

# **FESTIVAL OF INNOVATION**

(12 – 18 March, 2016)

## **Booklet on working of National Innovation Clubs**

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## **Institutes of Higher Learning**

**RASHTRAPATI BHAVAN  
NEW DELHI**

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## FESTIVAL OF INNOVATION, 2016

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## **ASSAM UNIVERSITY**

### **GRASSROOTS INNOVATIONS ASSAM UNIVERSITY INNOVATION CLUB**

#### **Activities during the year 2015: -**

1. An Exhibition cum Workshop of innovations (Grassroots as well as by the students and scholar) was organized on 21st January, 2015. Inaugurated by Honorable Vice- Chancellor, AUS and attended by well over 200 faculty and students.
2. Invitational Lecture on “Intellectual Property Rights and the process of applying patents” was delivered by Prof. S.C. Mandal, Jadavpur University, on 21st Jan, 2015.
3. Prof. David Scharf, Department of Physics, Maharishi Management University, Fairfield, USA delivered Invitational Lecture on 26th at 11 am. Topic: Wither Modern Scientific Research: Exploration, Research and Innovation.
4. Professor Bal Ram Singh, Department of Chemistry and Bio-Chemistry, University of Massachusetts, Dartmouth, Boston, USA delivered Lecture on 30th March, at 12 pm. Topic: Scientific Research: Challenges and the way forward.

# CENTRAL UNIVERSITY OF BIHAR

## **Innovations in the Nano-Chemistry Lab (Dr. Amiya Priyam) @ CUSB, Gaya**

Research in our nano-chemistry lab is focused on synthesis and biomedical applications of **photoactive nanomaterials**. These are materials which get activated by light. Principally, we are working on two types of **photoactive materials**, **Luminescent** and Plasmonic nanomaterials. The two types of luminescent nanomaterials that have caught our imagination are:

1. Semiconductor nanocrystals or quantum dots (QDs) and
2. Lanthanide based upconversion nanocrystals (UCNs).

We are developing soft chemical routes to obtain water soluble, biocompatible, highly luminescent and stable nanocrystals with narrow size distribution. In the synthetic methodology developed by us, the nanoparticles are capped with amino acids, thiols and dendrimers which impart stability, functionality and determine the solubility of these particles.

The ultimate aim of our research is to develop a composite nanoparticle system in which plasmons can couple with excitation modes in the QDs and UCNs and cause substantial enhancement of luminescence. Such multifunctional nanomaterials will help develop new **non-invasive biomedical techniques** for cancer diagnosis and treatment based on synergistic imaging and therapy of deep tissue, which would be far more efficient and cost-effective than the existing ones.

**Note: Other innovations of the members of the club will be presented at the time of the meeting**



# CENTRAL UNIVERSITY OF JAMMU

## Innovation, Incubation and Entrepreneurship Council (IIEC), Central University of Jammu

### University Business Incubation Centre (UBIC)

The University Business Incubation Centre (UBIC) nurtures the innovative ideas of the Entrepreneurs' in emerging technological and knowledge based innovative ventures by providing necessary mentoring, promoting IP ecosystem and providing entrepreneurs a platform to commercialize their ideas besides it facilitates in raising the seed capital from different financial institutions at subsidised rates and IP protection by helping them to register IPs. The UBIC is established for nurturing innovation in local resource endowments thereby helping in income and employment generation in the region. The objective of UBIC is to emerge as a Centre of excellence in incubating ideas. Some of the activities conducted UBIC:

- Sensitization of target Groups
- Nurturing of Innovative Ideas
- Linkage between innovators venture capitalists and financial Institution
- IPR Facilitation
- Undertakes Research Projects on Incubation Ecosystem in J&K.
- Annual start-up India competition.

### Innovation Cell:

In Search of Unrecognized Innovators and Discoverers...

<http://www.cujammu.ac.in//Default.aspx?option=article&type=single&id=10308&mnuid=11318&prvtyp=sit e&pos=Right>

### Identifies Grass root Innovators

- Linkages established between Business Incubation Centre and Innovation Club
- List of Innovators Identified

S.No	Innovators	Innovations
1.	Nipun Khajuria , Udhampur	H2 Run Car & Hydraulic Wheel Lock

2.	Zaffar Javaid, Shahdra Sharif Rajouri	<b>Comb embedded with oil antiseptics</b>
3.	Naseema Akhter, Kulgam	<b>Destruction of Polythene</b>
4.	Pardeep Kumar, Rajouri	<b>Alternative Source of Energy</b>
5.	Dr D. M. Gaisas, Jammu	<b>Three in One Ventilator</b>
6.	Dr Ashish Patel, Dandiocha	<b>Five Pang Needle</b>
7.	Prof. Nirmohi, Katra	<b>Research on Duggar Heritage</b>
8.	Dharamvir Singh, Yamuna Nagar	<b>Multifunctional Machine</b>
9.	O. P. Vidyarthi, Jammu	<b>Discoveries on Plants</b>
10.	Anil Paba, Udhampur	<b>Discoveries of ancient Tarcotas &amp; Manuscripts</b>
11	Chetan Ji, Ramnagar	<b>Innovation form Junk Material</b>
12.	Dr. K. C. Sharma, Udhampur	<b>Sharma's Cystostomy Set Innovations in Surgery Plants and Drugs</b>
13.	Wasim Pervaiz, Udhmapur	<b>Scientific Card Board Modeling</b>
14.	Aman, Chennani	<b>Moving wall pictures</b>
15	Bittu Ram, Bilawar	<b>Multiple Activities Single Handed</b>

### \* J&K Science Congress Exhibition, UOK

#### **Achievements of IIEC, Central University of Jammu**

Padma Shri Prof. (Dr.) Kasturi Lal Chopra delivered lecture on “Nurturing Innovation, Incubation and Entrepreneurship in Academia”, 22nd September 2015. National Workshop on “Intellectual Property Rights: Implementation and Enforcement” w.e.f. January 14th – 15th, 2016

#### **MOU's**

University Business Incubation Centre is linked with Ashray Incubator, Ahmadabad for supporting young innovators. MOU signed on 18th November, 2015 MOU was signed between University Business Incubation Centre and NIT Srinagar

# CENTRAL UNIVERSITY OF KERALA

## Note on Innovation Club and Incubator

The University has a 100 member strong innovation club which is functioning under six clusters viz. Biomedical Cluster; Robotics and Engineering Cluster; Software Development Cluster; Animation and Designing Cluster; Electronics utility Cluster Social Science Cluster. The Club has recommended disbursal of small amounts (not more that 25,000/- per innovative project approved) in order to allow the innovators to prove the validity of their concept. The funds may also be used for filing patents. Once the innovator establishes the proof of concept, the club members will help the innovator to arrange external funds for product development. A few projects are already running under this initiative. The club, apart from nurturing the already motivated members, is also involved in organizing lecture series, skill imparting workshops and industrial visits which would motivate our students for innovation apart from providing excellent exposure. As the first step, The Innovation club in association with The Department of Biochemistry & Molecular biology has organized a day long lecture and interactive session with one of the successful innovator; Dr. Rajagopal from CFTRI, Mysore and a week-long workshop on Decoding the Non-coding has been scheduled.

After identifying appropriate infrastructural facilities, the Club will help individuals/groups (students only) enthusiastic of "spin offs" on a 25% revenue sharing basis, thereby acting as an incubationcentre for the start ups

# **CENTRAL UNIVERSITY OF ORISSA**

## **INNOVATION CLUB CENTRAL UNIVERSITY OF ORISSA**

### **ACTIVITIES OF INNOVATION CLUB**

#### **Seminar on 'Biodiversity and Conservation Initiatives in Koraput Region'**

School of Biodiversity and Conservation of Natural Resources, Central University of Orissa organised a 2 days seminar on Biodiversity & Conservation Initiatives in Koraput Region, Odisha during 28-29 March, 2015. This was an effort for disseminating the knowledge of biodiversity conservation at local level by tribal communities and by NGOs of Koraput region vis a vis scientific research conducted on ethno-biological aspects and bioprospecting of the region.

#### **Innovation and Research Activities by Members**

##### **Ornamental fishes from hill streams of Deomali Hills of Eastern Ghats, Koraput**

Dr. Sharat Kumar Palita, Dean, School of Biodiversity and Conservation of Natural Resources and research Scholar Mr. Amit Kumar Das carried studies in diversity of hill stream fishes in Deomali Hills (1672 mts asl), the highest peak of Odisha. Fifteen species of fishes were recorded within an altitude range of 800-1237 mts. Among these hill stream fishes, nine species are ornamental fishes, which can provide economic benefits to local tribal communities, for use in aquariums.

##### **Wild edible plant resources as alternative source of food for tribals of Koraput**

Dr. Debabrata Panda, Asst. Professor of Department of Biodiversity and Conservation of Natural Resources (DBCNR) and his PhD Scholar Bandana Padhan have documented the baseline ethnobotanical information of wild edible plant resources and their importance towards food security for poor tribals of Koraput. A total of 122 wild edible plant species under 56 families and 94 genera have been documented for their ethnomedicinal importance. Both in situ and ex situ conservation of these plants are of utmost importance for enhancing the food security of tribal communities of Koraput.

##### **Medicinal properties of crop weed: Fast aid for tribals**

Dr. Debabrata Panda and his scholar Ms. S. S. Rathinayak reported 39 weed species from crop fields of Koraput having medicinal properties for different common ailments

and are used by the tribals of the region. The herbal recipes are expected to provide efficacy against common ailments and helpful for new drug development.

### **Wild Rice: potential for phytoremediation and phyto restoration of metalcontaminated sites.**

Dr. Debabrata Panda and his PhD Scholar Swati Sakambari Mishra studied the growth potential of wild rice under fly ash, mining soil and chromium. As the Wild/ Weed Rice have the potential to grow in contaminated sites, therefore it can be used as a convenient plant material for phytoremediation and phyto restoration.

### **Best from the waste: Water Hyacinth**

Dr. Kakoli Banerjee, Asst. Professor, Department of Biodiversity and Conservation of Natural Resources studied the preparation of organic manure (SABUJIMA) from Water hyacinth (*Eichhornia crassipes*), a common invasive species in Indian wetlands. The manure was applied on *Heritiera fomes* (a fresh water loving mangrove floral species) seedlings and found that selected phytopigments (chlorophyll and carotenoid) were relatively higher in the leaves of seedlings treated with organic manure.

### **Documentary Films by the Dept. of Journalism and Mass Communication**

The students and faculty of the Department of Journalism and Mass Communication prepared two documentary films; "Ninee: The Winner" for women empowerment and "CUO: A Journey towards Excellence".

### **Research activities of the Dept. of Anthropological Studies (DAS)**

The department has undertaken research activities on the assessment of nutritional status of children and adults of different tribal communities. Studies have been conducted on exploration of different wild food items consumed by tribals and detection of their nutritional quality. Social impact assessment of different developmental projects on the life and livelihood of tribal communities were undertaken.

### **Study Habit Inventory for Adolescents**

Dr. Ramendra Kumar Padhi, Asst. Professor of Dept of Teachers' Education formulated and developed a 'Study Habit Inventory' and the trainee teachers of B. Ed. administered the text of the 'Inventory' to 400 adolescent students (within the age group of 14-18yrs) of different schools in an around Koraput.

# CENTRAL UNIVERSITY OF RAJASTHAN

## Innovation club at Central University of Rajasthan

The University encourages working on different domains to develop new science and technology to solve the society problems. Followings are the few identified core areas:

- Drug discovery to combat infectious diseases
  - Enhancement of water holding capacity of desert soil by using biomass of an aquatic weedwater hyacinth (*Eichornia* sps)
  - Higher learning initiative at Central University of Rajasthan
  - Innovation networks: Social capital and successful network performance
  - Big data and policy
- **Drug discovery to combat infectious diseases**

Faculty members from Department of Biochemistry are involved in the development of new drug to fight against different infectious and fatal diseases. They are promoting the drug discovery program to identify novel molecules against visceral leishmaniasis disease. They have developed nanomedicine approach for the treatment of experimental visceral leishmaniasis (Prajapati VK et al; *J Infect Dis.* 2012 Jan 15; 205(2):333-6 & *J Antimicrob Chemother.* 2011 Apr; 66(4):874-9). In this work, they have conjugated amphotericin B drug along with carbon nanotubes and delivered in experimental animal through oral. This novel drug development work against infectious disease was highlighted by Nature journal (doi:10.1038/nindia.2011.74).

Drug discovery group is headed by Dr. Vijay Kumar Prajapati and they have identified novel chemical compounds to fight against visceral leishmaniasis disease. They have identified 5- nitroimidazole as a novel molecule which can specifically inhibit the activity of trypanothione reductase present in *Leishmania* parasites only. Imidazole molecule has shown the higher inhibitory and negligible toxicity in comparison of available inhibitor for trypanothione reductase. (Prajapati VK et al; *J Biomol Struct Dyn.* 2015 Dec; 33(12):2541-53)

Their group has assessed the antileishmanial activity from the series of antiparasitic drugs and interestingly we have noticed higher efficacy in the febrifugine analogues. Febrifugine compound has the great capacity to inhibit trypanothione reductase with negligible toxicity to humans. This molecule has shown the capacity to develop oral antileishmanial drug (Prajapati VK et al; *J Biomol Struct Dyn.* 2016 Jan; DOI-10.1080/07391102.2015.1135298).

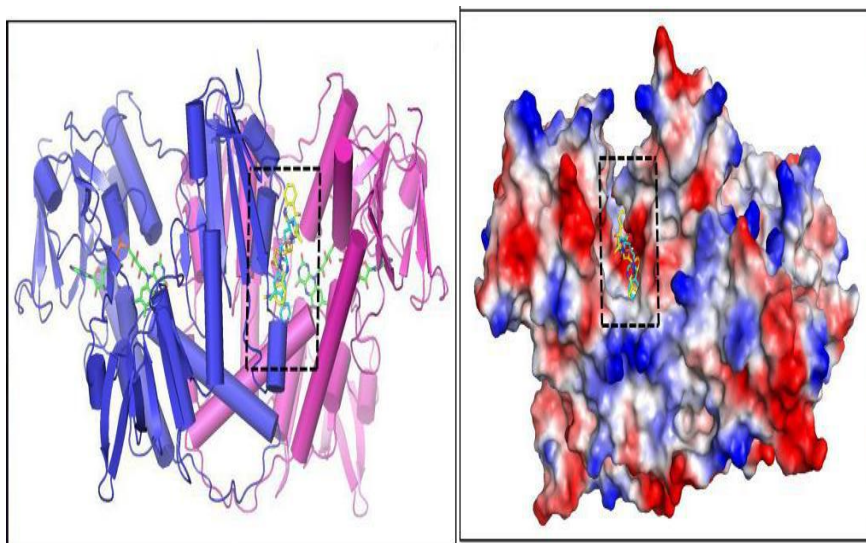


Figure-1; Febrifugine in the binding pocket of trypanothione reductase of Leishmania

In 2014 year, there was an outbreak of jaundice in the Central University of Rajasthan. As a researcher from infectious disease field researcher from Central University of Rajasthan took it as challenge to find out the risk factor for the jaundice outbreak. In this effort, they have established a correlation for the jaundice outbreak in the Central University of Rajasthan and tried to educate the students living in hostels to protect themselves from the diseases (Prajapati VK et al; J Pub Health; Jan 2016; DOI-10.1007/s10389-015-0702-7).

### **Key publications-**

1. Prajapati VK et al; J Biomol Struct Dyn. 2015 Dec; 33(12):2541-53.
2. Prajapati VK et al; J Biomol Struct Dyn. 2016 Jan; DOI-10.1080/07391102.2015.1135298.
3. Prajapati VK et al; J Pub Health; Jan 2016; DOI-10.1007/s10389-015-0702-7.

### **Enhancement of water holding capacity of desert soil by using biomass of an aquatic– weed- water hyacinth (*Eichornia* sps)**

The arid western plains of Rajasthan that includes the district **Bikaner**, **Jaisalmer** and **Barmer** and part of **Jodhpur** and **Churu** districts, face extreme climatic conditions such as, high temperature (~ 49°C), low humidity, extremely low rainfall, high wind velocity, longer duration of sunlight and above all the poor water holding capacity of soil, making the land barren and unproductive.



On the other hand, a troublesome aquatic weed (Water hyacinth) poses a serious threat for water bodies in the state, as it causes enormous water loss through evapotranspiration, depletion of dissolved O<sub>2</sub>, deterioration of biological, physical and chemical properties of water, which are detrimental for the ecosystem. Its profuse growth creates a microhabitat suitable for breeding of many vectors of human diseases and hosting poisonous snakes. Successive accumulation and sedimentation of its biomass result in the shallowing and disappearance water bodies.

Bioremediation group is headed by Dr. Jay Kant Yadav and they have used the Water hyacinth biomass to improve the water holding capacity of the barren soil in an ecofriendly manner. Their initial findings suggest that the water holding capacity of soil can be enhanced by approx. 6 fold making the soil productive with minimum water requirement. This process offer many positive attributes in a cost effective manner such as, (a) the uncultivable soil can be converted into fertile one, (b) water requirement can be significantly reduced, (c) since the process supplements organic manure, the soil can be maintained fertile for longer period of time and (d) the problem associated with Water hyacinth can be persistently mitigated.

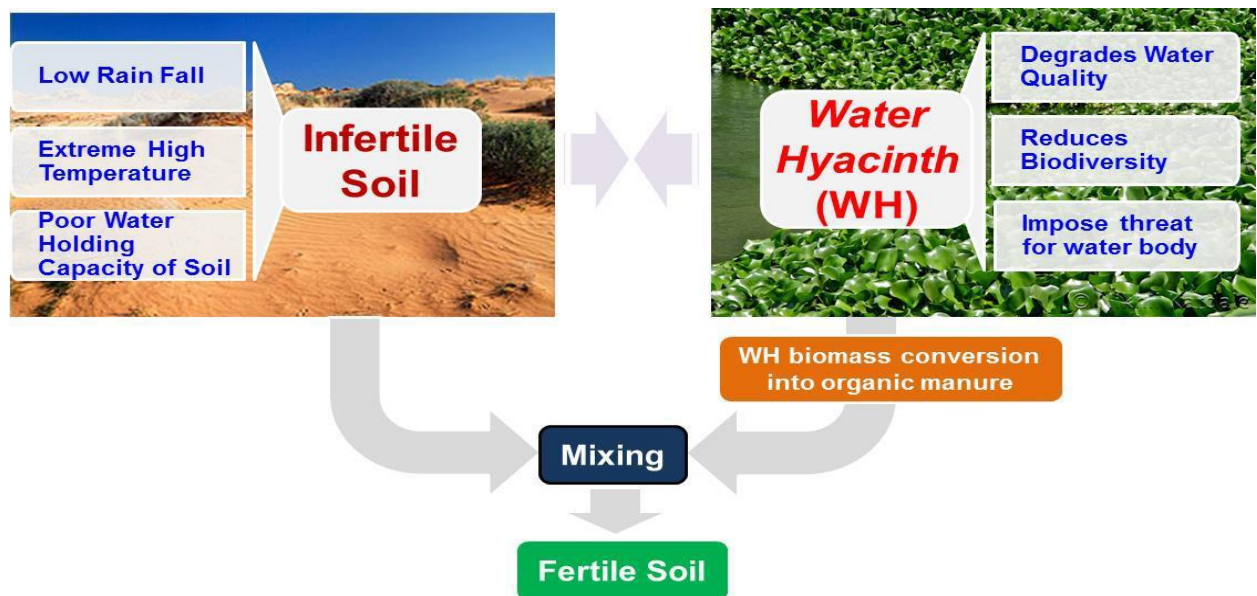


Figure-2 Ray diagram representing water holding capacity of desert soil by water hyacinth

### Higher Learning Initiative at Central University of Rajasthan

The following is our Activities related to Higher learning activities at Central University of Rajasthan.



Infrastructure at CURAJ to meet Higher Learning objective: Central University of Rajasthan has A-View Class Room with the following features. CURAJ has established Remote center to conduct online workshops through A-View Software. University has received a grant of 2.5 Lakh fund to conduct online workshops through A-View from IITB. IITB-MHRD has been release a grant of 2.8 Lakh to establish A-View Class Room to conduct online workshop through A-View Software. Dr. Nagaraju Aitha is coordinating NKN activities from Central University of Rajasthan.

University has live transmission facility of the workshop from IIT Bombay and publish video stream of a Remote Centre for an interaction to IIT Bombay.



Figure- 3: Seminar Hall at CURAJ

The university is actively using NKN Bandwidth to enhance the quality in Higher Education; we have organized the following workshops using NKN and MOOCs. All the workshops are of duration two weeks.

S No	Name of the Workshop	Organized by	Funded BY
1	Computer Programming Workshop	Department of CS	NMEICT-IITB
2	Cyber Security	Department of CS	NMEICT-IITB
3	Design and Analysis of Algorithms	Department of CSE	NMEICT-IITB

The University is actively participating in Hon'ble President Message delivery program in every six months through NKN with a minimum of 500 participants.

## **Innovation Networks: Social Capital and Successful Network Performance**

The quest for the unknown has intrigued the human race and triggered development of new technologies and products, thereby improving the living standards of people. Faculty members from University are interested in doing research on innovation as well as promoting innovation among the student community. Faculty members from University participated in the Third International Conference on Creativity and Innovations at Grassroots organized during January 19-22, 2015, at Indian Institute of Management, Ahmedabad. This conference was supported by the Honey Bee Network, National Innovation Foundation, UNICEF, NABARD and SRISTI. The Conference brought together over 300 academics, researchers, R&D experts from industry, school children and even grassroots innovators and rural innovators. The participants were from all-over India, and other countries, such as Indonesia, Spain, Ethiopia and Brazil.

This work is headed by Dr. Avantika Singh and she has presented a paper titled, 'Innovation Networks: Social Capital and Successful Network Performance' at the Third international conference on creativity and innovations at grassroots; Jan 19-22; 2015 at Indian Institute of Management, Ahmedabad. Innovation networks are loosely connected networks of various actors (including individuals, groups and organizations) which share information interact, cooperate and collaborate leading to knowledge sharing and consequently innovation. Social capital refers to features of networks, such as the density and embeddedness of interactions rooted in trust, mutual understanding, and cooperation, shared values and shared knowledge. This paper conceptualizes that a high degree of social capital results in successful network performance. The paper examines a number of cases of successful innovation networks, for example, the honey bee network, geographical cluster, R&D network, emergency/ disaster management network, the film making network, the fashion designing network, and the open source software community. The paper identifies the factors for successful network performance. The values and norms of the network and knowledge transfer and exchange (KTE) mechanisms are essential to network success. The imperative is to enhance KTE through development of social capital in innovation networks.

# CENTRAL UNIVERSITY OF TAMIL NADU

Central University of Tamil Nadu, Thiruvapur



## CUTN-Innovation Club

**Coordinator: Dr.S.G.Ramkumar, Assistant Professor,  
Department of Chemistry**

With the modest resources, we had identified the problems. The problems were discussed in detail, and one problem is taken by the student.

Web application for online submission of leave and mess reduction, etc., Then the idea was improved to add features like hall ticket, notification etc.

### **"CUTN" MOBILE APP**

- EASY W'L U R BUSY



#### **KEY HIGHLIGHTS OF THE APP: ( SOON)**



The above app is being tested for its stability at CUTN. We will shortly launch this app. The app is developed by Mr. Chintha Sai Bhargav Reddy, 4th Year i.M.Sc Chemistry in consultation with Mr.Mohith.A, CEO, Wectonic, Bangalore.

