of learning and teaching, and innovative and effective ways of imparting education to children.

Other Activities

• Provide school dresses, winter clothes and all study materials ranging from mats for sitting in the classrooms to books, pens, pencils, notebooks, etc.

• Every year, the children participate in cultural functions on Independence Day, Republic day and Annual day.
Regular meetings are held with the parents of the students and other labourers, on issues such as education of children, personal and community hygiene and awareness regarding minimum wages and other related workers’ rights issues.

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**ADDITIONAL INFORMATION**

Apna Skool [http://apnaskool-kanpur.blogspot.in/](http://apnaskool-kanpur.blogspot.in/)
https://www.facebook.com/apnaskool

Jagriti Bal Vikas Samiti [http://home.iitk.ac.in/~ag/jagriti/](http://home.iitk.ac.in/~ag/jagriti/)
http://jagriti.seeyourimpact.org/


**A short film on Apna Skool** (courtesy Sahara TV)
[http://www.youtube.com/watch?v=NJhOEa4mQA](http://www.youtube.com/watch?v=NJhOEa4mQA)

Annual Day function and parents’ comments:
[http://www.youtube.com/watch?v=WCIQgMqQsX0](http://www.youtube.com/watch?v=WCIQgMqQsX0)

Prayas: [http://students.iitk.ac.in/prayas/](http://students.iitk.ac.in/prayas/)

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VOICES is grateful to VOXPOPULI [http://voxiitk.com](http://voxiitk.com) for permission to publish excerpts from its story on Prayas and Mrs. Vijaya Ramachandran.
A Few Award Winning Photographs from the
Photography Competition