# Dr. B R AMBEDKAR NATIONAL INSTITUTE OF TECHNOLOGY (NIT JALANDHAR)

## Brief Achievements of Innovation Club NITJ

IPR club NITJ started on 22-04-2008 with objective to spread awareness of Intellectual Property Rights in the students, faculty and staff of the institute. The club is organizing various IPR activities time to time. Institute is in process to start Innovation Incubation Center under the Chairmanship of Dean Research and consultancy to enhance the innovations. Reach out program and Rashtryia Avishkar Abhyian is also contributing in promotion of science and technology in common people. Several innovative engineering projects has been developed in recent past and protected under IPR by the institute. The list of the protected IPR (Applied and Granted Total 22) is given below:-

### Patents

1. **Mechanism to Clean Bird Dropping (Garbage) within a Cage type Poultry Farm**, Indian Patent no 210090, Granted on 18/9/2007, Inventor:KS Nagla
2. **An Earth Quake Alarm**, Indian Patent no 220748, Inventor: KS Nagla
3. **An Intelligent Leg Exercise Machine**, Patent application no427/del/2007, First examination over, inventors: K S Nagla, Dr Moin Uddin, Amandeep Singh Kalra, Akshay Kathiyal.
4. **A Method and Mechanism to Control the Position and Orientation of Cleaning Nozzle of Robot**, 2489/DEL/2009, Inventors: K S Nagla, Dr.MoinUddin, Dr. R Jha
5. Patent applied entitled "**Induction Hardening Machine**" with DAV Institute of engineering and Technology, Jalandhar, Patent application number 2269/del/2012,inventors Amit kohli, KS Nagla, Hari Singh
6. Patent entitled, "**Industrial filtration rig for the assessment of filtration performance of filter media in tubular form similar to industrial set up maintaining clean air requirement**" Patent Application No.512/DEL/2015 Name of Inventor: A Mukhopadhyay, Awadhesh Kumar Choudhary, Kamal Dhawan
7. Patent etitled, "**Pulse-jet filtration test rig for the assessment of filtration performance of filter media (in flat form) challenged with aerosol**",Patent Number: 511/DEL/2015 , Name of Inventor:Arunangshu Mukhopadhyay, Awadhesh Kumar Choudhary, Kamal Dhawan
8. Patent entitled "**An Improved Packed Bed Photocatalytic Reactor With High And Uniform Illumination And An Associated Technique Of Purification**" Inventor Dr Jatinder Kumar Ratan, Dr KS Nagla applied patent application no 4290/DEL/2016.

## Designs

9. Decorative **Article, Indian Design No 207315**, Granted on 6<sup>th</sup> Dec.,2006  
Designer: KS Nagla
10. Industrial design Heat treatment tray, **Indian Design No 254948 Granted**  
on 3/7/2013
11. Indian design patent titled “Door Handle”, Indian Design no 265973 **Granted**  
on 20-02-2015
12. Packed Bed Photocatalytic Reactor, Designed Dr Jatinder Kumar, Dr KS  
Nagla, design no design application no 279651 dated 21-01-2016

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Dr KS Nagla
17. Pani de shudikharn dealn navian vidian ©L-36944/2011, Dt. 06/01/2011,  
Copy Right of Dr KS Nagla
18. Discovering a twist on the stem of eucalyptus plants, Discovered by: KS  
Nagla, ©L-29494/2007 Dt. 12/11/2007
19. Discovering a Unique Twist Pattern in of Nassella Neesiana, Discovered by:  
KS Nagla, ©L-35431/2010, Dt. 09/02/2010
20. Discovering Buoyancy Force Based Perpetual Motion Machine, Discovered  
by: KS Nagla, ©L-35432/2010, Dt. 09/02/2010

## Computer Software Developed

21. Program tool for multisensor data fusion: focused on mobile robots  
mapping, Copy Right © Diary no 3390/2015-co/SW applied on dated  
08/04/2015
22. Program tool for corner extraction using laser range finder focused on  
mobile robot mapping applied for copy right © Diary Number 3390/2015-  
CO/SW, applied on April, 2015.

Dr K S Nagla

# **Dr. HARI SINGH GOUR VISHWAVIDYALAYA**

**Dr. Harisingh Gour Vishwavidyalaya, Sagar (M. P.)  
(A Central University)**

The Innovation club was setup in 2014 as per directives of His Excellency the President of India. The aim of the club is to organize regular activities to promote, interact, and innovate prime area of research through inter dependent and inter faculty collaboration to explain integrated expertise available with the University. All the National scientific problems were discussed in the club. To resolve them as per directives of Government of India. Club is providing full support to encourage research scholars and faculty members to regulate the innovative culture in the University. Innovation club shall inculcate innovate research skill in the young mind exploiting experience of senior faculty as an academic support.

## **Achievements of the Innovation club**

- Prof. R. N. Yadav, Chairman of Innovation Club has been unanimously elected sectional President of Chemical Sciences section of Indian Sciences Congress Association 2017. Prof. Yadav delivered invited lecture in Third International Conference of Asian Allelopathy Society, held at Fuzhou China and Elected Joint Secretary of Asian Allelopathy Society for three year. 2015-17
- Prof. Siddhartha Mishra, Department of Zoology M.S. Swaminathan Young Botanist by the Indian Botanical Society of India are also awarded Programme on Cancer Biology under GIAN Programm of MHRD, New Delhi 2015
- Dr. Abhilasha Durgvansi and Dr. Kalptaru Das both from Department of Chemistry awarded Programme on “Substance of abuse: Pre and Post Natal exposure and analysis and Green and sustainable Chemistry (synthetic strategy, catalysis and applicants under GIAN programme of MHRD, New Delhi.
- Dr. Devashish Bose, Department of Criminology, and Foreigsic Science awarded programme on Chemmetrics and Liquid Chromatographic Method Development under GIAN programme of MHRD, New Delhi.
- Mr. Brijendra Kusmariya, Research Scholar, Department of Chemistry: Best poster presentation award in the section of chemical sciences in the Indian Science Congress held at University of Mysore January, 3-7, 2016
- Dr. S.K. Kashaw, Department of Pharmaceutical Science and Dr. Rajesh Gautam, Department of Anthropology, award Raman Post Doctoral Fellowship by University Grants Commission, New Delhi. January, 2016
- Mr. Hemant Soni, Department of Microbiology, Young Scientist Award by MP Young Scientist Congress. 2015

- Mr. Hemant Kumar Rawat, Department of Pharmaceutical Science: Best Poster Award in National Conference at Indore MP 16.10.2015
- **Memorandum of Understanding (MoU's):** signed with instutation in Spain, Nigeria, and Korea.
- MOU will be signed with industrial partner "Executive Director,M.R. Moraraka GDC Rural Research Foundation, Jaipur (Raj) to launch new course "Diploma in Vermitechnology and Organic Agriculture Management" is in process.
- 10 to 12 MoU's are Under process with different laboratories by department of Pharmaceutical Sciences.
- **Research and Development Projects** based on Innovative and novel Ideas Funded by DST and DBT. 2015-16
- Dr. Shweta Yadav, Department of Zoology: Programme "Training and demonstration of vermi-biotechnology for empowerment of SC/ST and other weaker section of Madhya Pradesh- A participatory approach" has been sanctioned by Ministry of Science & Technology, Govt. of India costing 17.70 lakhs, for three years (2016-2019) to train and educate 3300 beneficiaries to empower farmers of weaker section of society of selected area of Madhya Pradesh.
- Prof. A. Ghajbhiya and S. K. Kashaw, Department of Pharmaceutical Sciences sanctioned Rs. 40 Lakh and 36 Lakh Projects by DST Govt. of India. 2015-16

#### **Conferences:**

- National Conference on International Year of Light (Horizons of Light in Molecules, Materials and Daily Life Organized by Department of Chemistry) December, 2015
- A Brainstorming workshop on climate variability: Challenges and Opportunities organized by Department of Applied Geology. September 2015
- Organized various popular lectures in different departments and University Foundation Day. 2015-16
- Seven days workshop on Literary Cultural History of south Asia Organized by Department of English and other European language. March 2015
- Theatre Workshop for students on Text to Performance: Organized by Department of English and other European language. September, 2015
- \* Establishment of Centre for Climate changes adoptability and mitigation (C-CCAM) by Uni

# GURU GHASIDAS VISHWAVIDYALAYA

Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

## Brief Achievements of the Innovation Club and its Members:

The Guru Ghasidas Vishwavidyalaya is committed to the improvement of the social and economic conditions and welfare of the people by improving their intellectual, academic and cultural development. To fulfill the above commitment, the Innovation Club of this Vishwavidyalaya (GGV) has come into existence which consists of the following Nodal Officer and Members.

1	Prof. S.S. Singh,	Nodal Officer	Dept. of Forestry
2	Prof. Shailendra Kumar,	Member	Dept. of Civil Engineering, IT
3	Dr. (Mrs) Alpana Ram,	Member	Associate Professor, Dept. of Pharmacy
4	Dr. Nilakantha Panigrahi,	Member	Associate Professor, Dept. of Anthropology & Tribal Development
5	Dr. Kalluri VS Ranganath,	Member	Asst. Professor, Chemistry

## Brief Achievements of the Innovation Club:

Methodology to develop the production of hydrogen using magnetite nano-material in Chhattisgarh is on way. The innovation club, GGV, is working on the forest based bio-economy for rural inhabitants. Pharmaceutical science students are working on the Herbal medicine formulation (Knowledge based on tribal traditional practices). Innovation club have regular interaction with the students and research scholars of different School of Studies in the University. The M.Sc students and research scholars of department of Chemistry are given an opportunity to work in the innovative lines. The students have been trying to produce hydrogen gas with high efficiency using magnetite. Apart from this, CNTs are being used to store CO<sub>2</sub> gas and utilization of CO<sub>2</sub> in organic reactions. Moreover, nanomaterial was developed for the production of HMF, which is used in biodiesel from honey available in Chhattishgarh abundantly. The innovation club members have been interacting with the students of School of Engineering and Technology of the University from time to time. The students have shown interests to make some prototype innovative models. One of the students Mr. Visal Kumar, IV<sup>th</sup> Semester of Information Technology is making attempt to design a prototype generator which works on water by the process of electrolysis. The generator may work with water instead of any fuel like diesel or petrol.





Fig: Interaction with villagers regarding NWFP utilization pattern at Chuhiya village (Korba District C.G.)



Fig: Innovation club members interaction with Research scholars of School of Life Sciences

Prof S.S.Singh with forestry research scholar's team visited the forest sites in Korba Forest Division for analyzing the forest wood utilization pattern by the villagers particularly by the tribal people. During the visit interaction was made with respect to their livelihood pattern, source of drinking water and pattern of wood energy utilization. The patterns of non-wood forest utilization by the tribal people and other villagers have also been analyzed. The team has noted their problems related to their livelihood in the forest area and working on the lines to give the right patterns of NWFP product utilization.

#### Brief Achievements of the Innovation Club Members:

##### Prof S S Singh

Dr S S Singh is a Professor in Forestry, School of Natural resources of Guru Ghasidas Vishwavidyalaya. He has done most of his works on the line of forest tree improvement through mutagenesis. The radiosensitivity level and the induced mutants adaptability have been carried out for its variability induction, wood quality and better root system of the forest tree species eg. *Albizia lebbek*, *Albizia procera*, *Albizia chinensis*, *Bauhinia variegata*, *Bauhinia purpurea*, *Bauhinia retusa*, *Robinia pseudocassia*, *Leucaena leucocephala*.

For *Populus deltoides*, clones have been taken to induce mutants for its fast and more wood production and fast growth and to be adaptive for a wider climate range in India.

He has developed a pattern of acceptable dose rate of physical mutagen (Gamma rays) for xylogenesis (Wood formation) rate and better growth pattern. Low level continuous and Fractionated doses (100Gy and 200Gy) have been recommended for better wood production and growth pattern in maximum tree species.

Presently he is working with the genetic diversity analysis and mutant induction for better wood quality in *Terminalia tomentosa*, *Terminalia arjuna*, *Pongamia pinnata*, *Albizia saman* and *Butea monosperma* in Central India.

The following two major research projects are going on under his supervision sanctioned by Ministry of Environment, Forest and Climate Change. The project title are

“Assessment of Air Pollutants and its Impact on Tropical Forests of Northern Chhattisgarh”. (running since 2012; Rs. 57.19 lacs).

“Application of RS & GIS for Integrated Management Management of Hasdeo River Watershed (A Tributary of Mahanadi River) in Chhattisgarh”( running since 2013; Rs. 50.03 lacs).

He is also working on forested watershed LULC pattern and the forest tree diversity variability along the watershed catchment.

The analysis of influence of thermal power plants pollutants on carbon fixation, wood quality, regeneration and pattern of change in diversity level of forest in Central India is also going on under his supervision.

He has published more than forty research papers in journals of international and national repute.

He has supervised seven PhD Scholars and presently six PhD Scholars are pursuing their PhD work under his guidance.

He has professional affiliation with many agencies like IUFRO , CFA, ISCNr,NRCAF. He is the editorial member of reputed international and national journals.

### **Prof Shailendra Kumar**

Dr. Shailendra Kumar is a Professor in the Department of Civil Engineering, Institute of Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.), India. He received his B.Sc.(Engg) degree in Civil Engineering from NIT Jamshedpur, India in 1993, M.E. degree in Structural Engineering from NIT Rourkela, India in 1996 and Ph.D. degree in Structural Engineering from IIT Kharagpur, India in 2010. He served as research assistant and faculty member in the Department of Civil Engineering National Institute of Technology, Jamshedpur, India during 1996 to 2011. His research interests are Fracture Mechanics of Concrete, Fibre-reinforced Concrete and Soft Computing Applications. He has authored/co-authored more than 50 papers in International/National Journals and Conferences and one book titled

“Concrete Fracture Models and Applications” published in Springer with ISBN 9783642167638 (Hard Cover). He has also worked in many consultancy projects undertaken at NIT Jamshedpur and in the university of GGV. He received Indian National Group of the IABSE medal award for the best paper entitled “Shear Strength of Reinforced Fibrous Concrete Beams Without Web Reinforcement” published in journal the Bridge and Structural Engineer, 2000,30(3),17- 29. His Ph.D. work was nominated for Innovative Students Project Award – 2010 by Indian National Academy of Engineering (INAE). He has been invited as Member-cum-Secretary in the proposal for a 4 new International Union of Laboratories and Experts in Construction Materials, System and Structures (RILEM) Technical Committee (created in 2011) TC TDK for “Testing methods for determination of double-K criterion for crack propagation in concrete”. Attended the invited meeting as member cum secretary in RILEM meet of Technical Committee (TCTDK) in April 2013 at Hangzhou, China. He is working in two major research projects funded by UGC and MHRD, GOI. Three Ph.D. students are pursuing Ph.D. research work under his supervision. He is also working as nodal office of Industry Interface Cell (IIC) and Convener of the Committee for setting up and development of Design Innovation Centre (DIC) in the university. He has been actively involved in taking initiatives in development of testing and consultancy services, reformation in academic curriculum, developing research activities, deployment of infrastructural and laboratory facilities, discharging duties on various administrative positions in his department, Institute of Technology and the University.

### **Dr Alpana Ram**

Dr Alpana Ram received her Ph.D from university of Rajasthan, Jaipur in 1995. She is having 25 years of experience in teaching of UG and PG classes. Her research interests are novel drug delivery systems to modify the release of the active Pharmaceutical Ingredients in human body such as sustained release Dosage forms, enteric coated formulations to provide specific drug Release to colon, carrier mediated systems like liposomes, niosomes, Proniosomes, Transfersomes, multiparticulate drug carriers as microspheres, solid lipid nanoparticles, nanosuspensions, multiple emulsions, transdermal drug delivery through skin, matrix tablets, microporous osmotic tablets for combination drug therapy. Fast release formulations like solid dispersions. Studies on Cholesterol lowering plant materials viz. *Plumbago zeylanica*, *Terminalia arjuna*, *Myristica fragrans*. Phytochemical and pharmacological investigation of *Morina logifolia* and *Bauhinia Variegata* for immunomodulatory, antiinflammatory, hepatoprotective and anticataract activity. Preparation and standardization of some antiasthmatic ayurvedic formulations. Dr. Alpana Ram is having nearly 40 publications in international Journals and three research scholars got Ph.D. Degree under her supervision.

### **Dr Nilakantha Panigrahi**

Dr.Nilakantha Panigrahi has been awarded with M.A, M.Phil, Ph.D in Anthropology and LL.B from Sambalpur University, Odisha. He has worked with Danish International Development Agency from 1988 to 1997 in different positions in bi-lateral Development Projects. From 1997 to 2013 he worked as the Faculty in Anthropology at Nabakrushna Choudhury Centre for Development Studies (ICSSR Centre), Odisha, and Bhubaneswar. Since September 2013 he is working as Associate Professor of Anthropology 5 in the Department of Anthropology and Tribal Development, at Guru Ghasidas Vishwavidyalaya (GGV), A Central University, Bilaspur, Chhattisgarh. He has published 54 research papers in different national and international journals and edited books. He has completed 25 research projects supported by different national and international agencies and Ministries of both State and National Government of India on various issues relating to tribal development, livelihood, community health, disaster management, ethnicity; He has authored four (4) books. He has rendered 11 consultancy services to different national and international agencies like IWMI-TATA, IIPA, IDEI of India, Practical Action, SriLanka. His areas of interest include Development Anthropology, Action Anthropology, Disaster Management, Tribal Livelihood, Ethnicity and Ethnic Problems and Eco-Tourism.

### **Dr Kalluri V.S. Ranganath**

Dr.Kalluri V.S. Ranganath received his Ph.D from IICT-Hyderabad in 2005 in the area of nanomaterials. His research interests are nanomaterials, asymmetric catalysis and electrocatalysis. Development of new materials for the separation of racemic mixture into pure enantiomer is one of his achievement towards advancement of science. He has been awarded with Young Scientist Award in 2004 by APSA while pursuing Doctoral studies at IICT. Later he moved to Japan and persued as a highly prestigious JSPS postdoctoral fellow (2005-2008) with Prof. Junji Inanaga, where he dveloped rare earth nanoparticles for asymmetric catalysis. Then he moved to Germany in 2008 as an Alexander von Humboldt fellow in the University of Muenster and served as a postdoctoral fellow (2008 -2011) in the Prof. Frank Glorius group. The magnetite nanoparticles for the creation of quarternary chiral centre was achieved by him with high enantiomeric excess. He has been working as an Asst. Professor in Chemistry at GGV, A Central University, Bilaspur, Chhattishgarh. He has 24 total publications and five patents to his credit. He is having two major DST sponsored projects entitled below. He has been selected for Ramanujan Fellowship from DST. Currently two Ph.D scholars are working with him.

1. Asymmetric nanocatalysis using functionalized materials :DST-SERB : S1/IC-10/2013 (Rs.41,50,000/-)
2. Entrapment of nanoparticles in MOF : SR/NM/1169-2012 (Rs.31,50,000/-)

# IIIT, DESIGN & MANUFACTURING, CHENNAI

## Introducing IIITDM

- One of two IIITDMs in the country (the other is in Jabalpur, MP)
- MHRD Institute of National Importance, founded in 2007
- Focused on IT-enabled design and manufacturing, esp. Make in India product development through hands-on learning
- UG and PG/PhD courses in computer, electronics, and mechanical engineering
- Has Designers Club, Make in India Club, and MHRD Teaching Learning Centre for Design and Manufacturing Education
- An Innovation Studio and a Start up Centre are planned

## Celebrating Independence Day through High Tech Innovation

August 15, 2015 –Unmanned aerial vehicle (drone) flies the national flag at ceremony

- Drone was built by Designers Club students with inexpensive off-the-shelf components
- The drone is also to be used in a faculty research project (Dr. S. R. Pandian, Electronics Engineering) on automated identification and prevention of power line theft, a major economic problem in India



## Celebrating Republic Day through High Tech Innovation

January 26, 2016 –Tricolor mobile robot controlled by children at flag hoisting ceremony, with a smart phone mobile app

- Children also played with a telepresence mobile robot using game controller
- TLC staff and Designers Club students built the mobile robots, which will be taken to local schools to educate kids
- Part of a self-driving vehicle research project 4





## Robots for Swachh Bharat

IIITDM has an ongoing innovative high-tech initiative for campus cleanup

- Drone will fly periodically over the campus and identify trash and its locations with on-board GPS
- A mobile robot fitted with arm (manipulator) and trash can will travel to the trash locations and pick up and store the trash without human intervention
- The mobile robot will also be taken to local schools to educate children on implementing Swachh Bharat

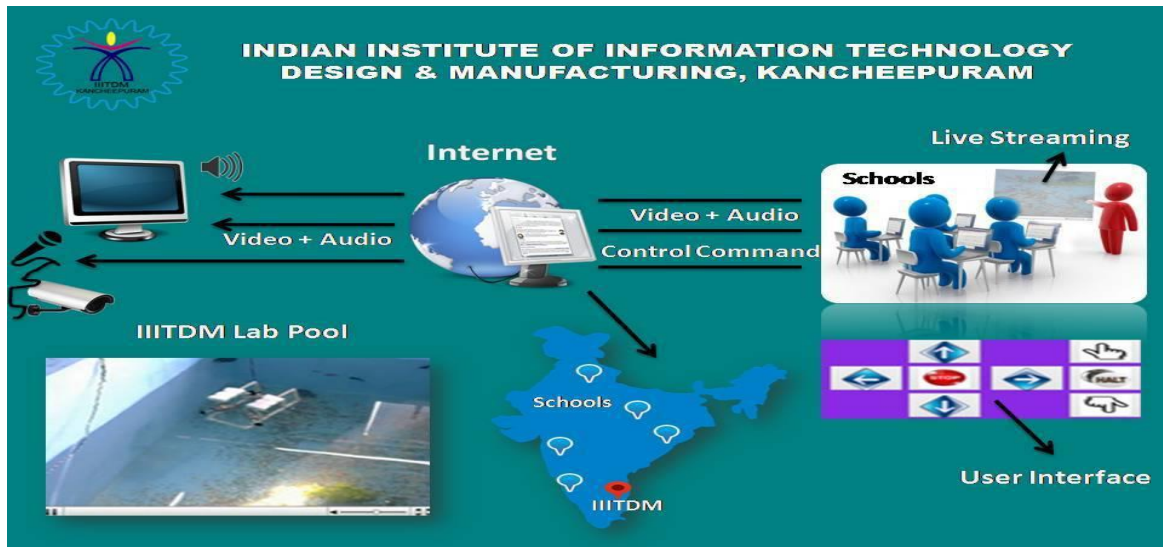


## Low-cost Smart Trap for Mosquito Collection, Identification, and Reporting

Research done at IIITDM, in collaboration with ICMR Centre for Research in Medical Entomology, Madurai

- Mosquito-borne diseases are a major public health issue in India
- The smart trap can be set up in public spaces like schools and hospitals to reduce mosquitoes, and also report on their prevalence to help in public health promotion

## Playful Learning with Underwater Robots

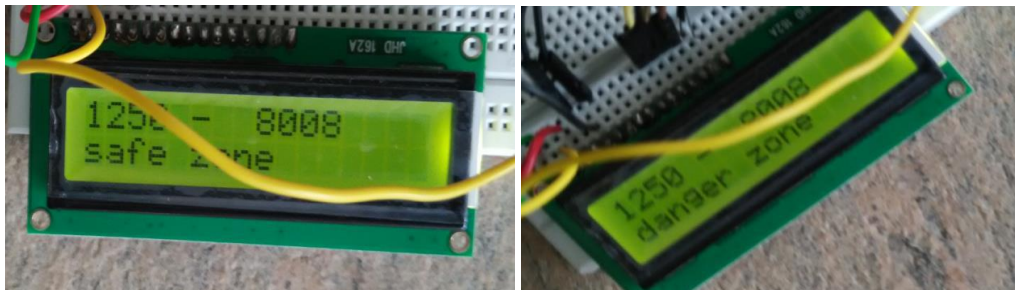


## Intellectual Device to Support Fishermen in Sea

M. AbhiShravan Guide: Dr. BinsuJ Kailath

Objectives:

- To design a support system which indicates the exact location of the fishermen in the sea
- To design a system which sends message to coastal guards and nearest boat when met with any calamity or crosses boundary purposefully.
- To interface RF module with microcontroller for wireless transmission of data
- Optimize the design to make it portable and cost effective.boat acting as relay



## Conclusions:

- 1.This system prevents the small scale fishermen on crossing the International waters.
- 2.GPS updates the current longitudinal and latitudinal values and is compared with the pre-programmed values in the microcontroller unit and identifies whether the device is within safe border.
- 3.This can also be used as a distress alert system to the coast guard section whenever the fishermen face any calamities within the ocean. Also the communication between the nearby ship helps them in the dangerous conditions.

# AUTOMATIC SYSTEM FOR VEHICLE SAFETY, MONITORING AND TOLL COLLECTION

By: Abhijit Bala - M.Des (Electronic Systems) (2013-15)

Guide: Dr. K. Selvajyothi

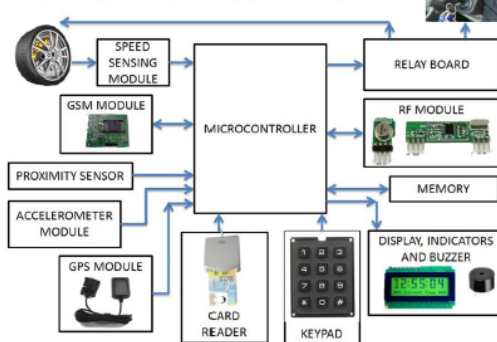
## Objectives

- Development of a low cost system that can be installed in every vehicle so that parameters related to vehicle leading to accidents can be monitored.
- Techniques to prevent accidents, if somehow accidents occur then measures to reduce death rate.
- Easy tracking of vehicle and its driver any time with facility to lock down vehicle remotely.
- Reduction of congestion at toll plazas to reduce travel time with centralized control over everything.

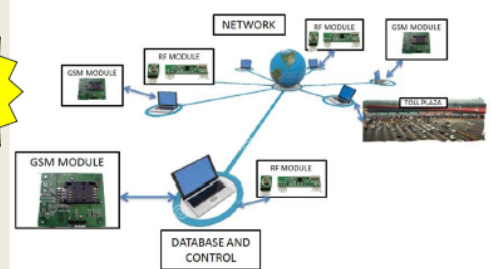
## System Designing Stage



## VEHICLE END BLOCK DIAGRAM



## REMOTE END BLOCK DIAGRAM

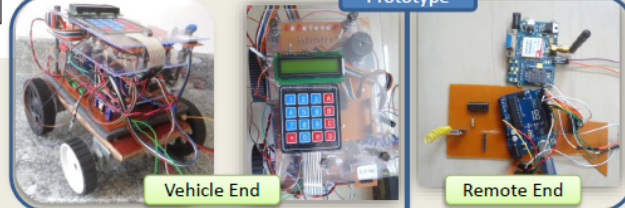


Decade of action on road safety 2011-2020 by UN

## Conclusions

- A prototype of the system has been successfully made based on the study on causes of road accidents with prevention measures.
- The results obtained from experiments carried out on prototype were satisfactory.

## Prototype



## Braille E-Book Reader –Interfacing and Text Recognition

### Objectives:

- To convert the e-book files into Braille characters and display on a tactile display unit.
- To identify headlines and chapters
- To actuate the motors for the Braille display.
- To capture any new image and convert to Braille
- To Interface camera module with microcontroller
- To add voice based menu navigation system and On-board dictionary for increasing comprehension





## Conclusions:

- A prototype of Braille e-book reader is designed and developed
- It uses a single actuator, consisting of 6 DC motors, to actuate the Braille cells using click-pen mechanism.
- The design results in much reduced cost compared to existing designs
- Device also captures real-time images and display the extracted text in Braille



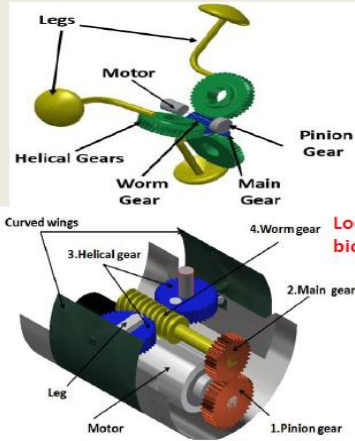
## Design and Modeling of a Novel Robotic Endocapsule for Inspection of Lower Gastrointestinal Tract

SauravVerma

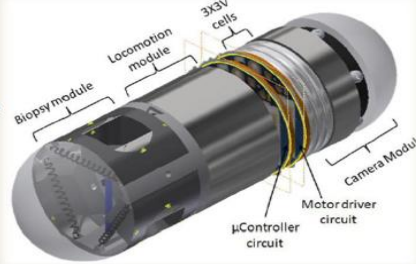
Guide: Dr. M. Sreekumar

**Objectives:**

- To design a robotic endo-capsule with a steering mechanism to make it pass faster inside the lower gastrointestinal tract, so as to reduce the time of endoscopy.
- To design an efficient vision and feedback system to control the steering mechanism as well as the biopsy process of the endo-capsule.



Locomotion and biopsy modules



Full Model

**Conclusions:**

- ❖ Different design has been explored and as a final point we move towards the worm-reciprocating mechanism along with the effective feedback system with the aid of trigonal mirror.

**Visible Output:**

Saurav Verma, Mohit Verma and M. Sreekumar, "Design and Development of a Novel Robotic Endocapsule for Inspection of Lower Gastrointestinal Tract", Proc. International Conference on Advances in Design & Manufacturing (ICAD&M'14), NIT Trichy, India, 5-7 Dec. 2014, ISBN 978-93-84743-12-3, 609-613.

## AUTOMATIC SORTING SYSTEM FOR TOMATOES USING MACHINE VISION, BASED MATURITY PREDICTION

Nishanth P.V.

Guide: Dr. V. Masilamani

**Objectives:**

- This project aimed at development of low-cost automated system for sorting of harvested tomatoes into groups, according to the days left, before it gets over matured or rotten, with the help of images of tomatoes.
- Proposed system classifies tomatoes into four classes: low, normal, high, rotten



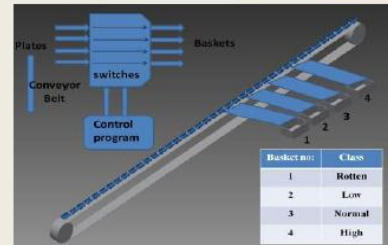
Low

Normal



High

Rotten



System Model

**System Model**

- Preprocessing :
  - Frame extraction->Elimination of motion blur using wiener filter->Denoising using pseudomedian filter
- Feature extraction
- Classification using Support Vector Machine
- Notification through mobile phone to workers

**Conclusions:**

- Real-time hardware implementation for grouping tomatoes according to the maturity level

## Quantification of Wear & Prediction of Fatigue Life of Human Dental Crown

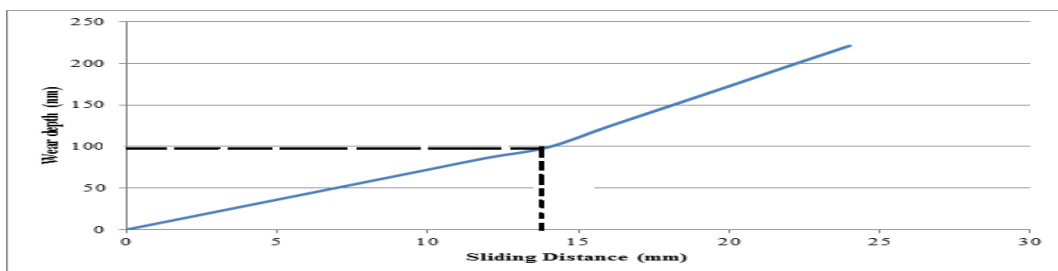
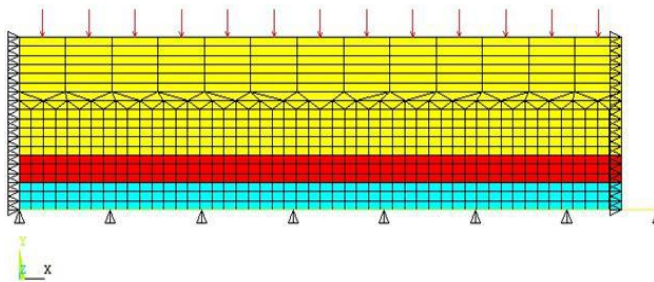
Kumbhar Pramod Yallappa

Guides: Prof. R Gnanamoorthy & Mr. C Gurunathan

Objectives:

Adhesives and skill of dentist play a role on the life of the dental crown. The current study is aimed at estimating the fatigue life of crowned teeth with varying percentage of bonding agent using FE analysis on RVE model.

Study is also focused on prediction of wear rate and pattern of dental crown by FE simulations and validating the same with experimental approach.



Conclusions:

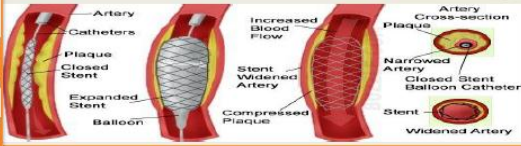
1. Fatigue life is highly dependent on percentage of adhesion. Better the adhesion more the life.
2. Wear rate abruptly increases after removal of crown due to change in hardness and frictional coefficient of natural enamel

## Studies on Surface Deterioration of Cardiovascular Stents



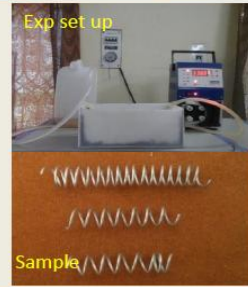
### Introduction:

Cardiovascular stents serve in severe operating conditions and their life mostly depends on the resistance to surface



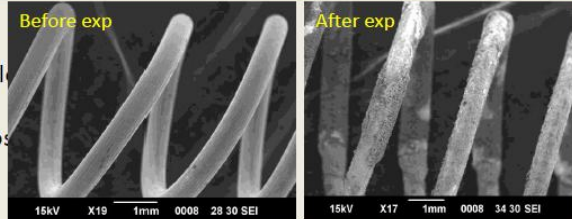
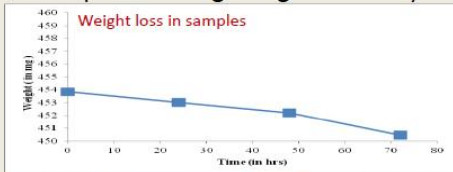
### Objective:

➤ Design & Develop an experimental set up to study the surface deterioration under simulated conditions and to conduct preliminary tests.



### Results:

- Weight loss observed in specimen samples.
- Particles sticking to sample surface.
- Sample surface getting affected by corrosion.



### Conclusion:

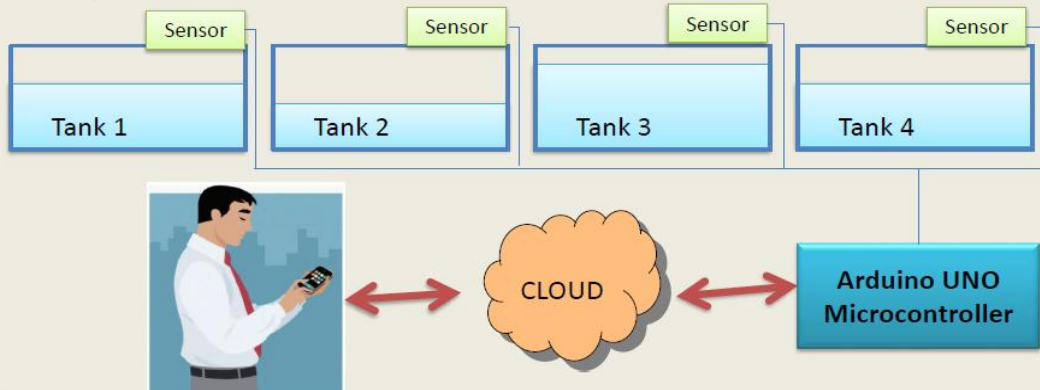
➤ Experiment can be now run using artificial blood and Stents.

## Smart Water Grid

Lakavath Ram Naik and Dr Noor Mahammad Sk

### Objectives:

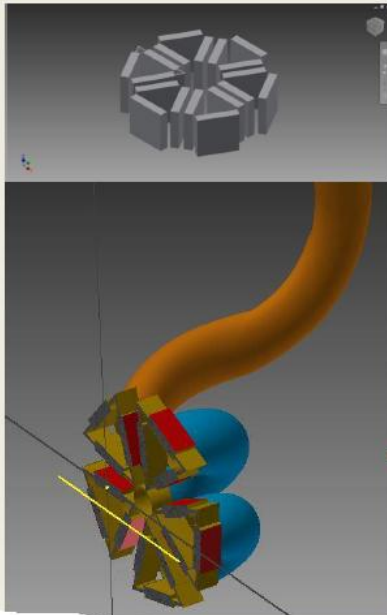
- Sense the Water level in the overhead tank using sensor.
- Arduino UNO Microcontroller receives the sensed level and calibrate the quantity in liters.
- Microcontroller send this data to the Cloud database.
- Authorized person can view the data at any point of time in his mobile application.
- This will also helps is estimating the water requirement for a give organization.



## Harnessing Heat Energy from Two Wheelers using Thermo-Electric Materials with Energy Efficient Techniques

**Objective:**

➤ To harness power using efficient techniques in the range of up to 1 kW in 125cc-200cc motorcycles.



The modules

**Internal Components:**



**Conclusions:**

- ❖ The stand alone output voltage of the setup was recorded up to 3.08Volts. Beyond this point the setup stopped working
- ❖ Changes like addition of extended surfaces(fins) can help in reducing the accumulated heat on the TEG external surface.

## Design and Development of a Plastic-Coin Exchanger

**Objective:**

➤ To design, model, simulate and fabricate a machine to exchange coins for plastics.

**Internal Components:**



**Conclusions:**

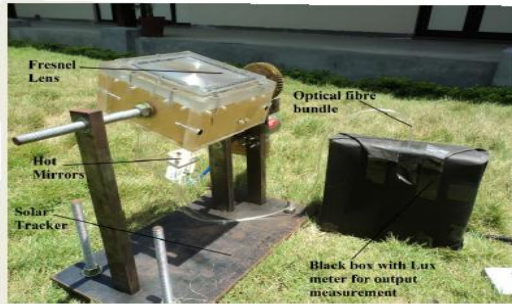
- ❖ A working prototype of a cost and space efficient Plastic – Coin Exchanger alias RVM (Reverse Vending Machine) is successfully modelled, fabricated and assembled.
- ❖ This product is a complete novel idea of designing an RVM suitable for developing nations.

**Visible Output:**

In the process of preparation of documents for filing patent application.

## Sun light transportation through optical Fiber





### Objectives

To design and develop a system for direct sunlight transportation inside high-rise buildings

To conduct feasibility of employing optical fibers for the applications

To generate experimental data for comparing the suitability of different types of optical fiber



### Outcomes

An indigenously designed optical fiber based sunlight transportation unit has been developed.

The real-time performance of the implemented system has been carried out.

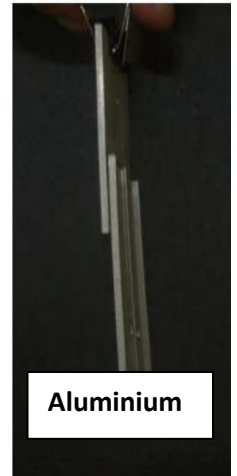
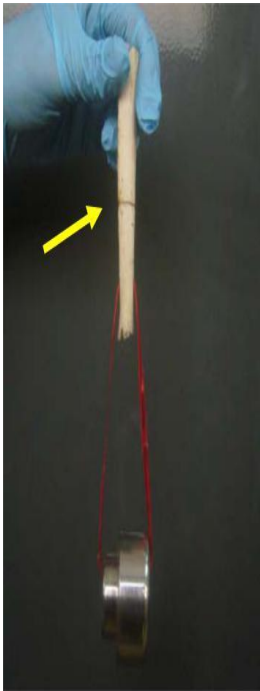
Silica fibers were found suitable for longer distance transmission.

## Design and Development of the Microwave Sensors using Split Ring Resonators

- Under constant fatigue, metals can also develop micro level cracks.
- So early detection of these cracks on metal surface can avoid property damage and human losses.
- A small size and highly efficient microwave sensor using open slot split ring resonator (OSSRR) which can be able to detect micro level crack of 100 micrometer on metal surface is developed.
- A novel method for the detection of gold nanoparticles embedded in mammalian cell using open complementary split ring resonator (OCSRR) is proposed.



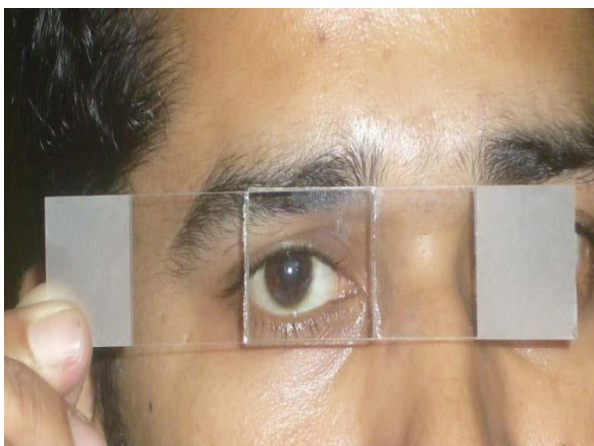
# Underwater Self-Curing Adhesives for Bone Adhesion



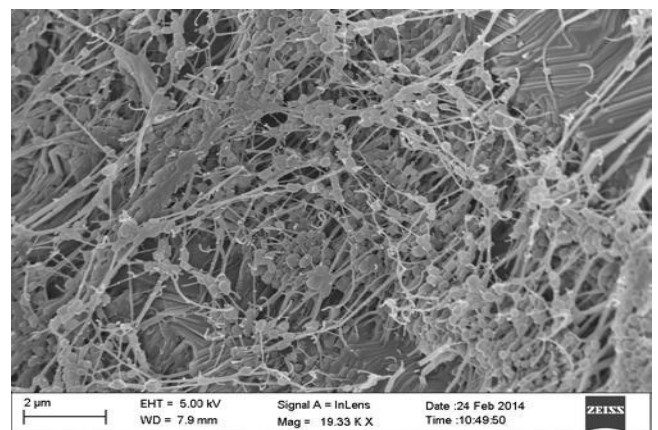
**Bone Adhesion in Air**

**Adhesion Under-water**

Adhesive Strength on Bone : Upto 704 kPa or 7 kg/cm<sup>2</sup>



**Visual clarity of Glue**



**Nanofibers present in glue (egg shell substrate)**

Indian patent Application No.3401/DEL for “biodegradeable Self-Curing Adhesives” published on 06 Feb., 2015 Inventors: Dr. Aasheesh Srivastava and Dr. Aashish Sharma, IISER Bhopal.



# IISER KOLKATA

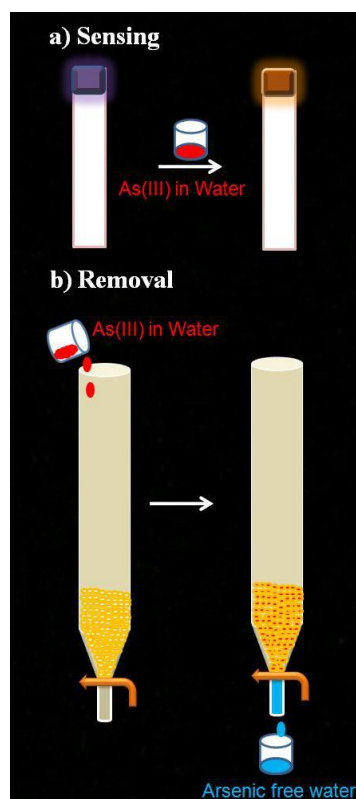
Raja Shunmugam, IISER Kolkata

## “Unique Norbornene Polymer Based "In-Field" Sensor for As (III)”

Over the past few years in West Bengal as well as Bangladesh, a fiercely emerged and discussed subject is about the arsenic contamination of drinking water. The name “Arsenic” is very familiar in the chemical industry for its hazardous nature and is listed by World Health Organization (WHO) and Environmental Protection

Agency (EPA) as a well-known carcinogen. The combination of high toxicity and widespread occurrence has created a pressing need for effective monitoring and measurement of arsenic in a variety of environmental samples such as soil and groundwater. In particular, the occurrence of arsenic in well water has received significant attention during recent years. In many regions of the world, local populations are exposed to arsenic through ingestion of contaminated water.

Sensing As (III) by simple and efficient method is the biggest challenge for the researchers. There is no viable technology available today for the efficient removal of As(III) while compared to As (V). Until now, there is no simple and viable technique for the field determination of arsenic in aqueous environment. We have tried an innovative approach by the combination of colorimetry and fluorometry in aqueous environment to come out with a norbornene derived rhodamine monomer (Nor-Rh) that responds very selectively and sensitively to As (III) in presence of potassium iodate and hydrochloric acid. The newly designed system merely uses the very basic redox reaction in the sensing process. The response time is instantaneous even at ppb level of As (III) and the redox reaction is very specific to As (III). To the best of our knowledge this is the first report that effectively senses As (III) in aqueous environment.



We have also demonstrated norbornene attached thiol monomer and its polymer for As(III) removal as Arsenic (III) has specific affinity towards thiol based ligands. As expected, the ability of the polymer in removing As (III) was 10 times greater than that of its corresponding monomer due to the availability of more number of thiol group in polymer to bind arsenic.

**Reference:** Sourav Bhattacharya, Santu Sarkar and Raja Shunmugam\* "Unique norbornenepolymer based "in-field" sensor for As(III)" *J. Mater. Chem. A*,**2013**, 1, 8398-8405.

# IISER MOHALI

## What is Our Idea?

Most schools today do not have a Junior Science Laboratory, and even if they have, their curriculum is not designed in such a way that it enables students to get hands on experience of the concepts taught in their class. This lacunae in the system leads to loss of creative thinking and students losing interest in Science, at the very age when their imagination should start soaring.

To solve this problem, we have come up with an **innovative idea to equip all students with their own personal laboratories, in form of monthly, home delivered science kits**. For the past one and half year, we have researched extensively to make our kits affordable, make learning fun, and most importantly safe for the students to handle on their own.

Example of the activities in the box:

- 1- Making microscope, telescope, electric circuits, air pressure gauge, loudspeakers, microphones, hygrometer, anemometer, rain gauge, periscope, electromagnet, electric bell, observing wave propagation through models, Bernoulli apparatus and a lots of other stuff..
- 2- Understanding rusting, indicator chemistry, crystallization, chromatography, soap chemistry, redox/neutralization/displacement/addition reactions, test of starch/protein/carbohydrates/fats, Fermentation, waste management, and recycling.
- 3- Observing micro-life, human life processes' models, capillary action, in plants, studying life processes in plants, studying types of teeth, observation of life stages of insects(eg. butterfly), making basic medical instruments like stethoscope, lung capacity testing

Some Snapshots :



## IIT BHU

### **Brief information about Projects and Achievements of Indian Institute of Technology (BHU) Varanasi**

IIT (BHU) has been continuously work for the realization of projects of national and social relevance. Highly qualified faculty and talented research scholars are active in frontier areas of research and their efforts are supported by Govt. research sponsoring agencies and many reputed industries such as TISCO, HINDALCO, ONGC, SAIL, BHEL, MECON, UPSEB, FCI, Coal India etc. The total financial supports for the ongoing projects around 40 in the Departments and Schools is nearly Rs. 10.29 crores including FIST/UGC-SAP funding/ steel technology centre. Rs.7.11 crores were sanctioned in the last financial year.

Extension of our expertise and laboratory facilities to the industries of this region is an important service activity of the Institute. All the major departments of the Institute have been actively engaged in providing industrial consultancy and testing services to a large number of industries and entrepreneurs of the region and also to large industrial houses.

# IIT BHUBANESHWAR

## Achievements of the Innovation Club at IIT Bhubaneswar

IIT Bhubaneswar has been involved in various innovative activities since its inception. These innovations have been in various areas like teaching, research, product development, health and socio-economic development. Students and faculty members of the Institute have been actively working towards providing innovative solutions to various problems in these areas.

During the initial phase of the Institute, when setting up of laboratories came as an impediment, the Innovation Club turned this adversity into opportunity by innovating completely novel ways of conducting those classes which resulted in even higher student involvement and participation. Those methodologies are being followed now in many other educational institutes as an established practice.

The Institute has produced many inventions in order to solve day to day problems. With all these inventions the Institute Innovation Club has filed eleven patents and six more are in the process of being filed. The Institute now has established its Design Innovation Center with funding from the Ministry of HRD and has a vision of infusing a culture of innovative thinking in the budding engineers through interdisciplinary projects leading to development of educational and community driven products primarily for children.

Grants were released for setting up of the Design Innovation Centre (DIC) at IIT Bhubaneswar under the scheme of National Initiative for Design Innovation. Thereafter, various physical facilities have been developed, various outreach programs have been conducted and planning has been done for further progress. Activities and the development of the physical facilities are described below.

### 1. Activities till date

- On 27th June, 2015, in order to realize the goals set in the proposal of DIC, IIT Bhubaneswar a “**Brainstorming Session**” was organized in the institute where experts from existing DICs, eminent artisans, reputed industries along with the spoke institutes participated.
- The first workshop on “Freehand Sketching” for our students was organized on 22nd August, 2015 at the Community Hall of Argul Campus. Shri Meenaketan Pattnaik, BK College of Art and Crafts, Bhubaneswar, who is an expert in this

field was invited to conduct this workshop. Shri Pattnaik has conducted many such workshops in various reputed organizations including IDC at IIT Bombay. The response of the students to this workshop was overwhelming with more than fifty participants. All the participants were issued with a certificate of participation.

- A workshop on “**3D printing**” has been organized in three stages out of which already two stages based on solid modelling and analysis using SOLIDWORKS have been completed on 3rd and 10th October, 2015 and the final stage based on printing of the developed models is to be conducted within a month or so.
- A four-day workshop on “**Robotics**” was organized by the Design Innovation Centre at IIT Bhubaneswar during 9-12 December, 2015 in the Institute Auditorium. More than forty students from various schools of the institute participated in the event. In the workshop they learnt about various aspects of embedded robotics and had hands-on training on many types of sensors, actuators and controllers. On the final day of the event they built their own maze solving robots by applying all the skills that they had acquired during the workshop. The robots contested with each other in terms of speed and accuracy and smoothness in solving the maze and the winning robots were accorded with many prizes under various categories. Certificates of participation were given to all the participants who successfully completed the workshop.
- Innovative projects:



Low cost quadcopter under development



Simple and low cost apparatus for density measurement

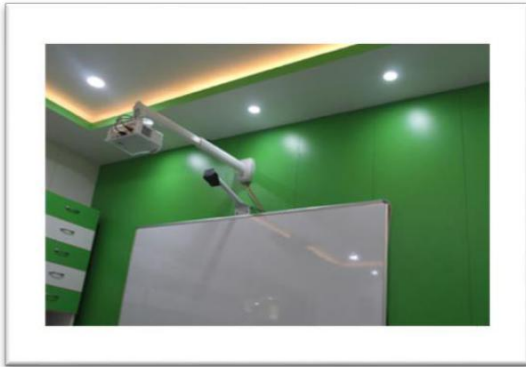
- DIC@IITBBS website has been designed by the student members of the center and has been hosted on the institute website (<http://webapps.iitbbs.ac.in/dic/index.php>).

The students are constantly upgrading the website so that it can be even more versatile in future.

## 2. Physical facilities Developed

Some of the equipment/tools purchased under different arenas are shown below.

- **Dream, Draw, Design Arena:**



Interactive board



High-end Workstations



Color printer



16\_node\_server





CAD CAM Lab

High End Software

- **Cut, Measure and Scan Arena**



Electronic components

Rapid Prototyping Machine



3D Profilometer



TIG welding equipment



Table saw



Bench grinder



Members of the innovation club undertook a study on the LPG distribution system in the country. They found out that there are two kinds of problems from two different segments of the consumers. In one case, a huge number of cylinders (around 50 million) remain idle for a long period of time with consumers who have two cylinder connections. On the other hand, a large number of consumers (around 66 million) suffer from non-availability of cylinders because of the time lag between ordering and receiving a new cylinder. The team then came out with a novel method and apparatus for automation and optimization of LPG cylinder distribution system.

Another group of the club have tried to tackle the issues related to public security. Timely reporting and authentic witness gathering in case of any road accident or roadside crime such as riot, robbery etc. are major challenges that law enforcement and relief supply agencies are facing today. Hence the group worked on an invention that involves the development of a system which can solve the above stated problem, more specifically the invention is directed to provide a vehicle mounted monitoring and surveillance system which is designed to track the vehicle position and monitor the vehicle surrounding with provision of timely forwarding the surveillance data to a central database.

IIT Bhubaneswar has always given emphasis on the green technologies. In this regard the innovation club has developed products which can save energy in every household. One such invention is a processing condition monitoring system for utility products such as food processors and the like wherein every user of such product will contribute towards saving some energy through its use. Students have also developed products to improve general health situation. An intelligent fluid consumption monitoring system for dynamical health monitoring is one such product. A novel and more economic way of producing Hydrogen has also been developed by the club which is a major contribution to the domain of alternative energy.

# IIT BOMBAY

## Introduction

Started with the name **TechGSR (Tech geek social responsibility)** which formed the precursor to establishing the **national innovation club**, the student body of IIT Bombay aims to build asustainable system at IIT Bombay which will promote the technical brains of IIT Bombay to create technology for development of country with acollaboration from learned professors, established institutes and citizens of India themselves and to create leaders and entrepreneurs in socio-tech fields

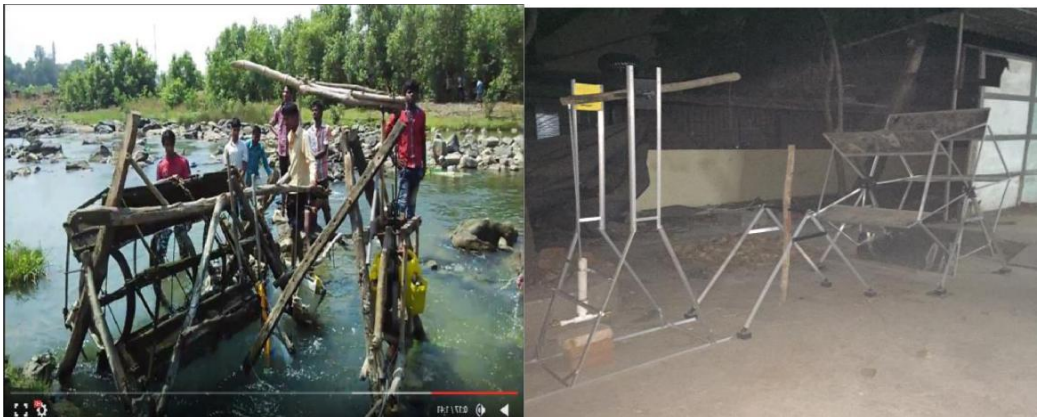
## Ongoing Projects

### Projects for augmentation and value addition to grassroots innovations

These includes taking existing working ideas and investigate with an engineering bent of mind how to even slightly improve the existing working solution. It is therefore not about "forcing our solutions manufactured in labs but about complementing or supplementing existing solutions. Some problem statements we received from NIF (National Innovation Foundation) and one from an NGO nearby. Following are the projects and their current status.

#### **Non-electric automated turbine pump for irrigation purposes**

The prototype of the re-engineered model is ready for implementation. Following image is the comparison of the two models. The first is one made by Kamlakar (the innovator) and the latter is its reengineered and optimized model which is more sustainable and replicable.





### Wheelchair convertible to crutch and shock absorbing crutches

The first prototype of both of them are ready and the team is working on improving the design. They were the problem statement received from the NIF and on which the students showed interest. Following are the images of the same.

### **Bridging the urban rural divide- Creating a Model Village**

Under this sector, we worked on a village named Hirewadi in Raigad district of Maharashtra on the following problems-

- Health issues because of the smoke created by biomass cook stoves
- Lack of transportation facility in medical emergency situations
- Livelihood generation
- Lack of cleanliness
- Efficient lighting, etc

Out of these a few problems were selected on which the teams could work upon and following are the concept models for the same. Lately, considering the work done the village has been adopted as a part of **Unnat Bharat Abhiyan**.

### **Other Projects**

#### **Remotely controlling the flow of water**

The problem was that a person has to go every day at night to a place where the valves are for the water supply and stay there for 3 hrs unnecessarily. It was given by a gram panchayat sarpanch. Some students then came up with a GSM based model to remotely control the valves giving sarpanch total control without being actually present there.

- Develop tools to interactively screen children suffering from any kind of learning disabilities. This problem was suggested by some clinical psychologists. Currently it's in the ideation phase.
- Develop a device for hearing impaired to effectively communicate with the other people. This project is also under ideation phase.

### **Other activities and achievements**

- **Sammilan** - An international socio tech conference held in August 2014 with MHRD TEQIP KIT and Harvard US India Initiative
- **Smart Bucket Challenge**: We shared a bucket consisting of rajma, soya bean, dal, wheat and other utilities like first aid kit, mosquito coils and coloring books for kids in Hirewadi as an evolved version of the ALS Ice Bucket Challenge. It was implemented on a mass level in Chhattisgarh by Cabinet Minister.
- **Accepted publications in various conferences** – Rural development Conference in Bangkok, Wessex Institute – Sustainable planning conference in UK over various themes from youth education to water management
- **Smart campus workshop** – Designed various solutions from device to avoid Mess food wastage to cycle pooling solutions to prevent resource wastage at the campus in IITB, with mentoring from various technical organizations like Arduino, Texas Instruments etc Inter-IIT Tech Competition- Won the 1st prize in the inter IIT-Tech model village competition
- **Media coverage** on the work done by IITB students.

### **Tinkerers' Laboratory (<http://www.stab-iitb.org/tinkerers-lab/>)**

Tinkerers' Lab, popularly known as 'TL' among students of IITB, is a 24\*7 technical facility open to all IITB students. This facility has been conceptualized and built from the generous contribution and immense support of our 1975 batch of alumni, it remains one the sought after place in the institute.

The first phase of the Tinkerers' Lab was established on January 14, 2014 at the 3rd Floor of the Main Building and inaugurated by the Honorable Director, Prof. Devang Khakhar. Following this, the second phase with a even bigger space of 700sqft. was established on March 19, 2014 and inaugurated by Dr. R. Chidambaram, Principal Scientific Advisor to the Government of India. It has been two years since then and over 1000 student have used the facility.

Tinkerers' Lab houses wide variety of equipment and resources to facilitate a wide variety of technical activity. The inventory of the lab includes CNC Machines, 3D Printer, Heavy Machines like Lathe, Milling, Drill, necessary Electronics equipment and the software assistance. The idea behind this is to foster innovation and pursuance of technology among students. It has received a great response from students. Student has been using this facility for variety of purposes which includes course projects, B-Tech Projects, Hobby projects, DIYs and in fact, 3 startups has emerged as well. This facility is a great complement to our engineering education.

# *innovation*

# *@iitd*

*Apart from two pillars namely  
“teaching” and “research”, IIT Delhi has  
identified “innovation driven  
entrepreneurship” as its third pillar in its  
new vision.*

## **Contents**

- 1.1 New Courses introduced in Design & Innovation
- 1.2 Mandatory Credits in Design/Innovation/Practical Experience
- 1.3 Industry/Alumni/Government Sponsored Initiatives in Innovation
- 1.4 Design Innovation Center (DIC) supported by MHRD
- 1.5 Some IIT Delhi Innovations which have reached Market/People
- 1.6 Student Entrepreneurial Activities
- 1.7 Innovations related Events/Courses/Workshops
- 1.8 Awards and Recognitions

## 1.9 Outreach Activities in the space of Innovation ■

### **New Courses to Excite Students Early in Design & Innovation**

#### **Catch them Young**

When students come for higher education after many years of schooling, they are extremely excited and enthusiastic about new journey.

The interest & energy among students in the first year is very high and it drastically goes down if their expectations are not met early in their programmes.

First Semester is a make or break time for institutes/universities to keep students interests alive and sustained throughout their stay on campus.

Keeping this in mind, IIT Delhi has introduced multiple courses and activities with design and innovation focus in the very first year. taking as a vehicle to solve real world problem.

#### **NIN 100 – Introduction to Engineering**

A flagship course for new undergraduate entrants in the very first semester.

expose them “engineering”, “design” and “innovation” as a vehicle for social and economic development.

educate students how research and innovation in science/engineering has enormous impact on our day to day lives.

enlighten students about process of engineering a product as it happens when people of varied disciplines come together and work in teams.

enthuse students about “design” & “innovation” by hands-on experiential learning projects.

No of students enrolled so far:2500+



## NIN 100 – Introduction to Engineering



## MCP 101 – Product Realization

Team based product building course to:



- provide product building experience to students very early in their programmes.
- provide hands-on experience of building a product in teams to address a need.
- provide experiential learning opportunity so that students can relate their own experience theoretical concepts.
- build confidence among students to take up product design and innovation projects on their own in future academic sessions.
- No of Students Enrolled so far: 2500+

## MCP 101 – Product Realization



Multi-disciplinary Design & Innovation Courses

(5 New Courses)

Multi-disciplinary Design & Innovation Courses

- Innovation activities require expertise from different backgrounds which include science/engineering/design/management/social sciences.
- It is not common in our education system where students from different specializations can come together as a team to address real world problems.
- To bridge this gap IIT Delhi has introduced multiple courses for students from different branches to join hands as a team to do projects.
- This endeavour has led to students picking up new set of needs and problems to address which is otherwise not possible in their own departments.

## Multi-disciplinary Design & Innovation Courses

IIT Delhi has introduced multiple courses which provide opportunity to work on real world problems through collaboration multi-disciplinary student teams:

- Inclusive Innovation
- Medical Device Design
- Embedded System Design
- Product Design & Manufacturing
- Entrepreneurship

## Inclusive Innovation

### ➤ Course Objectives

To provide knowledge about innovation systems and processes, paying particular attention to the needs and constraints that result from a focus on the underprivileged. Therefore, the students should be familiar with key concepts in innovation and instill in them state-of-art thinking in organizing for innovation, especially for bottom of pyramid.

To help the students understand and appreciate the various steps of inclusive innovation by providing them hands-on experience of identifying and validating a need and then proposing and validating a solution for the intended beneficiaries. The students are expected to go beyond the design of a solution to thinking about hoe it might be successfully translated and diffused into the real world.

# Inclusive Innovation

## ➤ Course Objectives

To facilitate the taking forward of promising ideas by interested students to prototype/pilot stage and pave the ways to bigger success later. This is to ensure that no passion dies due to lack or unavailability of resources.

To enable inter-disciplinary participation in creating a solution to real life complex problem. Since the course is open to students from all disciplines, it has a unique position in the curriculum by bringing together students possessing different knowledge and skill sets.

To excite students about how design, engineering, management and social sciences can be used to solve challenging problems that can have a Positive social and economical impact.

# Inclusive Innovation

## ➤ Course Statistics

- Total number of students enrolled over two semesters: 140+
- Total number of talks by outside innovation experts in the class: 12
- Total number of projects undertaken by students: 25+
- Total number of students continuing to pursue work in some way in the area of inclusive innovation: 10

# Inclusive Innovation

## Sample Projects

1. Improving the access to water in urban slums

(video: <https://www.youtube.com/watch?v=Wcj3DmQmVSg>)

2. Public grievance redressal system

(video: <https://www.youtube.com/watch?v=rhNs0jQkbZ0>)

3. Providing storage options for fruit vendors:

(video: <https://drive.google.com/file/d/0B5QxMnwNnPI7dG1zOEszaINldms/view>)

4. Providing sleeping options Rickshawallas in the city

(video: <https://www.youtube.com/watch?v=7Sz0OPIxlQg>)

5. Storage needs of street

vendors [youtube.com/watch?v=EsGEypJpVKE](https://www.youtube.com/watch?v=EsGEypJpVKE))

Inclusive Innovation

6. Alternative options for open defacation

7. Crowd sourced proofreading for blind

8. Stimulating savings among the urban poor

9. Modular shelters for construction workers

10. Development of comfortable, cost efficient and durable footwear for construction workers, farmers and working labourers and other proletariats

11. Use of ICT to supplement teachers and students in teaching/learning process

12. Reducing indoor air pollution caused due to unclean burning of solid fules.i

13. Design of communication channel to direct/link the developmental problems of urban slums to the relevant problem-solvers.

14. Safe and affordable transport and pre-hospital care of patients in urban areas

15. A platform for spreading awareness about the performance of legislators for greater civic engagement for more transparent and efficient democratic process.

16. Development of affordable and efficient treatment options of patients suffering from Severe Mental Illness (SMIs)

17. Technology based mechanisms get better price for garlic farmers in Rajathan

## Embedded Systems Design

Embedded Systems Design is a multi-disciplinary course where students working in small groups of four to six are expected to deliver in one semester on an innovative solution for problems/challenges that are typical to India and perhaps other developing countries.

The students would have to go through the full cycle of specification, design and prototyping/building a concept demonstrator.

Key component of the assessment would be through a public demonstration of their solution.

Last semester 101 students from 10 different branches worked on 19 projects. Some of these projects are being taken ahead by student teams beyond the course through seed grant provided as a part of DIC.

### Sample Course Projects

Energy solutions for hostel washrooms.

RFID based hostel mess authorization & accounting system.

Priority campus vehicle for disabled .

PickME: A mechanism to contact Rickshaw drivers quickly and easily.

Technology to ensure transparency in monitoring garbage cleaning contracts

Technological solutions for prevention of accidents on unmanned railway crossings

Monitoring teachers' attendance in schools

Technology to assist outdoor navigation of visually challenged

## Medical Device Design

### ➤ Course Contents

introduction to medical needs, identification of need by immersion, through physicians and policy makers.

diesese state fundamentals of the need being addressed, market analysis, stakeholder analysis.

technology or system based solution to address the need by ideation and brainstorming and prototyping.

evaluation of alternate solutions by applying filters including regulatory considerations, markets, IP, business and impact.

demonstration of solution proposed through prototyping and testing.

## Product Design & Manufacturing

### ➤ Course Objectives

Course will introduce tools and methodologies of designing and manufacturing products through experiential learning. The course will also introduce relation between design and manufacturing through DFMA (design for manufacture & assembly) and process planning.

### ➤ Course Contents

Product design for a given need or identified need, Development and evaluation of multiple solutions and concepts, Manufacturability assessments of given design, Product Costing and Bill of Materials, Process planning for components and assembly, Product manufacturing and testing.

## Entrepreneurship

### ➤ Course Contents

The course intends to introduce students to entrepreneurship. It will expose students to practical issues faced by entrepreneurs (focusing on startups) starting from making of a business plan, team building and securing funding to some legal procedures involved and ways to address them. Further, the course will provide an opportunity to interact with entrepreneurs, learn from their success and mistakes, and also a hands-on experience at making a business plan.

The practicals would consist of series of activities to be done in teams for preparing business plan for a case consisting of needs validation, market analysis, solution validation, competitive comparison, pricing



strategy, marketing strategy, management structure, financial plan. testing.

Marketing strategy, management structure, financial plain. Testing.

## Mandatory Design Credits for all UG Students

IIT Delhi is the first institute to make courses/activities in design/practical experience mandatory for all undergraduate students.

Every student has to earn minimum 5 credits/units as graduation requirements.

These credits can be earned by a basket of courses and activities which students choose on their own.

These courses give opportunity for many students to continue their design and innovation journey from first year to subsequent years in an uninterrupted manner.

### Multiple Ways to Earn Design Credits

- Courses which promote design and Innovation
- Optional design exercises in regular courses
- Team based product building initiatives
- Design & innovation summer awards (DISA)
- Design internships for students in summer
- Short-term workshops by design professionals
- Participation in national and international innovation challenge
- Design internships in collaboration with industries

#### Team Based Product Building Initiatives





## 1 Credit Course on Mindset and Skills Required for Engineers to do Creative Work



## 40 Day Souvenir Design Internship



## Sristi Summer School

IIT Delhi students participated in Sristi Summer School organized by HoneyBee Network at Ahmadabad and worked on many real world grassroots innovation needs. Some representative projects include:

Improving the ergonomics and safety of the workers carrying load on their back

Device for increasing efficiency of the splinting process in date palm leaf brooms manufacturing

Designing a brick carrying device for improving ergonomics and efficiency of laborers at construction sites

A simple fulcrum based device to eliminate child labor an increase safety in spray cans dismantling

## Government Sponsored Innovation Initiatives

### Design Innovation Center (DIC)

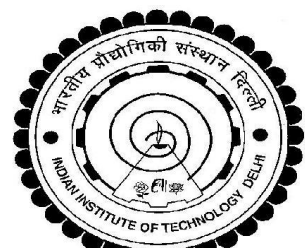
**Indian Institute of Technology Delhi**

**In partnership with**

**IIIT Delhi**

**IGDTU for Women**

**IIT Mandi**



## MHRD's Design Innovation Center (DIC)

### ➤ Purpose

To create design & innovation ecosystem for translation of ideas into products and solutions for people, society and industry

To establish institutes/universities as potential public spaces of innovation in order to address grand challenges facing our society

To bring design thinking and design culture as an essential component in currently changing phase of engineering education

### ➤ Objectives

- Opportunities for multi-disciplinary interactions among students/faculty
- Co-creation of products and solutions involving end user at every stage of development
- Sustaining translational research projects for longer durations
- Exciting students early in their programmes
- Formal mechanisms for interaction with outside world

### • MHRD's Design Innovation Center (DIC)

DIC (IIT Delhi) + Partnering Institutes (IIT Mandi),  
IGDTU for Women & IIIT Delhi

- NEW COURSES
- INNOVATION LAB
- SCHEMES AND ACTIVITIES

## 24x7 Tinkering Lab/Maker Lab



### New Initiatives in Design and Innovation

As a part of DIC (Design Innovation Center), following three new initiatives have been started to promote design and innovation among students and faculty.

**Design Innovation Summer Award (DISA):** Summer Internship for UG students who would like to engage in product design and innovation activities addressing specific needs of industry/people/society.

**Design and Innovation Fellowship:** pre-incubation fellowships for students who would like to continue with the institute beyond their graduation up to 12 months working towards translational research and/or commercialization of their innovations/ products.

**Design and Innovation Translational Seed Grant:** To bridge gap between a successful proof-of-concept prototype/solution and a market ready product or market deployable solution.

### DISA (Design Innovation Summer Award)

DISA is a new summer internship programme for students who would like to spend summer vacation working towards product design and innovation activities addressing specific needs of industry/people/society.

Emphasis of this 8-week internship award is on knowledge application leading to products/solutions which have potential to impact and not on mere knowledge creation.

The three categories of proposals supported under DISA are Products/Solutions leading to

1. Ideas to proof-of-concept prototypes
2. proof-of concept prototype to field deployable functional prototypes
3. Product refinement by design-build-test-modify iterations

## Sample DISA Projects

A-maze: A rectangular bag made of cardboard which can be converted into a desk.

Day lighting by direct use of sunlight using fibre optics

A system for monitoring particulate matter in the household

Smart-Scope: A smartphone based Microscopic Imaging device

Customised CV analysis using NLP and Ontology

Developing a system to handle a network of vending machines to dispense items.

An affordable way of Diabetic Retinopathy Detection

Harvesting Energy from Residual Radiations in Atmosphere.

## SIB – Stanford India Biodesign Program

IIT Delhi, AIIMS and Stanford University joined hands a few years back to develop and groom medical technology entrepreneurs in the country.

As part of this programme supported by DBT, about 100 Medtech innovators and Entrepreneurs have been trained till now who came up with more than 30 medical devices and close to 40 patents have been filed.

Apart from two products which are in the market, most of these innovations are in translation to reach market/people through multiple routes: technology transfer, technology licensing and new start-ups.

The successful experience gained from this programme is being used to design new courses at IIT Delhi in Medtech Innovation for student



# Alumni Sponsored Innovation Initiatives

## Alumni Sponsored Innovation Activities (Batch of 86 and 89)

- IIT alumni batch of 1986 has started “IIT Delhi Innovation Center” to promote innovation activities among students on campus.
- Students are provided with equipment and consumables which they require for design and fabrication. The plan is to expand this 24x7 prototyping facility to present 30 student capacity to 500 student capacity.
- Similarly IIT alumni batch of 1989 has initiated “IIT Delhi Innovation Award” to recognize students who excel in innovation activities.

## Student Innovations Supported/Recognized under IIT Delhi Innovation Award (89 Batch)

Pranay Jain & Anshul Singhal – Portable Braille Reader

Dhruv Jain & Team – Indoor Navigation System for the Visually Impaired

Parveen Kumar – Low Cost Pedal Assisted Electric Tricycle

Vishakha Shankar, Apekshit Solanki, Sameera – Use of Waste Plastic & Glass in pavements

Ankit Kumar, Pulkit Sapra: Hand held Braille embosser

Mukul Gupta & Team – Pre-Engineered Bamboo Structures For Modern Construction: A green sustainable Solution

Siddharth Garg & Team – Android App for Women’s safety

Portable immuno-magneticcapture system (iMC2) for early stage typhoid diagnosis in 6 hr

## Industry Sponsored Initiatives

Industry has come forward to support innovation activities on campus through various programmes

These programs cover some or all phases of innovation

- Ideas Stage
- Proof of Concept Stage (POC)
- Functional Prototype Stage
- Incubation Stage

Industry Sponsored Innovation Programs Launched at IIT Delhi include:

Omidyar (Inclusive Innovation Programme)

ICICI (Trinity program covering idea stage to functional prototype stage)

Google Pilot (Proof of Concept and Functional Prototype Stage)

Ericsson Innovation Award (Idea to Incubation)

Pfizer (IIT Delhi Innovation and IP Program)

Goldman Sachs (Functional Prototype Stage)

POSOCO – Power System Award for best innovation

## IIT Delhi Student Innovations which have reached People/Market/Industry (Five Representative Examples)

### Smartcane



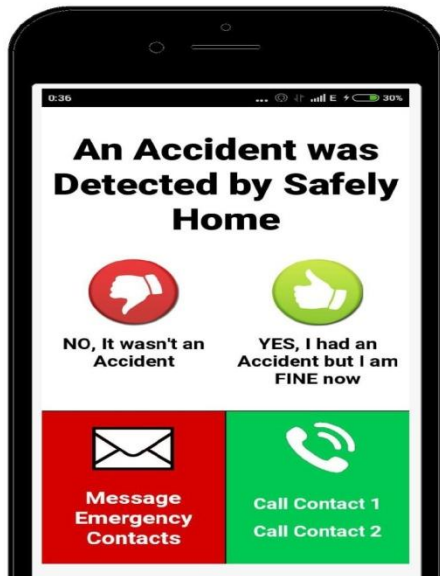
Smartcane helps visually challenged people in independent mobility by detecting obstacles from knee to head and alerting to avoid collisions. Smartcane started as an undergraduate students project at IIT Delhi.



Now it as a product selling well in Indian and International market.

Technology transferred to Phoenix Medical Systems Chennai.

## “Safely Home” App



Safely Home is an app developed by Ishan Jindal, IIT Delhi student in his third year.

Safely Home uses accelerometer data of smart phones to detect accident by vehicle collisions and alerts relatives/nearby hospitals.

The app was launched in September 2015 in Haryana by Gurgaon Police Chief.

The idea to develop such a product came to Ishan when he was doing an innovation exercise in his first year course “Introduction to Engineering”

## TrueHb” Hemometer



TrueHb Hemometer is a smart handheld ultra-portable and rechargeable device to instantly measure hemoglobin in blood.

TrueHb is a CE and ISO certified product doing well in market.

This device has been developed by Ambar Srivastava who incubated his company Wrig Nanosystems in IIT Delhi TBIU (Technology Based Incubation Unit).

Ambar was recipient of MIT's TR35 innovator Award

## Tactile Diagrams



## Safer



Safer is a safety device available in the market which can be worn as a pendant and has an in-built panic button which can be connected to the phone and also to one's loved one's phones. Safer from Leafθ Innovations is a branch of 5 students from IIT Delhi and DTU

## IIT Delhi Student Innovations in Translation

## Some Student Products in Translation

1. Affordable Breast Prosthesis for Cancer Patients
2. Device for early stage typhoid diagnosis (Patent Filed)

3. Assistive garment for Kangaroo Mother Care (KMC) for low birth weight (LBW) neonates (Patent Filed)
4. PickMe Mobile Application For Cycle Rickshaw
5. A-maze: A rectangular bag made of cardboard which can be converted into a desk
6. A Wearable Device for Reading Tactile Graphics (Patent Filed)
7. Radiotherapy breath control device (RBCD)
8. Refreshable Braille Display Device (Patent Filed & Technology Transferred to industry)

## Student Entrepreneurial Activities

There has been an explosion of student entrepreneurial activities on campus. Institute is working on student incubation center to provide formal recognition and possible space to students start-ups operating from hostels.

Students can now take a semester break to pursue their start-up and earn five design credits as well..

Students who graduated can opt for deferred placement option to start their own start-ups.

There are instances of students in their third year placing their products in the market.

## Interactive Session with Mark Zuckerberg



## Inclusive Innovation Conference

IIT Delhi organized a day long conference and exhibition on "Inclusive Innovation" on November 1, 2015 at its premises. Inclusive Innovation has

dual objectives of "social impact" and "financial return". The main objectives of the conference are to:

- (a) inspire students who are interested in exploring "inclusive innovation"
- (b) motivate other academics who want to start educational/research/practice activities in this space.
- (c) showcase successes, and
- (d) help strengthen the inclusive innovation community and ecosystem

## IIT-Boeing National Aeromodelling Challenge



## "Brainstorming and Experience Sharing Workshop" among all Design Innovation Centers

IIT Delhi organized a day long brainstorming and experience sharing workshop for faculty from institutes/universities involved in design and innovation on October 17, 2015. Following issues were discussed in this workshop.

1. Courses and Teaching/Learning Ecosystem for Design & Innovation
2. Development of Innovation Laboratories & Infrastructure
3. Overcoming Valley of Death: Proof of Concept to Market Ready Products and Solutions
4. Collaboration among Design Innovation Centers

## Technology for Social Good Summit





## Short Term Course on Innovative Product Design for faculty from Engineering Colleges



## Startup India Event with IvyCap



## Awards & Recognition for IITD Innovations

IIT Delhi student Paras Batra won the Inaugural Ericsson Innovation Award.

IGEM IIT Delhi team was awarded Bronze Medal at iGEM (International Genetically Engineered Machine) 2014 Giant Jamboree, a premiere undergraduate synthetic biology competition held at MIT, USA.

First National Award by Department of Science & Technology to Scientists working on Improving Accessibility for the Disabled

National Award by Ministry of Social Justice & Empowerment for the "Best Applied Research/Innovation/Product Development Aimed at Improving the Life of Persons with Disabilities

IIT Delhi Startup was among 5 shortlisted for Startup India Launch Event

2015 Manthan Award for IIT Delhi Product

Student team from IIT Delhi emerged as the winner of the 11th Enactus India National Championship 2015. A total of 57 student entrepreneurship projects for community outreach were presented by 3000 students from 90 colleges across India in the two-day national championship.

Prateek Kala, Sumit Kumar and Krishan Kant from IIT Delhi were among winners of Gandhian Young Technological Innovation Awards GYTI (2015)

## Awards & Recognition for IITD Innovations

- Rohan Paul of IIT Delhi is among this year's MIT Technology Review's TR35 awardees.
- Sumit Murab and Shibu Chameettachal from IIT Delhi won 3M Young Innovators Challenge 2015 for their new technology based innovation "Injectable Silk-In-Silk Microsphere-Hydrogel System For Treatment Of Lower Back Pain".
- Professor M Balakrishnan, CSE, IITD among the winners of NCPEDP-Mphasis Universal Design Awards 2015.

## Outreach Activities in Innovation

### Rashtriya Avishkar Abhiyan

MHRD has started Rastriya Avishkar Abhiyan to promote innovation in schools.

As a part of this school students and teachers will work closely with faculty from IITs and NITs to introduce multiple opportunities for students to engage in innovation activities.

IIT Delhi is one of the participating institutes in this endeavors. IIT Delhi is also involved in preparing implementation plan for this new scheme.

It is also taking lead in demonstrating to other institutes the type of innovation activities which can be carried out.

# Mentoring Other Institutions

IIT Delhi has been mentoring and helping following institutes and universities in development of Innovation Ecosystem in their places.  
IGDTU for Women

- IIT Mandi
- IIIT Delhi
- IIITDM Jabalpur
- Gujarat Technical University
- NIT Warangal
- IIT Bhubaneswar

## Contact

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Mobile: 9871346160

# Thank You



# IIT GANDHINAGAR

## IIT Gandhinagar

### Industrial Relation and Project Council

Industrial Relation and Project Council is an executive body of the student council at IIT Gandhinagar that is actively working towards promoting Innovation, strengthening the relations between Industries and the Institute. Since the election of the first council in year 2015, following activities have been successfully completed by council members:

**Tech Leaps: Technological Leaps**, is an initiative by IIT Gandhinagar to promote innovative thinking and technical culture at the institute. It has been started with a mince of thought that often it is the small technological leaps that creates a big difference in the The program supports students to use existing technology to make innovative products or solve existing problems using technology. The first version of Tech Leaps was successfully organized by IR and P council and problem statements for the second version was also launched on 26th January 2016.

**Preparing database of various industrial challenges** to ensure that students know about them well in advance and accordingly plan to participate.

Monitoring the progress done by the collaborative projects running in the institute which include challenges with Underwriters Laboratories, USA; Ricoh Company, Japan. This step was taken up by the council to ensure that teams work effectively and problems faced by the team could be addressed on time.

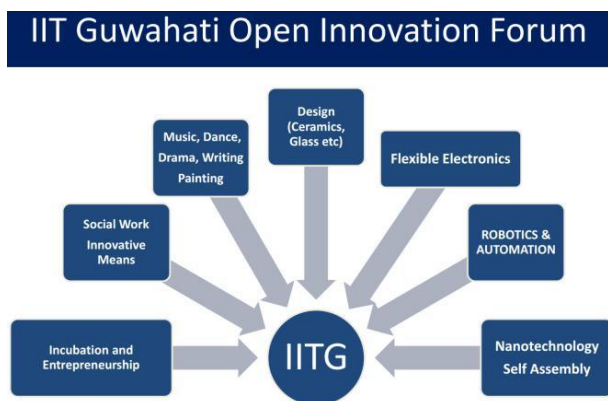
**IR & Portal design:** IR and P council has proposed the design of a portal so that students are timely informed about industrial projects and challenges based on their interest to avoid mass mailing. The portal is in internal testing phase to remove bugs.

**Mechanical Industry Outreach:** IR & P council is actively involved along with students towards organizing Industrial Week scheduled on 30th January 2016. The event focusses on to strengthening the relationship of the Institute with the Industries.

# IIT GUWAHATI

## Report on 4I-LAB

We must restore the pride and prestige of Science and scientists in our nation, revive the romance for science in society, rekindle the love for it in our children; and, encourage our scientists – to dream, imagine and explore. The director of IIT Guwahati, Professor Gautam Biswas proposed an initiative at IIT Guwahati similar to Tinkerer's Lab at IIT Bombay to get students to become comfortable with using their hands, to excite their curiosity, and progress to unleash their creativity. The proposed name was "4I-Lab". 4I stands for Initiate, Innovate, Inspire and Include. According to Prof. Biswas, "The route to open innovation has to be understood and strategized in a comprehensive manner" and proposed the following paths for IIT Guwahati open innovation forum.



The concept of 4i-Lab is very similar to Tinkerer's Lab and the objectives in brief are as follows.

- To provide a **tool room and workspace** that lets students have the freedom to try out, experiment and learn about the why and how and what-if in the process. To instil in them the confidence to work with their hands and innovate, test their ideas on the lab benches, remove fear of failure. This facility shall have mechanical fabrication equipment, and electrical

tools and electronic components and test equipment.

- The **projects that the student would work on are to be self-defined**. There was to be no restriction on how big the project needs to be. The projects could range from very simple ones taking days to complete or more complex ones taking over a year to build. Not every project needs to be about building, one could even be taking a technical gadget apart and then re-assembling just to learn how it works.
- **Groups of students working on any project** are to be formed organically and **not selected by any outsiders**. One student working on a small project or a group of 10-15 students coming from various disciplines working on a complex project are all allowed working at this facility.
- The **facility should be open 24/7** and have at least one staff member or technician available at all times.
- A website would be created to put this community in touch with each other. **Website should list all on-going projects as well as list of potential projects** someday someone could attempt to work on.
- **Alumni would engage with current students by providing mentoring**. This would entail providing expert help when needed with any projects, arranging for

inspirational talks with practising engineers from Industry and entrepreneurs from India and abroad, advice on individual projects, and suggesting interesting student projects.

- **The facility shall maintain a storeroom with inventory of electronics and mechanical parts** most commonly used in building projects. These parts are available on demand to students working on projects. These parts are to be returned to inventory, if reusable, after a completion of the project.
- The Lab has to impact as large a proportion of the student community as possible, and not just those who focus on sponsored multidisciplinary projects, international competitions etc. The target is to widen the impact among the student population. **The lab shall be open to allregistered students.**

It is believed that the undergraduate students of IITs can be assigned challenging research projects at an early stage so that they can complete the work by the time they graduate. As a result some projects may culminate into complete product. The 4I-Lab will be under the technical board. Already there are eleven different clubs namely Aeromodelling, Astronomy, Coding, Electronics, Entrepreneur Development, Robotics, Automobile, Acumen, Finance and Economics, Prakriti, RadioG under the technical board. Several interesting projects are going on under these clubs.

Another idea of 4I-lab is also to encourage multi-disciplinary learning and cross disciplinary innovative projects among the students. An open elective in the 4<sup>th</sup> semester and multi-disciplinary project in the 5<sup>th</sup> semester of BTech programme are proposed in the recent meeting of the Central Under Graduate Curriculum Review Committee (CUGCRC) of the Institute. This proposal will help to realize the ideas conceived by the students. After the 4<sup>th</sup> semester, the students can discuss with mentors from various departments during summer vacation and they can venture for innovative projects in the 5<sup>th</sup> semester. The students will have then sufficient time to execute as they will start early at 5<sup>th</sup> semester and continue as their final year projects to submit at the end of their academic programme. It is envisaged that the proposal will help in bringing new innovative products completed up to the prototype level.

# IIT INDORE

## Institute and Club Details

Institute: IIT Indore

Innovation Club Name: “**Student Entrepreneurship Support Cell**” @ IIT

Indore Inception date: **August 2013**

**Founding Faculty:** Dr. Bhupesh K. L., Asst. Prof. in Mech. Engg.  
Dr. Gourinath B., Asst. Prof. in Comp. Sci. and Engg.  
Dr. Vimal B., Assoc. Prof. in Elec. Engg. (Convener)

**Students:** Parul G., Gunjan K., Vibhor P., Kartikeya U., Miroojin B., Gaurav K., RameshR., Vijendra T., Haider H., Himanshu D., Sharang K., Digvijay S., Sarthak G., Abhinav T., Samyak J., Vibhor P., Vikas S, Anmol A., Vikram P.

## Achievements Summary

### A. Products developed and Patents filed:

- 1. Project Title:** “Embedded System based intervention for energy conservation”  
**Scope:** Potential to conserve 50 MW power  
**Deliverable/s Status:** (i) Product designed and demonstrated  
(ii) Patent filed with IPO, Mumbai. (4092/MUM/2015).
- 2. Project Title:** “Reconfigurable cooling pad for laptops”  
**Scope:** Prolongs the laptops' life and its a one-for-all kind of product because of reconfiguration  
**Deliverable/s Status:** Product designed and demonstrated.
- 3. Project Title:** “Brain-able Wheelchair”  
**Scope:** Brings mobility to severely disabled humans by controlling the chair with brain waves  
**Deliverable/s Status:** Working model developed and demonstrated.
- 4. Project Title:** “Software Defined Radio Sets for Disaster Management”  
**Scope:** Enables communication in severely hit disaster situations  
**Deliverable/s Status:** (i) Product designed and demonstrated  
(ii) Patent filed with IPO, Mumbai.
- 5. Project Title:** “WizCallRecorder App for Android”  
**Scope:** Sophisticates in-progress call recording with minimum efforts  
**Deliverable/s Status:** (i) Product designed and demonstrated  
(ii) Patent filed with IPO, Mumbai.

6. **Project Title:** “Courtsey App for Android”  
**Scope:** Automation in calendar applications  
**Deliverable/s Status:**(i) Product designed and demonstrated  
(ii)Patent filed with IPO, Mumbai.
  
7. **Project Title:** “System and method for emergency services”  
**Scope:** Emergency handling and monitoring equivalent of BalckBox but for automobiles  
**Deliverable/s Status:** (i) Product designed and demonstrated  
(ii)Patent filed with IPO, Mumbai.
  
8. **Project Title:** “Smart Manager Android App for Industries”  
**Scope:** An android app that facilitates measuring and monitoring of shop-floor entities.  
**Deliverable/s Status:**(i) Product developed  
(ii)Two conference papers published
  
9. **Project Title:** “Smart Communication Network for Shop-floor Planning”  
**Scope:** Designed a flexible communication network for effective information sharing between various industrial entities towards integrated shop-floor planning.  
**Deliverable/s Status:**(i) Patent filed  
(ii)One journal paper published

## **B. Startups launched**

Name of Startup: Geekware, IIT Indore. (yet to register)

Name of Startup: Chota hospital, IIT Indore. (registered)

## **C. Awards and Recognitions: (From Govt. of India agencies)**

**Sponsoring Grant Award:** Rs. 45.3 Lakhs

Awarded by: **Department of Science and Technology, Govt. of India**

Purpose: To setup “**Innovation and Entrepreneurship Development Center**”

(SESC-IEDC @ IIT Indore)

Status: Commissioned and operating

# IIT KANPUR

## SIDBI Innovation & Incubation Centre (SIIC)

SIDBI Innovation & Incubation Centre (SIIC) at IIT Kanpur was set up in collaboration with Small Industries Development Bank of India (SIDBI) to foster innovation, research and entrepreneurial activities in technology related areas. Established in 2000 with the vision of transforming knowledge into wealth, the centre has a twofold vision:

- To create a generation of zealous entrepreneurs.
- To convert novel research into valuable intellectual property.

SIIC is a one point contact for all matters related to innovation, incubation, entrepreneurship, technology transfer and commercialization at IIT Kanpur. So far, it has successfully:

- Incubated and mentored 53 startups,
- Disbursed seed funds of 50 Crores,
- Collaborated with organizations like NEN, SUM, IIMA,
- Filed 264 patents, and
- Commercialized 60 patents (worth US\$ 350,000).

## INCUBATION

**SIIC** offers a whole gamut of incubation facilities and services to prospective entrepreneurs and intrapreneurs to convert their innovative ideas into commercially viable products. **SIIC** incubates ventures in technology, engineering and other interdisciplinary areas. Regular events like entrepreneurial talk series, workshops and seminars have offered **SIIC** a good interface and visibility in the region. It is supported by SIDBI, DIT, DST, MSME, BIRAC and DSIR to boost the entrepreneurial ecosystem in the country.

Over the years, the center has grown tremendously and has emerged as a prestigious incubator in India (winner of the National Award for Technology Business Incubators for the year 2011). Today, it boasts of a thriving ecosystem, conducive for the growth of startups, which comprises:

Eight Incubation centers,

- World class Infrastructure,
- Excellent support services including the mentor and funding support,
- Student-run clubs and activities,
- Events and networking opportunities,
- IP and technology transfer cell.

## PATENTING



**SIIC** acts as a Technology Transfer Office of the Institute and provides professional aid to the **IITK** Faculty and students for filing patents and copyrights. So far, it has filed more than **250 patents**. Furthermore, SIIC facilitates the modification and up-gradation of the softwares/products developed by the faculty/students of IIT Kanpur to meet the industry requirements with the help of a commercial partner. The concerned faculty member acts as a mentor. The commercial partner is also responsible for marketing the product and providing customer support.

- See more at: <http://www.iitk.ac.in/siic/d/about-siic#sthash.d9rE3GzZ.dpuf>

# IIT MADRAS

## Centre for Innovation (CFI), IIT Madras

Sai Kanth Dacha, Student Executive Head

Meeting of National Innovation Clubs  
Rashtrapati Bhavan

### 1 Introduction

Centre for Innovation (CFI) is the student laboratory of IIT Madras. It is set in the building that houses the Central Workshop, right at the heart of the serene campus of IIT Madras. Setup in 2008 with an objective to be a forum of creative output of the budding engineers at IIT Madras, CFI is a *one of its kind facility in the whole of India*.

This document lists some achievements of various student teams at CFI and important milestones of CFI as an organization itself.

### 2. Important milestones of CFI

1. **100+ successful projects** so far since inception.
2. One of its kind facility in all of India, involving **800-1000 IIT Madras students** annu-ally.
3. Filed **2 patents** so far, more in the pipeline.
4. More than **3 Limca and Guinness records** in the making by Envisage. ('Envisage' is a one of its kind techno-entertainment show *created* by students at CFI, staged every year at 'Shaastra', the annual technical festival of IIT Madras.)
5. More than **5 companies** working on cutting edge technology trace their roots back to CFI.
6. Successfully completed **2 Industrial Consultancy Projects**, taking up more.
7. 5 projects **aimed directly at benefiting di erently-abled and rural groups**.
8. Over **20 awards and recognitions in various national and international competitions** (see below).

### 3. Awards and Accomplishments of various student teams

1. Team Amogh

- Represented IIT Madras and India at the international stage; finished 15th among 39 globally top teams at the International RoboSub Competition conducted by AUVSI in San Diego, USA.
- Published a paper on the Autonomous Underwater Vehicle (AUV) built by the team in IEEE.
- Winner, National Students Autonomous Vehicle Competition, SAVe 2014.
- ET Now Power of Shunya Challenge: Top 24 in India.

## 2. Team IITM Robocon

- Represented IIT Madras and India at the international stage of ABU Robocon, by win-ning the national contest in 2009.
- 'Fastest Job Solving Award' at the national level in 2013, 'Best Idea Award' in 2012, Quarter finalist in 2011.
- 3 related projects in Top 40 of EFY National Design Contest in 2014.

3. **Samsung Innovation Challenge, 2014:** 2nd, 3rd and 4th places all over India bagged by students of CFI.

4. **Masila Vijay Award** bagged by the Aero Club, for innovative design and manufacturing of a quadcopter.

5. **DAAD Science Slam:** Students from CFI bagged 1st and 2nd place at the Indian national level.

6. **GR Sakura Contest, 2013:** 'Best Open Source Award' at the international level won by 4 CFI students.

7. **DRDO SRC, 2010:** 'Joint winner' of the second stage.

8. **International Aerial Robotics Contest, 2010:** 'Best Image Processing Team' at the international level.

More information can be found at [www.cfi.iitm.ac.in](http://www.cfi.iitm.ac.in).

# IIT PATNA

## Innovation @ IIT Patna

Being a part of the prestigious family of institutes of national importance, the Indian Institute of Technology Patna (IITP) realizes its leadership role in moving forward science and technology to change the Innovation Landscape of the country. IITs always have a vantage point due to their students who are the best brains of the country. IITP being a new and modern IIT boasts of young and dynamic faculty members with interests in fields such as energy, medical, manufacturing, agriculture, river, Internet of Things (IOT), and Information and Communications Technology. Accordingly, we have taken various initiatives which encourage out-of-the-box thinking and blue skies research to expand the reach of scientific knowledge for solving problems of relevance to the society.

We realize our responsibility to ensure that any idea gets proper support and framework such that it can be nurtured to traverse the path of technology and product development for commercialization. For example, *Tinkerers Club* has been formulated to serve as a platform for students to explore their ideas, experiment the feasibility of these ideas, develop prototypes and create indigenous technologies. A framework of *Incubation Centre* has been set up to carry forward these innovative technologies to the next level of commercial product development *via* the route of physical infrastructural support, technical expertise and networking support. The Incubation Centre is aptly supported by the *Entrepreneurship Club* which strives to educate our young innovators about the nuances involved in entrepreneurship and business in order to prepare them for completing the journey from the genesis of an idea to its successful business implementation. IITP has also organized Workshops and Training Programmes to familiarize the Innovators about safeguarding their technologies and IPR.

These initiatives have been instrumental in creating a culture of innovative thinking at IITP, the examples of which are substantiated through a few highlights below:

1. Gandhian Young Technological Innovation Awards 2014 awarded to IITP B.Tech student.
2. IIT Patna student's team ranked among top 3 teams of the "Google GetSocial Competition"
3. A total of eight patents have been filed by our students/faculty
4. Technologies developed:
  - a. B.Tech students have invented a smartphone for the blind people

- b. B.Tech student have invented a low cost handle operated garbage and soil collector
- c. B.Tech. students have invented manual wheat harvester
- d. Microbots in magnetic field for low-cost cell manipulation of cells
- e. Novel surfactant based boiling system for zero-gravity space application
- f. Multi-person viewable 3D display device
- g. Blind Wireless Receiver (BWR) test-bed implementation for single carrier systems

\*Please contact Dr. Rishi Raj at [rraj@iitp.ac.in](mailto:rraj@iitp.ac.in) for any further information.

## IIT ROORKEE

### **TIDES Incubation Centre, IIT Roorkee**

Technology Incubation and Entrepreneurship Development Society (TIEDS), a society registered under the Societies Registration Act 1860, has been set up to promote innovation and entrepreneurship among the Faculty, Staff, Research Scholars, and Students at IITR. To accomplish its goal, **TIEDS (Society) runs and manages a Business Incubator called Technology Innovation & Development of Entrepreneurship Support (TIDES) Centre** at IIT Roorkee to facilitate incubation of new enterprises with innovative technologies by admitting them at TIDES Centre and providing them physical, technical, financial, mentor and networking supports and services.

Main objective of the TIDES centre are to:

1. To create a conducive environment for entrepreneurship.
2. To facilitate, improve, promote, train and support creative thinking, idea generation, inventions and entrepreneurial behaviours.
3. To provide infrastructure, seed funding and mentoring to start-ups.
4. To link business ecosystem entrepreneurs for a creative, result-driven environment to activate growth and economic vitality.
5. To build ecosystem of angel and institutional investors, industry experts, mentors and other entrepreneurship focused entities for the incubators.
6. To enable start-ups for successful exit from the incubator by providing assistance in external fund raising, custom acquisition, etc.
7. To leverage R&D infrastructure to create technology and innovation based startup companies.

#### **TIDES Organisation Structure**

##### **Governing Body:**

1. Prof. P. Banerjee, Director IIT Roorkee (Chairman)
2. Dr Sanjeev Manhas, Faculty-in-charge
3. Mr. Neeraj Gupta, CEO
4. Poyini Bhatt, COO at SINE, IIT Bombay
5. B K Chaturvedi, Independent Director and Mentor, Former MD at Eicher Limited, Former President and ED at Hindustan Motors Ltd
6. Ravi Sharma, Coach and Mentor, Former CEO at Adani Power Ltd, Former CEO at Videocon Limited, Former CEO and President at Alcatel-Lucent
7. K V Jagannath, CEO and MD at Choice Solutions
8. Prof. M Parida Dean SRIC (R&D) IIT Roorkee

##### **Startup Advisory board:**

1. Pramod Saxena, Founder & Chairman at Oxigen USA Inc
2. Mohit Saxena, Co Founder & CTO at Inmobi
3. Lalit Mangal, CoFounder at Commonfloor



4. Aakash Goel, VP at Bessemer Venture Partner
5. Ashish Sinha, Founder at NextBigWhat

### Recent Start-ups recommended for incubation

<http://www.log9materials.com/incubated>

MADGUY LABS: Alok Katiyar, Sonaal Topno, Jitendra Kumar, recommended for incubation  
 LOCALINGER: Puneet Sharma, Sachin Aggarwal, recommended for incubation

Matuti3pl Purvishkumar Patel, Mikul Patel, recommended for incubation

The work is underway for incubating few more start-ups in coming six months. The TIDES centre provides an office space, infrastructure facilities, seed-fund, mentorship, networking, IPR/legal advice, technical support/access to labs & interns to incubated companies. The start-up company is incubated for a period of up to two years, and review linked financial support of up to 25 Lakh is provided.

Some of **recent alumni start-ups** are:

No.	Name	Company	Branch	Batch
1	Ankush Sharma	Sattviko		2009
2	Rahul Gupta	Rays Power Experts	Civil	2010
3	Digendra Singh Rathor	<b>SolarWaale</b>	Mech	2013
4	Sanjay Bhasin	<b>SunTerrace</b>	EC	1986
5	Pramod Saxena	<b>Oxigen</b>	Chem	1975
6	Saurav Bhaik	tagbin / Tagplug	Biotech	2013
7	Amanjot Malhotra	Partiko		2013
8	Sudhanshu Jain	<u>weddingcentral.</u>	electrical	2006
9	Ishaan Bholra	Zimply	Arch	2014
10	Gagan Arora	Foodpanda /Printvenue	Chemical	2006
11	Saurabh Bansal	Unexo Pharma	Biotech	2010
12	Puneet Jaggi	Gensol & Ezysolare	Chemical	2010
13	Anurag Bajpai	GreenTree & Cypress	Arch	2006
14	Saurabh Awasthi	GoYayy	Meta	2008
15	Deepak Jain	<b>Baggout</b>		
16	Anish Kumar	Dnova Infracon	Arch	2008
17	Puneet Sharma	Localinger	Meta	2015
18	Lalit Mangal/Sumit Jain	<b>Commonfloor</b>		2005
19	Pankaj Sharma	Apprick	E&C	2006

20	Raghu Raaj	Neuron Gym	Archi	2013
21	Mohit Saxena	<b>InMobi</b>		2000
22	Pulkit	<b>Vedaantu</b>		
23	Sachin Aggarwal	Localinger	CS	20 15
24		Razorpay		20 13
25	Sachin	HckerEarth		
26	Udit Kothari	Vastutects	Arch	20 14
27	Abhishek Sharma	aadharmedicare		20 09
28	Kartik Sapra	amydus	Arch	20 12
29	Mani bansal	Future Edge	Mech	20 09
30	Karan Kukreja	White Walls Media	Mech	20 09
31	Pradeep Sharma	OrderChhotu/Ins tiboard	ECE	20 12
32	Narayan Singh Rao	The Indian Iris	ECE	20 05
33	Akshay Singhal	<b>Log 9 Materials</b>	Meta	20 15



Signing of incubation agreement with Log9 Materials pvt. Ltd.

To foster entrepreneurship and innovation, TIDES centre works with various other organisations in IIT complex such as: IIT Roorkee Alumni Association, IITR

Entrepreneurship Development Cell (student wing), IIT Roorkee Heritage Foundation, PAN-IIT Investors, E-Cells of other IIT's, Science and Technology Entrepreneur Park (STEP) and with students of Saharanpur campus. Over the years, IIT Roorkee has evolved different programs and organisations, which have facilitated growth of entrepreneurship environment in the institute. These organisations work closely with each other on need basis to foster entrepreneurship and innovation.

## **Programs/organisations supporting Innovation and Entrepreneurship at IIT Roorkee are:**

### **1. IIT Roorkee Alumni Association**

**Alumni Association** has current active members of more than 5000. The alumni have donated funds in excess of half a million US dollars. **The office of the Dean Alumni Affairs and International Relations** has been given mandate to foster the new ideas and innovations in science and technology and continue to be a source of pride to all students, faculty and Alumni. Our mission is to create an environment for the growth of our students in association with our Alumni and International partners for generating intellectual capability, innovation and entrepreneurial capability, which will contribute to the growth of Science and Technology in partnership with industry. For further information please see:

<http://daair.iitr.ac.in/>

<http://iitraa.in/>

<https://iitraa.almaconnect.com/>

### **2. IIT Roorkee Heritage Foundation**

The foundation provides opportunities to Alumni for professional enhancement. For young IIT-R graduates, they provide variety of support in their early years of career development; help develop their skills and self-confidence through interaction with their peers; **and promote their chances of success as entrepreneur with guidance available within the pool of IIT-R graduates**. For further details see: <http://www.iitr-heritagefund.org/Home>

### **3. Technology Incubation and Entrepreneurship Development Society (TIEDS)**

<http://edciitr.com/>

[http://www.iitr.ac.in/campus\\_life/pages/Societies+EDC.html](http://www.iitr.ac.in/campus_life/pages/Societies+EDC.html)

#### **Recent Start-ups recommended for incubation**

<http://www.log9materials.com/incubated>

MADGUY LABS: Alok Katiyar, Sonaal Topno, Jitendra Kumar, recommended for incubation

LOCALINGER: Puneet Sharma, Sachin Aggarwal, recommended for incubation

Matuti3pl Purvishkumar Patel, Mikul Patel, recommended for incubation

### **4. The Science and Technology Entrepreneur Park (STEP)**



STEP was setup at IIT Roorkee in 1987 with financial support from DST New Delhi. STEP IIT Roorkee has been promoting entrepreneurship by providing a conducive environment to the prospective entrepreneurs. STEP Roorkee has helped in development of entrepreneurs and carried close to 100 sponsored research and consultancy project in Institute-Industry interaction mode. Some of the major list projects done by STEP are as show below:

<p><b>Alternate Hydro Energy</b></p> <ul style="list-style-type: none"> <li>- Environmental &amp; Energy Audit</li> <li>- Preparation of DPR, Technical Specification and Engineering Designs for Arunachal Pradesh, U.P., Bihar, NTPC, Rajasthan, J&amp;K, Tea Estates, Small Hydro Power Projects.</li> </ul> <p><b>Chemical Engineering</b></p> <ul style="list-style-type: none"> <li>- Environment Impact Assessment of Bongalgaon Refinery &amp; Petrochemicals Ltd., Bongaigaon</li> <li>- Intensive Air Quality Monitoring of Doon Valley</li> <li>- Industrial Multi Tubular Vaporizer</li> <li>- Monitoring of Stack Gases, Process Stack and Ambient Air Quality</li> </ul> <p><b>Civil Engineering</b></p> <ul style="list-style-type: none"> <li>- Carrying Capacity based Development Planning for Doon Valley</li> <li>- Design of Foundation and Soil Investigation Polypropylene Recovery Unit</li> <li>- Dynamic Analysis of Koyna Unit</li> <li>- Environmental Audit for Ganga &amp; Yamuna Action Plans</li> <li>- Foundation Designs and Soil Testing of Overhead Tanks</li> <li>- Foundations for Structure Cement Plant</li> <li>- Investigation for Large Deflection in Bridges</li> <li>- National Highway Pavement Management Studies</li> <li>- Nature of Soils and Foundation Design for Delhi Water Supply</li> <li>- Soil Investigations and Foundations at Naina Devi Cable Lift Site</li> <li>- Stability Analysis and Remedial Measures for a Ropeway Foundation, Dehradun</li> <li>- Wind Tunnel Study of Multiflue Research Chimney</li> <li>- Transportation Study, Analysis and Modelling</li> <li>- Turbogenerator Foundation</li> <li>- Temperature and D.O. Modelling for Tehri and Jamrani Reservoirs</li> </ul> <p><b>Earthquake Engineering</b></p> <ul style="list-style-type: none"> <li>- Design Earthquake Parameters for Civil Engineering Structure</li> <li>- Seismic Instrumentation</li> <li>- Instrumentation at Kaiga Atomic Power Plant</li> <li>- Analysis of Earthquake Parameters</li> </ul> <p><b>Earth Sciences</b></p> <ul style="list-style-type: none"> <li>- Environmental Assessment of Ash ponds for Super Thermal Power Stations</li> <li>- Geochemical Analysis</li> <li>- Ground Water Surveys and Analysis</li> <li>- Terrain Evaluation Geological &amp; Geophysical Site Investigations</li> </ul>	<p><b>Electrical Engineering</b></p> <ul style="list-style-type: none"> <li>- Calibration of High Voltage Testing Equipment</li> <li>- Calibration of High Voltage Equipment</li> <li>- Development of Power Amplifier of 32 KVA Rating (MOSFET/IGBT Based) in Modular Construction</li> <li>- Development of Microprocessor Control for A.C. Coaches</li> <li>- Investigation of Lightning and Switching Phenomena</li> <li>- Type Tests and Calibration of Energy Meters, Watthour Meters and Multipart Tariff Meters</li> <li>- Design &amp; Development of Impulse Generator</li> </ul> <p><b>Electronics &amp; Computer Engineering</b></p> <ul style="list-style-type: none"> <li>- Design Software for the Analysis of Wave Guide Functions</li> <li>- Communication for Gandak Canals.</li> <li>- Development of Tin Oxide based gas sensors.</li> </ul> <p><b>Hydrology</b></p> <ul style="list-style-type: none"> <li>- Mathematical Modelling of Aquifer Response in Selected Areas</li> </ul> <p><b>Human Resource Development</b></p> <ul style="list-style-type: none"> <li>- Computer Software &amp; Hardware Training Programme</li> <li>- Courses for serving Engineers, Technologists, Scientists &amp; Technicians</li> <li>- Preparation of Educational Video Films</li> </ul> <p><b>Instrumentation</b></p> <ul style="list-style-type: none"> <li>- Development of Electronic Instrumentation</li> <li>- Analytical Testing of Materials</li> <li>- Repair of Sophisticated Instruments and Equipments</li> </ul> <p><b>Mechanical Engineering</b></p> <ul style="list-style-type: none"> <li>- Calibration of Martin's Heat Distortion Testing Machine</li> <li>- Calibration of Impact Testing Machine</li> <li>- Calibration of Universal testing Machine</li> <li>- Improvement &amp; Development of Design Technology to Produce Vibration Shaker having Peak Force Sine Vector upto + 4000 kgf</li> <li>- Weldability of Materials</li> </ul> <p><b>Metallurgical Engineering</b></p> <ul style="list-style-type: none"> <li>- Metallurgical Improvement of Electro Dynamic Vibration Shakers</li> <li>- Testing of Materials</li> <li>- Suitability of G.I. Pipes and Fittings</li> <li>- Suitability of the Material for Safe Use</li> <li>- Development of Alloys</li> </ul> <p><b>Water Resources Development</b></p> <ul style="list-style-type: none"> <li>- Ganga Fair Way Development</li> <li>- Planning and Design of Hydro-Electric Stations</li> </ul>
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## 5. The Entrepreneurship Development Cell

[http://www.iitr.ac.in/campus\\_life/pages/Groups\\_and\\_Societies+Entrepreneurship\\_Development\\_Cell.html](http://www.iitr.ac.in/campus_life/pages/Groups_and_Societies+Entrepreneurship_Development_Cell.html)

The Entrepreneurship Development Cell of IIT Roorkee, has been established with the objective of creating, fostering and promoting the spirit of entrepreneurship among the youth of the nation. EDC aims at developing the spirit of entrepreneurship among the students of IIT Roorkee. The cell undertakes various initiatives for the same. Some of them are Jugaad- the intra IIT Roorkee B-plan contest, Purna Yatra, Start-up internship program, TEDx, Business Baazigar, Guest lectures, workshops and other games and competitions. **The EDC work closely with TIDES incubator setup at IIT Roorkee for aiding students, who have a marketable idea or project and aspire to start their own ventures.**

## **6. Intellectual Property Right Cell**

<http://www.iitr.ac.in/ipr/about.html>

<http://www.iitr.ac.in/ipr/patents.html>

The IPR Cell at IIT Roorkee promotes academic freedom and safeguard the interests of inventor in creation and commercialization of intellectual property with legal support wherever necessary. It works towards creating an environment for acquiring new knowledge through innovation, develop an attitude of prudent IP management practices and promote an IPR culture compatible with the educational mission of the institute. IPR cell also has MHRD IPR Chair.

## **7. Cognizance IIT Roorkee**

<http://cognizance.org.in/>

Cognizance, the annual technical festival of IIT Roorkee, is an agglomeration of over 200 events, which encompass every wavelength of an entire technical spectrum. **Commenced in 2003, cognizance has emerged as the one of the largest festival of its kind in the Indian subcontinent and many of its core events witness a participation numbering in thousands.**

## **New TIDES Centre:**

The centre has funding of six cores partly from IIT Roorkee internal corpus funds as well as govt support. A plan to create a full-fledged TIDES Incubation Centre in Old Library Building of the campus is under progress. This 10,000 sq. ft. floor space centre will have latest infrastructure and facilities to house 8-10 companies, common meeting rooms (3-5), pantry facilities etc. In addition, to enable easy transition to market and their launch, a provision is also being created to shift the incubated start-ups at Roorkee campus to IIT Roorkee greater Noida centre in Knowledge Park, when they are close to maturity.

## **INDIAN MARITIME UNIVERSITY**

The Indian Maritime University came into being through an Act of Parliament (Act 22) on 14th November 2008 as a Central University and is poised to play a key role in the development of trained human resource for the maritime sector.

We are attending for the first time.



# JAMIA MILLIA ISLAMIA



## Centre for Innovation and Entrepreneurship (CIE) Jamia Millia Islamia New Delhi

➤ **INNOVATION CLUBS:** The following innovation clubs are working under CIE currently, where students are developing innovative projects and prototypes;

- Embedded Systems & Robotics Club
- Animation & Games Design Club
- Programming Club
- Biotech Club
- Start-Up Club

**Some Projects under the innovation clubs are as follows;**

### **INNOKART +**

The innovative mind behind this project identified the fact that the food sold on streets is cooked, stored and served in an unhygienic way and hence leads to health hazards. The students thus came up with a cart (thela) that has an affordable price and proper storage, shelter and hygiene. The cart promises to transform street food selling in India for the better, by providing means to the street vendors to ensure that the food is stored properly and is fit enough for human consumption- all this at a minimum price.

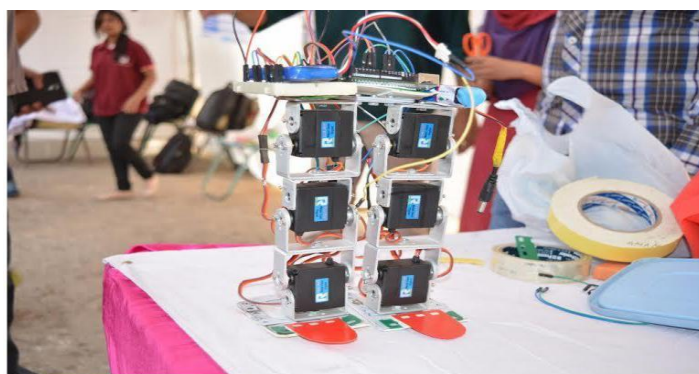
The team of “Innokart” consists of Huma Parvez, Ahmed Faraz Khan and Faiza Jamal who have also chalked out the financial aspects of the innovation. They aim to provide finance for such a cart firstly by procuring funds from companies as part of their CSR, and secondly in return of the advertisements that can be done on the cart. The cart is still being improvised to make it run on solar energy.





## HUMANOID

This project comprises of a robot that behaves like human beings. It comes with the ability of sensing images. The team consisting of Husain Quaisar, Abhishek Batra, Arsalan Javed Khan , Aman Siddiqui and Mohd. Huzaifa are behind its creation. The team is currently still working on the project to make Humanoid “more human” by adding more features. Presently, the robot can walk and kick.





➤ **GRASSROOTS INNOVATION EXHIBITION**

Centre for Innovation and Entrepreneurship organised an Exhibition of ‘**Grassroots Innovations**’ in Collaboration with National Innovation Foundation (NIF) on 29<sup>th</sup> and 30<sup>th</sup> October as our university has celebrated “95<sup>th</sup> FOUNDATION CELEBRATION DAY “Innovators from J&K, Maharashtra and NCR displayed their innovations. On 30<sup>th</sup> Oct. our honourable Vice-Chancellor Prof, Talat Ahmed inaugurated the exhibition. He interacts with all the innovators and appreciates their innovations. The following innovations are called up from different regions of India;

<i>List of Innovations</i>		
1	Walnut Cracker	Anantnag, J & K
2	Multipurpose Carpentry Tool	Anantnag, J & K
3	Modified Spade	Anantnag, J & K
4	Pole Pro	Anantnag, J & K
5	Adjustable Walker	Patna, Bihar
6	Horse Shaver	Meerut, U.P.
7	Milking Machine	Karnataka
8	Portable Energy Efficient Wood Stove	Calicut, Kerala
9	Multi Purpose Processing Machine	Haryana
10	Seed Cum Fertilizer Dibbler	Amreli, Gujarat
11	Solar Mosquito Destroyer	Kottayam, Kerala
12	Tree Climber	Coimbatore, TN
13	Sugarcane Bud Chipper	Narsinghpur M.P.
14	Chaff Cutter	Muradnagar, UP





## 8. Incubation & Entrepreneurship Development Division

- Scouting of ideas of social interest and public benefit
- Providing technical support, guidance and supervision
- Specialized laboratories for incubating ideas
- Develop prototype / working models

### Activities:

**1.2 INCUBATION:** CIE is incubating some student start-ups as follows;

**CRAZY BRUNO** - Crazy Bruno, a start up to cater to the hunger pranks of nocturnal youngsters, is being incubated by CIE. This company is growing and has two more sit down restaurants in Delhi.

### **SIMY'S HANDMADE SHOP**

**Simy's Handmade Shop** is an online Gift's Boutique that was established by Simeen Anjum. It is an online business where people can buy and design and create personalised gifts. Room makeovers are also done on order.



## **Additional Initiatives**

### **1. Collaboration with National Small Industries Corporation (NSIC):**

The Centre for Innovation and Entrepreneurship (CIE) has tied up with the Design Innovation Centre of University of Delhi and is also planning to setup a Livelihood Business Incubation (LBI) Centre on campus with the help of The National Small Industries Corporation Ltd. (NSIC) under the ASPIRE scheme under the Ministry of Small and Medium Enterprises (MSME).

The University undertook a study to assess the awareness and inclination among students to consider entrepreneurship as a career option. The response was very encouraging from a cross spectrum of students, across faculties.

The following programmes have been finalized for the LBI Project under the ASPIRE scheme;

Bread, Biscuit & Bakery Unit, Beautician Training, Chocolate Making Machine, Computer Hardware & Networking, Drinking Water Purification and PET Bottle Making plant, Gems & Jewellery Making, Ice-Cream Making & Ice-Cream Cone / Wafer Making Machine, Sanitary Napkin Making Machine and Vending Machine, Spice Grinding & Packaging Machine, Tailoring, Fashion Designing and Machine Embroidery, Tomato Ketchup / Tomato Paste & Fruit Juice Making

**2. Tie-up with Delhi University's Design Innovation Centre (DIC):** CIE is a spoke of the Design Innovation Centre of the University of Delhi under Ministry of Human resource Development, GOI. The mandate of the spoke is to encourage innovation, patenting, internship, incubation and to float elective courses under the Choice Based Credit System (CBCS) recognized by the university curriculum starting from January 2016. An Innovative product design course is being introduced this year for undergraduate students.

**3. Collaboration with National Entrepreneurship Network (NEN):** CIE is in talks with NEN for signing up a Memorandum of Understanding (MoU)

**Some Innovative Projects from the Jamia Millia Islamia are as follows;**

**A. Prof. S. S. Islam - Honorary Director, Centre for Nanoscience and Nanotechnology, Prabhash Mishra, K. Sengupta**

**Development of highly sensitive, and low cost Ammonia / Nitrogen Dioxide gas Sensor by using indigenously developed Carbon nanotube/ Alumina**



## Nanocomposite Applicable for detection of Environmental pollution in ppm level

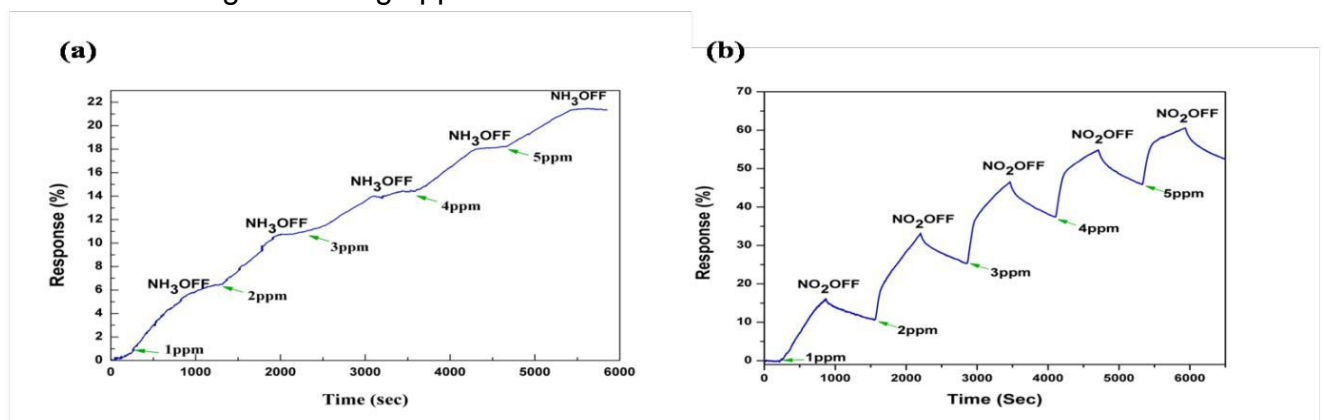
**1. Brief Introduction:** In this invention, the authors report an age old 'gel-casting technique' to prepare extremely sensitive CNTs sensing film using sol-gel science and technology. This has resulted in enormous increase in sensitivity towards NH<sub>3</sub> and NO<sub>2</sub>; and the values achieved are 15% at 1ppm, 37% at 5ppm for NH<sub>3</sub>, and 32% at 1ppm, 58% at 5ppm for NO<sub>2</sub> respectively. The method is simple and reliable, easy to fabricate using extremely low cost machines, and nobody has reported this method till date to improve the surface to volume ratio of the sensing film in such a novice way.

### 2. Drawbacks in existing toxic gas sensor:

- It shows poor sensitivity at room temperature. Normal working temperature is in the range of 200°C to 500°C.
- Existing toxic gas sensor shows limited maximum sensitivity
- The main drawback of using oxide-based gas sensors is that their use in gas sensing is governed by the microfabrication techniques used to build the sensor. This puts a limit on the size and geometry of the sensor.
- Fabrication cost is very high.
- Operating power for existing sensor is also very high.
- Existing toxic gas sensors shows very poor selectivity.
- Unspecific gas sensing mechanism, more or less many types of reducing gases are sensed.
- Silicon-based conventional technology that involves rigorous fabrication steps using top-down approach. Also, it has already been speculated that the scaling of silicon-based devices will soon reach their limit; therefore, there is an urgent need to explore novel materials.
- Response time is also very poor.

### 3. Report on functional efficiency

Dynamic response curve as shown in fig. is being monitored over last several months and it is observed that (i) response is noise free, (ii) sensitivity and resolution is extremely good, and notably (iii) there is negligible drift in its response. No base line correction was required. These positive indications show the strong viability of using this CNTs- ceramic composite film as a sensing layer for toxic gas sensing applications.



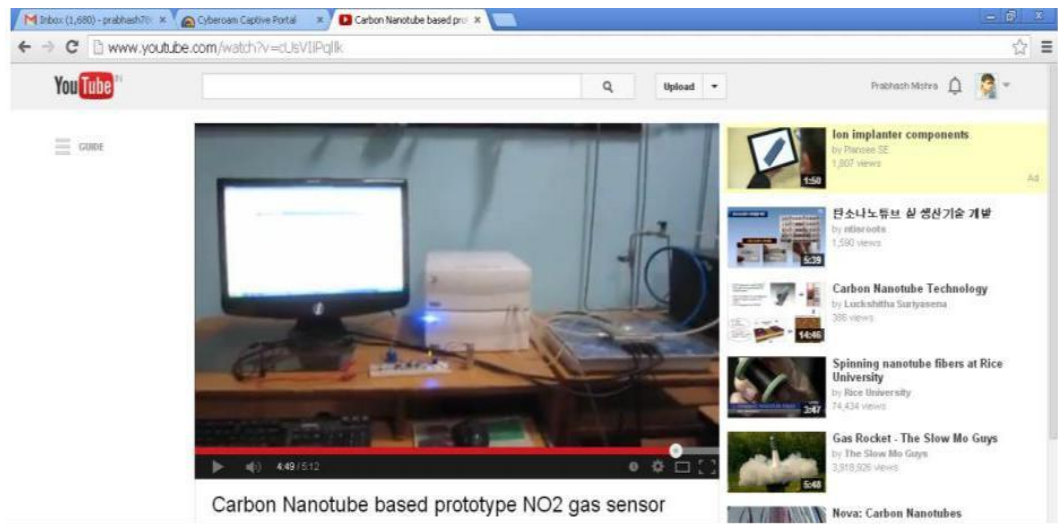
**FIG: DYNAMIC RESPONSE OF SWCNTS/AL2O3NANOCOMPOSITE BASED (A) NH3GAS**

**SENSOR AND (B) NO2 GAS SENSOR AT 1 TO 5PPM CONCENTRATION.**

**4. Prototype NO2Gas sensor developed uploaded to You Tube Link:**

**Prototype Sensor : Developed (YouTube link**

**<http://youtu.be/cUsVliPqIk><http://www.youtube.com/watch?v=cUsVliPqIk&feature=youtu.be>**



Specifications	Electrochemical sensor (MiIL-RAM Technology, Inc., USA)	CNT Based resistive sensor (NSRL, JMI)
Detection Range	0-200 PPM $\text{NH}_3$ Gas	0.1 -100 PPM $\text{NH}_3$ Gas
Resolution	1 PPM $\text{NH}_3$	0.1 PPM
Response Time	< 60 sec to 90 % of final reading	< 20 minutes
Recovery Time	< 2 min. to 90% recovery	15 minutes
Temperature Range	-40 deg. C to +50 deg. C	+ 30 deg. C
Humidity Range	10-95% RH, non-condensing, Continuous	40% RH - 80% RH
Zero Drift	< 5 PPM	Not Yet observed for long period
Power Requirement	10-30V DC; 0.48W max. @24VDC	12V DC
Long life	>2 years Typical under normal operating condition	Not yet seen

## B. Prof. Biswajit Das - Innovative Research Prototype at CCMG,JMI

The Centre for Culture, Media & Governance, Jamia Millia Islamia undertook two innovative research projects. The prototypes have been developed for further engagement:

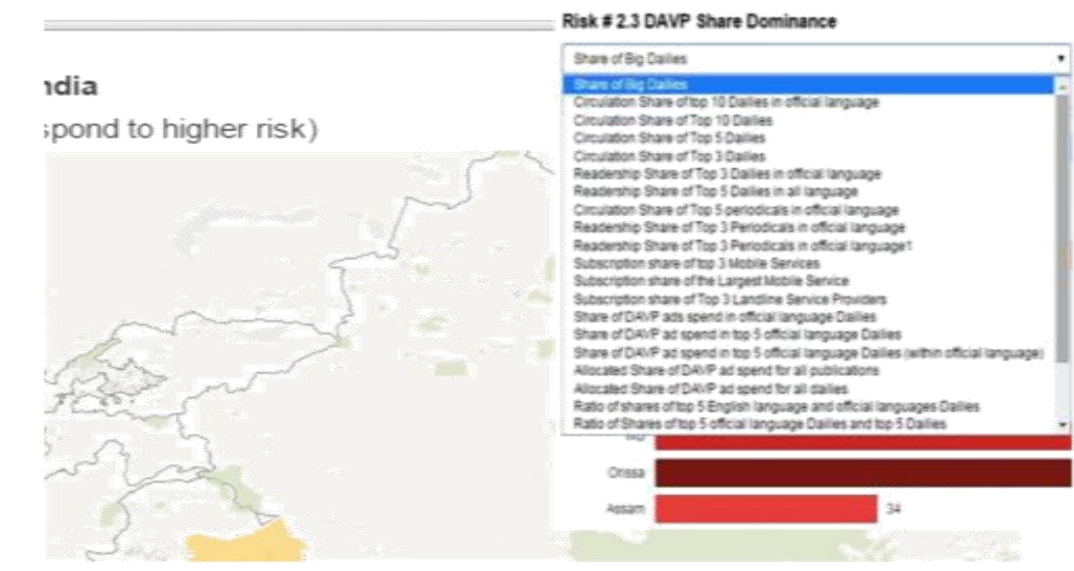
### Research Prototype on Media diversity Index

Mapping, measuring and scoping media diversity in a country like India, with its varied states and union territories, official and non-official language(s) in respective states, a diverse array of religious, ethnic, geographical and minority populations, has to be both complex and nuanced. Therefore, any Media Diversity Index, as well as the various domains, risks, indicators and measurements, have to be designed specifically for the unique Indian context.. In addition, one has to give different priorities, relevance and weightages to these domains, risks and indicators to capture the truths of Indian media landscape.

The centre developed a distinct conceptual framework to measure news media diversity in India. This entails:-

- Evolving new domains & risks that may be more relevant for the Indian news media.
- Tweaking & molding sub-domains and indicators in a bid to correctly design an Indian Diversity Index.
- Incorporating how the country's policy makers, regulators, judiciary and other experts have seen diversity in news media through different prisms over the past 60 years.

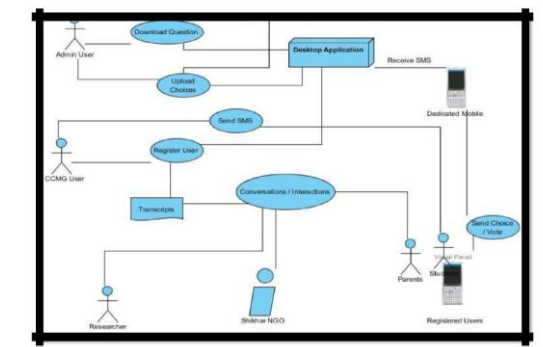
### Research Prototype – Media Diversity Index



## Research Prototype on Mobile media and Local Governance

This project suggests a model of governance that involves direct involvement of local communities. From a practical standpoint, it demonstrates how interaction with different communities may shape technology design during the course of IT implementation. The model itself is essentially an "informational model" - a set of diagrams that describe the flow of information, the behaviour and the interactions between the various entities that form a part of the IT system. In order to identify the specifics of the research, a preliminary study was conducted with the community around the Jamia Nagar area. The study was conducted with the help of an NGO "Shikhar" - organization for social development. As an outcome of the study, the area of **cleanliness** and **garbage collection** was identified as being of primary concern to the residents. A more focused study around the issue of **garbage** collection was conducted. Apart from one-on-one interactions, this also involved the use of SMS over mobile phones to respond to a set of poll questions. Responses received over the mobile were also updated on a website along with the mobile number of the respondent to highlight the nature of the issues the residents were facing.

### Research Prototype – Mobile Media & Local Governance



# JAWAHARLAL NEHRU UNIVERSITY

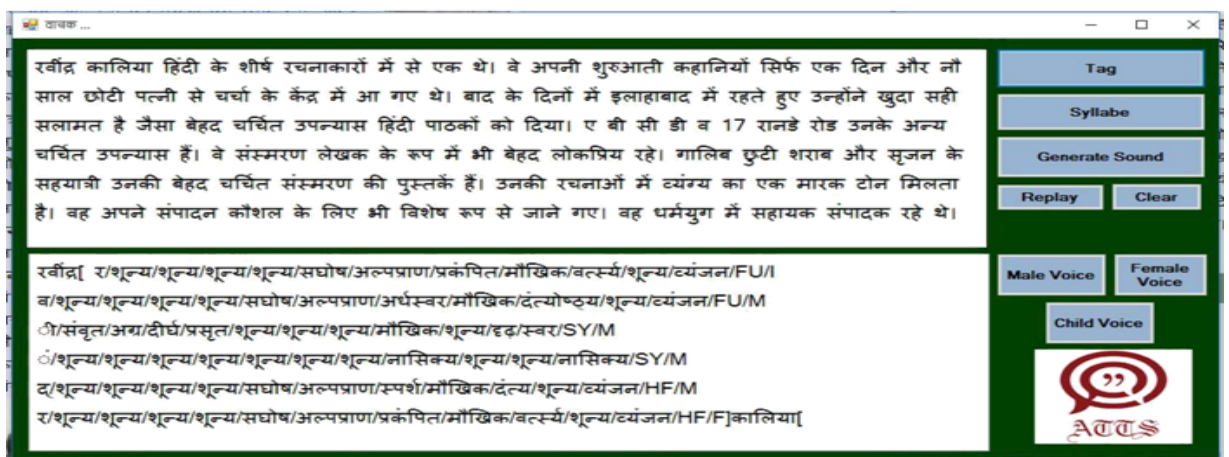
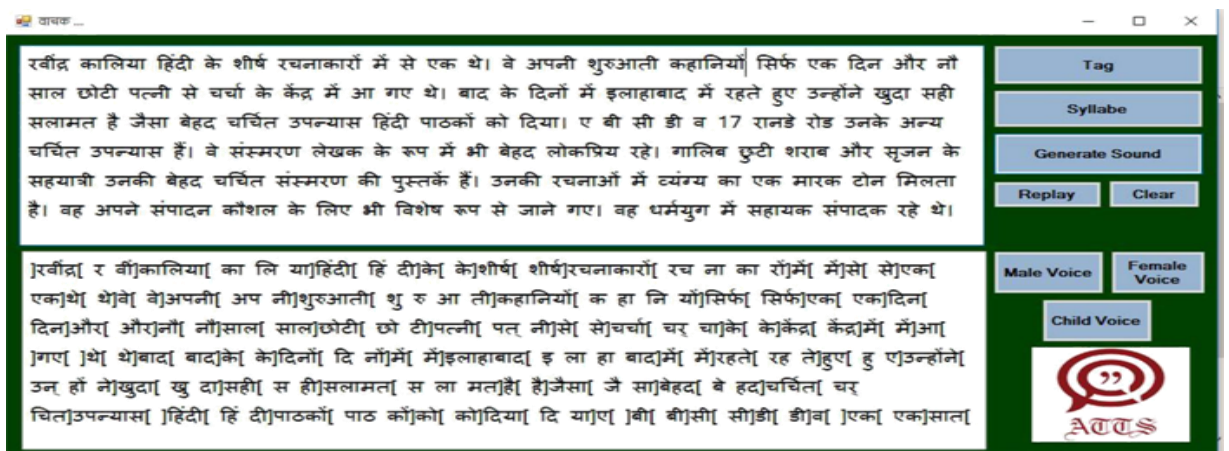
## INNOVATION /DEVELOPMENT OF INSTRUMENTS/ DEVICES

1. Designed and fabricated a remotely operated 1 Curie  $^{241}\text{Am}$  source handling and sample irradiating apparatus for Photon induced X-ray emission studies.
2. Designed and fabricated an angular distribution and polarisation measurement equipment for the study of anisotropy of photon induced x-rays.
3. Designed and fabricated spring loaded round tip microprobes for electronic characterisation of electronic semiconductor materials at cryogenic and high temperatures. The new design offers several advantages over the pressure contact design of probes used in many equipment. The new design used in Biorad's DL4600 DLTS equipment for characterisation of semiconductor materials.
4. Electronic process control circuit for the controlled anodic oxidation of semiconductor materials like MCT, CdTe, GaAs etc. for their surface passivation has been designed.
5. Designed and developed the prototype of a device to control the pollution caused by auto exhaust emission from automobiles. The device can be used in all kinds of vehicles in place of the muffler. The device has been tested to work satisfactorily and is found to reduce the pollutants up to 80-85%.
6. Designed and developed a commercial water sampler for collecting water samples for the pollution studies. The sampler can collect adjustable amount of water sample from adjustable pre-set depths without intermixing of waters from different depths.
7. Designed and fabricated a dedicated x-ray detection window cum collimator with changeable thin foil window for online experiments at Nuclear Science Centre Pelletron, New Delhi.
8. Designed and developed low cost ,single wire gas flow position sensitive detector for X-rays and charged particles for atomic physics experiments. An import substitute item.

9. A low cost, highly efficient and easy to assemble Solar Cooker for rural applications has been developed in 1982.
10. Designed low cost Solar Water Heater from refuse material in 1980
11. Fabricated six inches Newtonian reflecting telescope in 1979.
12. A multi-channel Omni-directional VHF antenna for TV reception was designed in 1979.
13. A working model of Wilson cloud chamber was fabricated in 1977.
14. A working model of an electromechanical Robot was fabricated as a college student in 1973.



# MAHATMA GANDHI ANTARRASTRIYA HINDI VISHWAVIDYALAYA



## **Team Member:**

### **Concept & Developed By**

Anjani Kumar Ray

System Analyst

Mahatma Gandhi Antarrashtriya Hindi University, Wardha (Maharashtra)

### **Language Architect**

Sarav Kumar

Student

Ph.D. (Computational Linguistic)

Amit Kumar Jha

Student

Master of Informatics & Language Engineering

## **Devnagri to IPA transcription tool**

### **Introduction**

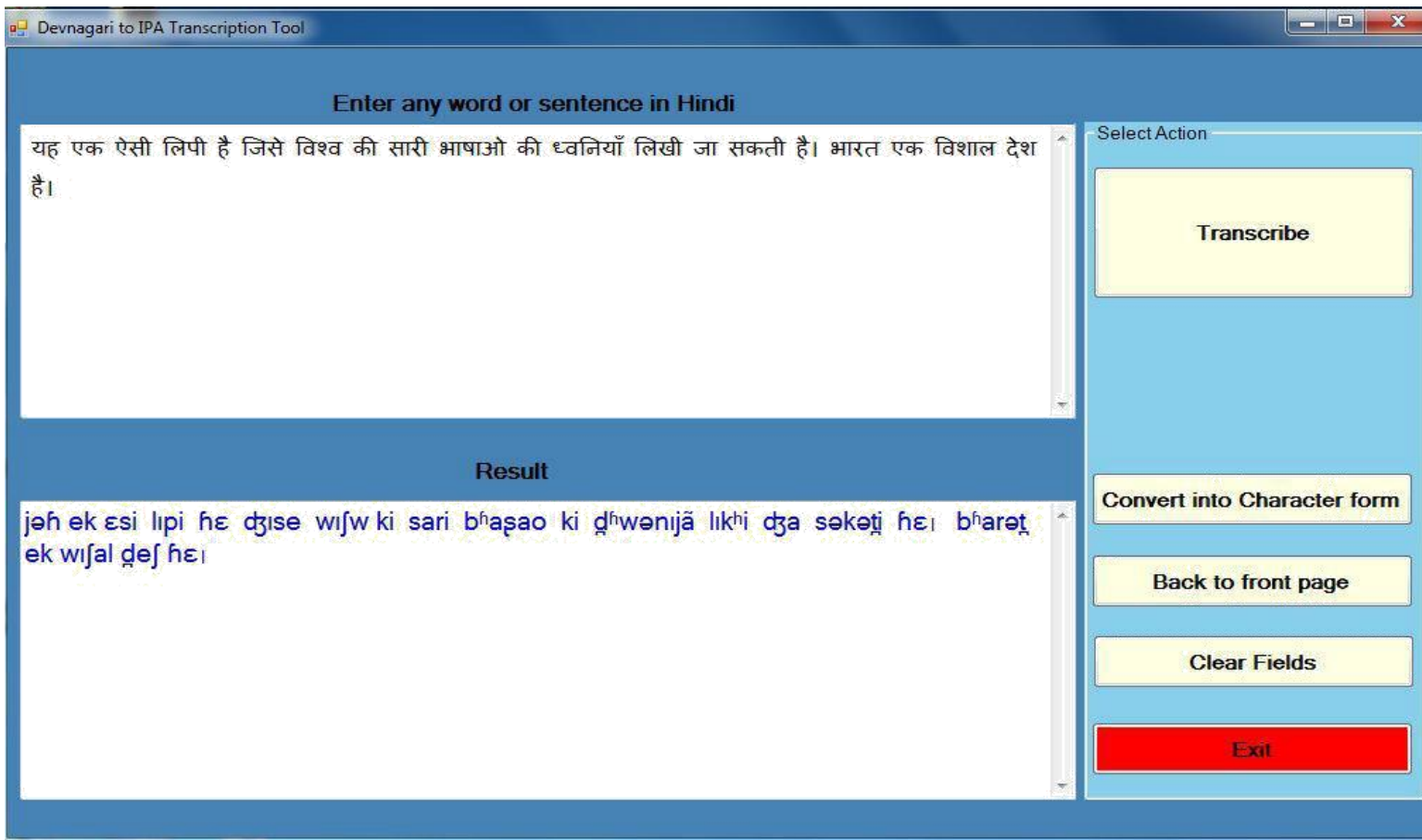
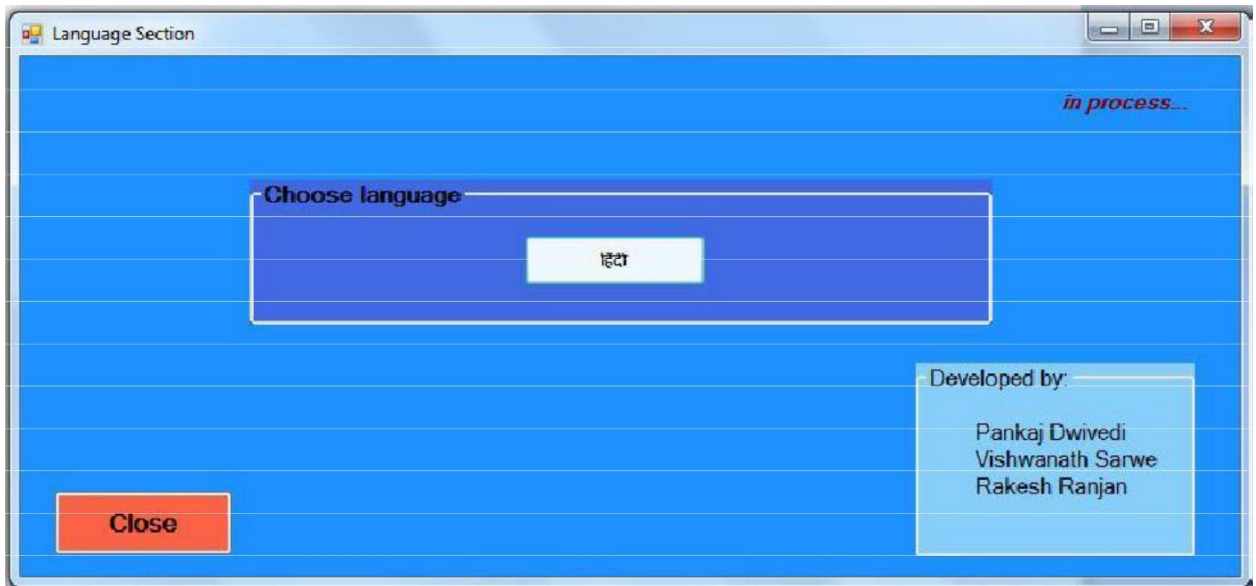
Devnagri to IPA transcription tool is developed at Department of Computational Linguistics in Mahatma Gandhi Antarrashtriya Hindi Vishwavidyalaya, Wardha jointly by Mr. Vishwanath Sarwe (Mphil student) and Mr. Rakesh Kumar Ranjan (Mphil student) under the supervision of Mr. Pankaj Dwivedi (Assistant Professor). This tool effectively and accurately converts Devnagri scripts into International Phonetic Alphabet in a single click. With the help of IPA characters, all languages of the world can be phonemically and phonetically described. Apart from doing IPA transcription, this tool sequentially counts no. of vowel and consonant sounds of the given input. Therefore, this tool is very helpful for the linguists and computer scientists alike as they all have to go through tedious process of phonetic and phonemic transcription. Currently, scope of this tool is limited to Hindi language only. However, its application can be extended to any language written in Devnagri script such as Marathi, Nepali, Pali, Konkani, Bodo, Sindhi and Maithili.

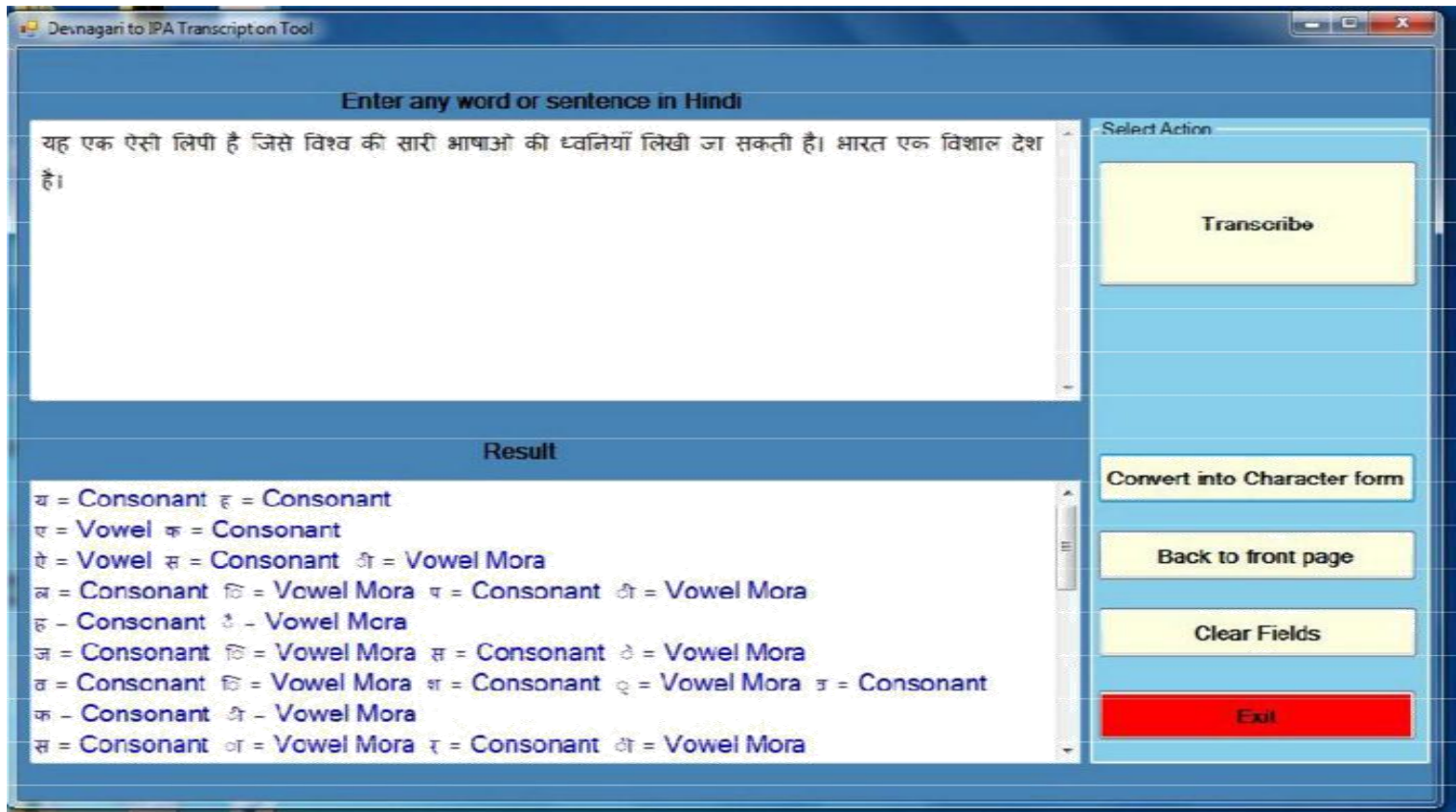
### **Technical Details:**

Compatible OS:- Windows 2007 and higher versions;

Input: Unicode (Devnagri Script)

Output: International Phonetic Alphabet (IPA)





Team Member:

Concept by

Pankaj Dwivedi  
Assistant Professor  
Dept. of Computational Linguistic

Developed by

Rakesh Kumar Ranjan  
Student  
M. Phil. (Computational Linguistic)

Vishwanath Sarwe  
Student  
M. Phil. (Computational Linguistic)

# MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

## Achievements

MNIT innovation club is a place for likeminded people who wish to work in tandem with each other and bring about a change in the society by innovating and making life simpler. In this students are encouraged to start new Ventures and become job creators. Presently we have 6 running startups in college namely, Rent me book, Y junk, Just Byte Labs, Picturewale, Trace ink etc and many more in the idea stage. We have also established a tie-up with Headstart where various startups are invited every alternate Saturday to share their stories and encourage students in undertaking their own ventures and making the world a better place to live in. MNIT is also starting an incubation center in the coming 3-4 months which would provide the young minds proper infrastructure and proper mentorship. It also helps and guides students during the valuable projects that they undertake.

# **MAULANA AZAD NATIONAL URDU UNIVERSITY (HYDERABAD, ANDHRA PRADESH)**

## **Innovation club**

### **Maulana Azad National Urdu University (MANUU), Hyderabad**

Maulana Azad National Urdu University is a unique institution in offering programs of higher education in Urdu medium. The University students of MANUU are largely first generation learners belong to economically deprived sections of the society from across the states. The university is although eighteen years old whereas the campus mode education has been started merely 12 years back with programmes in languages, few disciplines of social sciences, management and teacher-education. Here, it is important to note that, programmes in basic sciences and information technology have been initiated only couple of years back. These new departments are gradually being developed into research based teaching departments with adequate research infrastructural facilities. In addition, the most important feature of MANUU is its wide outreach through its offsite campuses spread across every region of the country.

The innovative practices are introduced at various levels such as; faculty/department levels as well as few activities exclusively at university level. At university level; the most important innovative measure planned to implement from the current academic year is to offer “A Bridge Course of One Year duration for Student of recognized Madararasas” in order to orient and integrate them into mainstream undergraduate education in different areas of studies. This initiative is unique and ambitious to introduce and integrate the excluded section Madrassa students into modern education system through their choice of subjects leading to successful careers in various fields. The university shall provide adequate counselling and guidance at the beginning of the bridge course for selecting their choice of subjects through a suitable screening test.

The mandate of the university is to offer higher education through Urdu medium which itself is unique and innovative in the country. The university in its wisdom to make the students employable in present market scenario, is providing special inputs on soft skills, communication skills, Information and Communication technology skills and more importantly focus is given on English for functional and professional purposes for all programmes.

Some of the innovative activities being practiced at university levels are described below::



- Nukkad Nataks with themes and message for the conservation eco system and environment along with focus on cleanliness have also been organized time to time to educate the campus residents and Students. Some of the themes are also on eradicating social evils and promoting moral values.
- The campus is rich in natural unique rock formations, the university in collaboration with NGO the “Save Rock Society” has earmarked two rocks on the campus as Heritage Rocks.
- The authorities of the university has entered into MoU with several private development oriented organizations and industries for the training and internship to enhance the employability of the students.
- The H.K Sherwani Center for Deccan Studies has signed a MoU with Association for the Study of Persianate Societies (ASPS) for a Research cum Travel grant sponsorship of research fellows.
- Students from the Department of Management and Commerce have been going training in skill development in retail management through the STAR scheme of National Skill Development Corporation (NSDC).
- The university initiated e-governance, to begin with most of the inter-institutional correspondence is made through e-mails. This initiative has reduced consumption of stationaries and manpower; enhanced the speed of correspondence. All payrolls/ pay receipts are through email only. Technology enabled admission process has been initiated.
- School of Education and Training of MANUU has organized qualitative orientation for the new curriculum of teacher education for the three South Indian states and further trained their faculty members in order to incorporate new curriculum in their respective institutions which may be considered as a major reform in this sector.

Besides above activities,

- The Innovation Club’s vision is to network people, to document innovative practices, new ideas, adopt best practices of other institutions, and generate resources to promote the inquisition for innovation among students/faculty.
- The club also organized occasional lecture series by eminent scientist such as; Prof. Lalji Singh, (Former Director CCMB Hyderabad and Vice Chancellor of BHU Varanasi), Prof. Sriram Ramaswamy (Director, TIFR Hyderabad), Prof. Somak Roychoudhary, (Director, IUCAA Pune) to enrich the knowledge domain of faculty and students.
- The club has established a user group named MOSUG (MANUU Open Source User Group) to encourage students to use open resource software for learning and education tool. The club established an activity Lab for the students to experiment with their innovative ideas in recycling of waste materials to produce usable products/ gadgets. The club invites freelancers/ professionals involved in such activities.

Prof. P. F. Rahaman  
Nodal Person  
Innovation club  
Maulana Azad National Urdu University  
Gachibowli  
Hyderabad  
rahman\_f@rediffmail.com  
cell-09490105324

# MIZORAM UNIVERSITY

## **ACHIEVEMENTS OF MZU INNOVATION CLUB**

The University has already established Innovation Centre (notified February 2015). The Innovation Centre had participated in Meeting of Innovation Clubs held at Rastrapati Bhavan on the 10th of March, 2015. The club, working with the DST, Govt. of Mizoram gave lectures and trainings on creativity development and innovation to The Regional Institute of Paramedical & Nursing Sciences (RIPANS) on 24th March, 2015, Mizoram Chamber of Industries on 27th March, 2015, National Institute of Technology - Mizoram on 31st March, 2015. The Club also organised State Level Workshop on "Animation and Facilitation of Innovation Clubs in Educational Institutes" on 22nd May, 2015. The Innovation Club has animated Innovation Clubs in two colleges and several higher secondary schools, including St. Pauls HSS.

The MZU Innovation Club, along with Indian Institute of Management Calcutta Innovation Park will be organising "Celebration of Creativity and Innovation Festival" during 22<sup>nd</sup> – 24<sup>th</sup> February, 2016.

Incubation Centre is on the process of animation at present. The Innovation Club already visited Incubation Centres of IIM-Calcutta and West Bengal Institute of Technology for possible link-ups and emulating their models for establishing such incubation centre in the University.

The Innovation Club have registered the University's Incubation Centre with the Registrar-Firms & Societies (Govt. of Mizoram). Till date, informal linkages have been made with North Eastern Development Finance Corporation Ltd. for possible investment in future incubates, Patent Information Cell for exploring IPR registration, Department of Industries for possible benefits from industrial policies, trade link-up with Mizoram Chamber of Industries and so on.

Members of Innovation Club are as follows:

- Dr. Laldinliana, Dy. Director, IQAC – Convener
- Dr. K. Robin, ASC – Member
- Mr. Lalhrualtuanga, Deptt. Of Biotechnology – Member
- Ms. Sylvia Romawizuali, Deptt. Of Planning & Architech. – Member
- Dr. Rohmingmawii, Asst. Prof. History Deptt., PUC

# NATIONAL INSTITUTE OF PHARMACEUTICAL EDUCATION & RESEARCH, AHMEDABAD

## Innovation Club of the Institute:

**National Institute of Pharmaceutical Education and Research (NIPER) - Ahmedabad** is keenly promoting young minds and intends to deliver their innovative ideas and concepts. For the "Festival of Innovation, 2016" Meeting of National Innovation Clubs, we have invited novel concepts from our students; they have come forward with various concepts. Initially our faculty have been meticulously scrutinized the concepts and the following concepts are selected for final presentation at institute level.

### **1. A NOVEL APPROACH FOR CARTILAGE REGENERATION**

The approach is utilizing the piezoelectric property of biological tissue, collagen in the extracellular matrix of cartilage. The natural property is recreating with the help of a piezoelectric scaffold. This scaffold will aid in the achievement of local electric field characteristics of the natural ECM during development and regeneration of cartilage. Thus it will help to stimulate the natural regeneration mechanism in response to electrical stimuli.

Group members:

Dr. Govinda Kapusetti

Ms. Jaicy Jacob (MS Pharm, Medical Devices)

Mr. Namdev More (MS Pharm, Medical Devices)

Ms. Mounika Choppadandi (MS Pharm, Medical Devices)

Mr. Pranav Joshi (MS Pharm, Biotechnology)

### **2. WASTE TO REGENERATIVE MEDICINE**

The development of urine cell bank and generation of urine-derived iPSCs (UiPSCs) from urine cell bank for future implementation of them to build UiPSCs bank. Through the extensive differentiation approach, UiPSCs will be transformed into the functional tissue or organ and which will be further implemented with appropriate biomaterial and bio-regenerative strategies.

Group members:

Mr. Maitray Raval (MS Pharm, Biotechnology)

Mr. Akhil Mansuri (MS Pharm, Biotechnology)

Mr. Samrat Mazumdar (MS Pharm, Medical Devices)

Mr. Piyush Gondaliya (Ph.D. Biotechnology)

### **3. EASY AND INSTANT DIAGNOSTIC STRIPS FOR ORGANOPHOSPHATE POISONING**

Early stage determination of organophosphate poisoning using a diagnostic strip. It is based on the reaction between Acetylcholine esterases and acetylthiocholine results in the formation of thiocholine, which decolorizes the substrate from blue to colorless.

Group members:

Ms. Rashmi Chaudhari (MS Pharm, Pharmacology and Toxicology)

Mr. Kalpesh Bhaviskar (MS Pharm, Pharmaceutical Analysis)

Ms. Krushali Powale (MS Pharm, Biotechnology)

### **4. PERSONALIZED ANTIDIABETIC MEDICINE FOR INDIAN POPULATION**

This is providing a way to personalize antidiabetic treatment for Indian population by metabolic profiling. The detection of the metabolic profile of patients with the help of microarray technology can be an innovative idea in this area.

Group members:

Ms. Heta Shah (Ph.D. Biotechnology)

Mr. Manish Patel (Ph.D. Biotechnology)

Ms. Triveni Pardhi (Ph.D. Biotechnology)

### **5. AUTOMATED TLC EQUIPMENT**

This is hypothesized the development of Automated TLC equipment. This approach will facilitate the sample analysis with the help of a complete online application. This approach is applicable in all fields like pharmaceuticals, herbal medicines, industrial application etc.

Group members:

Mr. Jaydeep Chauhan (MS Pharm, Natural Products)

# NATIONAL INSTITUTE OF PHARMACEUTICAL EDUCATION & RESEARCH, HYDERABAD

*NIPER Hyderabad Innovation Club*

## **Nanotherapeutics: Innovative Drug Delivery Platforms for Cancer Treatment**

Cancer is a group of diseases characterized by uncontrolled growth and metastasis of the abnormal cells. Worldwide, one in seven deaths are due to cancer and about 15 million new cases of cancer occur globally every year. Chemotherapy is one of the principle modes for the treatment of cancer but the effectiveness of chemotherapy is limited due to various reasons. Tumor resistance is one such important reason that limits the effectiveness of currently available cancer therapies. Nanotherapeutics is a powerful concept in cancer therapy and is advancing rapidly to overcome the issues associated with delivery of anticancer drugs and tumor resistance. This concept forms one of the basic foundations of the Innovation Club at National Institute of Pharmaceutical Education & Research [NIPER], Hyderabad and is utilized in the various activities associated with the club which are mentioned below.

### **A. Nanotechnology based combinational chemotherapy**

Chemotherapy is one of the standard method of treatment in many forms of cancer. It is capable of inducing apoptosis in tumour cells and reducing the bulk of tumours. However, significant number of patients, revisit clinic with recurrence of disease with more aggressive and chemo resistive phenotype. The established reason behind this is the underlying presence of a small population of cancer stem cells (CSC) along with cancer cells which causes relapse. We have worked on combinational chemotherapy acting on both cancer cells and CSC. The combination employed was of a CSC inhibitor (CSC-I) and a conventional anticancer drug (AD) delivered through polymeric nanoparticles for the complete eradication of tumor by eliminating both cancer stem cells and cancer cells. Prepared nanoformulations (size below 150 nm) showed in vitro sustained release pattern of both the drugs for more than a month. Cytotoxicity studies on cancer cells revealed the toxicity potential of nanoparticles over drug solutions. Hyaluronic acid (HA) was coated onto the surface of CSC-I nanoparticles for targeting CD44 receptors over expressed on cancer stem cells. CD44<sup>+</sup> cell count was drastically decreased when treated with HA coated CSC-I nanoparticles indicating their efficiency towards cancer stem cells.



Combination of HA coated CSC-I nanoparticles and AD nanoparticles showed the highest cytotoxicity against CD44<sup>+</sup> cells. Hence, combinational therapy using conventional chemotherapeutic drug and cancer stem cell inhibitor showed promising approach in overcoming cancer recurrence due to resistant cell population.

## **B. Smart nanotherapeutics aiming clinical translation**

Multidrug resistance (MDR) is one of the most significant obstacles in cancer chemotherapy. One mechanism involved in the development of MDR is the over expression of P-glycoprotein (P-gp) in tumor cells which reduces the intercellular drug concentrations. Accordingly, there are synthetic P-gp modulators/inhibitors which enhance the cellular bioavailability of many anticancer drugs by blocking the P-gp efflux pump but their use is limited because of various toxicities associated with their use. It is widely known that many natural origin compounds act as P-gp inhibitors. Co-administration of natural origin P-gp inhibitors substantially increase the oral bioavailability of drugs belonging to the class of taxanes, epipodophyllotoxin and anthracyclines. Incorporating the drug and P-gp inhibitor into a nanocarrier provide improved bioavailability, improved cellular uptake, sustained drug release within the cell and reduced dose and toxicity associated with anticancer drugs. Formulating nanoparticles of functional excipients capable of altering absorption pathway along with P-gp inhibition activity is another approach adopted to improve the bioavailability of these anticancer drugs.

## **C. Prodrug/ligand based targeting**

Most of the anticancer agents used in chemotherapy of cancer lack selectivity towards tumor cells leading to side effects and dose limitation. The selectivity of the traditional cytotoxic agents is mainly based on the difference in proliferation rate between malignant and normal cells. Development of anticancer agents with improved selectivity towards cancerous tissue is one of the most important challenges in modern drug design. Therefore, a practical approach would be to selectively deliver the available cytotoxic agents in and around the tumor cells thereby maximizing its concentration around the tumors while at the same time minimizing its concentration in healthy tissues. In this context, the development of glycoside prodrugs has been investigated to provide improved selectivity of drugs towards cancer tissues. As predicted, these new prodrugs fulfilled the criteria of selective activation with, significant enhancement of

stability and water solubility demonstrating that they are good candidates for targeted delivery. Similarly, small molecules for e.g., lactoferrin, benzamide, adenosine etc. have immense potential to be used as tumor targeting ligands when conjugated to surface of nanotherapeutics. Considering this, we are working extensively on new “surface conjugated nanotherapeutics” as potential carriers for targeted drug delivery. These formulations modify pharmacokinetic and pharmacodynamic profiles of conventional therapeutics and also improve the efficacy of existing anti-cancer compounds.

#### **D. RNAi based nanotherapeutics**

Since the Nobel prize-winning work of Fire and Mello a little more than ten years ago, gene silencing by means of short interfering RNA (siRNA) has been of substantial interest, particularly in the treatment of cancer. siRNA's can silence the expression of any gene with high efficiency and specificity, including targets traditionally considered to be “undruggable”. However, delivery of naked siRNA remains a hurdle owing to rapid enzymatic digestion, renal elimination and inefficient uptake of tumor cells. Consequently, delivery has become the rate limiting step in realizing the full potential of siRNA. Therefore, development of effective nanocarriers which are biocompatible, biodegradable and non-immunogenic is essential. With this aim, we are formulating stable siRNA loaded biodegradable nanocarriers. The main objective of this work is to construct and use nanocarriers based systems to bind and protect siRNA while transiting to the target cells, facilitate its transfection into the cytoplasm, release the siRNA once inside the cell, and evaluation of the formed systems *in vivo*. We have international collaboration with Poland and Israel on these projects.

Thus, at the Innovation Club at NIPER Hyderabad, we are working on numerous diverse research projects supported by Department of Pharmaceuticals and also funded by various funding agencies viz. Department of Science & Technology (DST) and Department of Biotechnology (DBT), Department of AYUSH, YISSUM Research and Development Co., Israel etc. A number of research papers have been published apart from filing patents and also collaborating with various industries for translating these projects into clinical use.

# NIT ARUNACHAL PRADESH

## Achievement of Innovation Club

### NIT Arunachal Pradesh

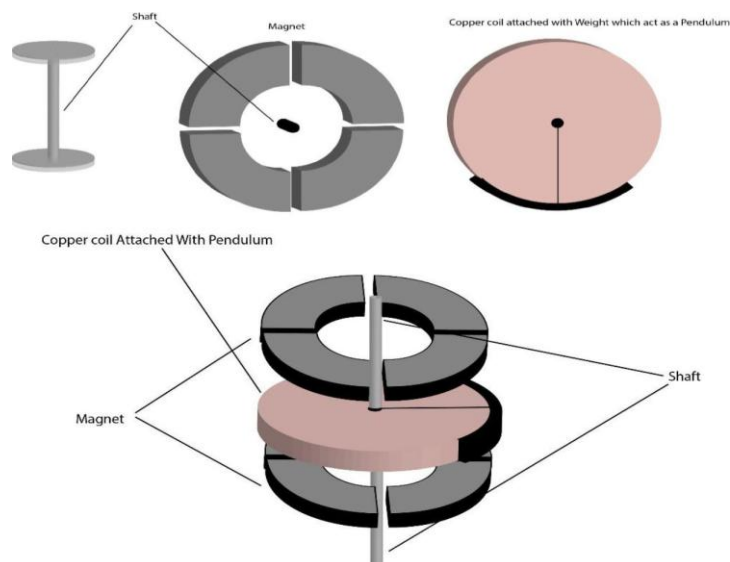
#### 1. Motion Based Mobile Charger by Shri Alak Majumder, ECE

In this high technology era, everybody is getting more and more dependent to the smart phones, but the battery backup is still a big problem.

So, we came up with the idea of a device which can recharge the battery from the casual motion. Almost all of us carry our mobile phone with ourselves all the time when phone is in continuous motion during this whole process. This motion can be used to convert the kinetic energy into electrical energy which can be used to recharge our phone. This device (motion charger) could be built inside a cell phone cover, which most of us generally use for protection of cell phone, thus keeping the cost of cell phone low and providing choice to user.

Motion charger is made of thin magnets and copper coil organized in a compact and specified structure which on movement produces potential which is then supplied to battery, thus increasing the battery backup of cell phones.

It consist of two parallel layers of magnet in between them very thin copper coil and a weight is attached to the coil to work as a pendulum as shown in figure.



The design of generator part is like pendulum which moves with the motion of device. The base consist the thin circular magnets and over this circular copper coil is placed which is connected to through shaft. A heavy metal is attached to the outer most circumference of the coil, which helps to behave like pendulum. The weight always tries to stay level with gravity, the motion of device caused weight to shift its position and weight would tries to swing back to normal. The magnet is stationary attached to the panel the movement of the coil induces the magnetic flux through the coil which creates electric current. The current is amplified by the current amplifier circuit, which leads to increase its efficiency and at the end the electricity is stored in the battery.

### **Impact to Society:**

- It can solve the problem of battery back-up and reduces the carbon foot prints of an individual.
- Though small but there is a saving in the electricity.

### **Future Scope:**

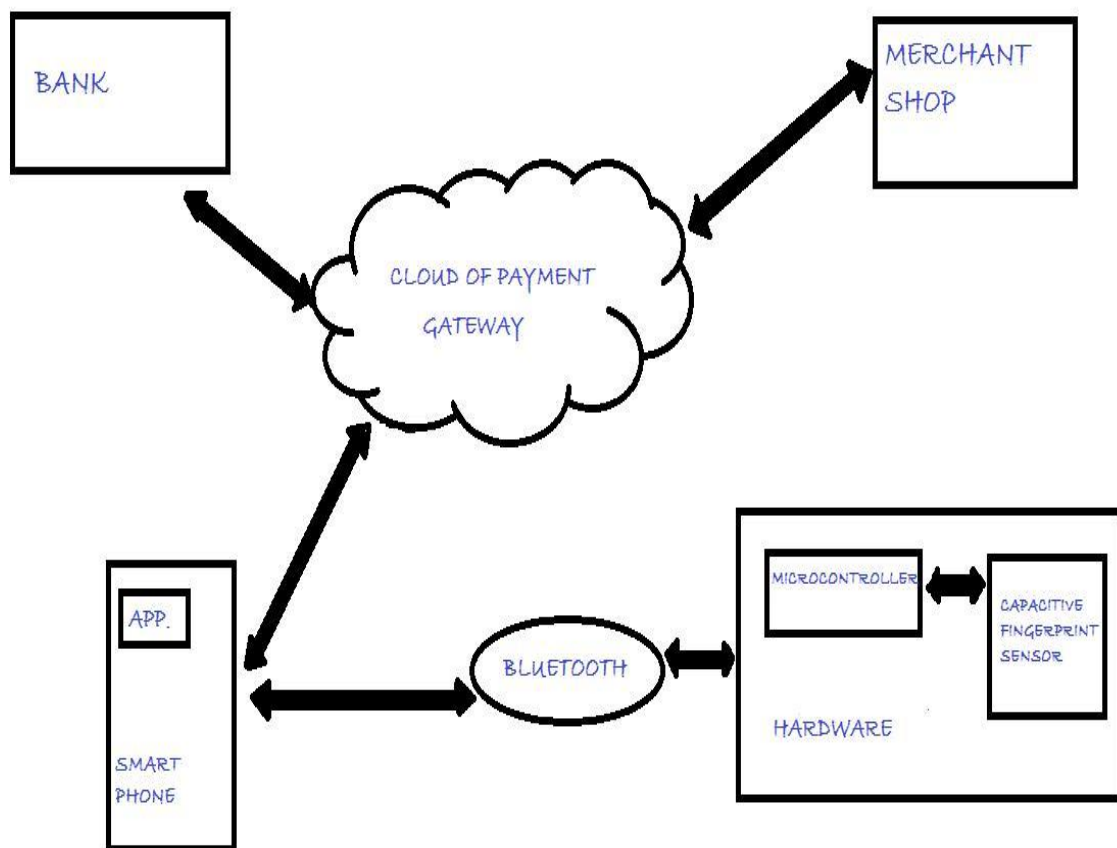
- It can be made efficient to be used in all other coming hand held electronic gadgets.
- It can be made more compact like paper and more efficient to increase the battery back-up.

### **Online Payment Framework Using QR CODE & Biometric Authentication by Shri Alak Majumder, ECE**

The innovation is a combination of hardware and software i.e. a mobile app, based on a process called Tokenization. Tokenization is mainly used for online data safety in which data is transferred in the form of tokens, hence mainly used for payment purposes. In order to enhance the security, a thin fingerprint scanner (hardware) is installed on the customer side. The device is compatible with multiple devices like smart phones, tablets and laptops/desktops and connected to them via Bluetooth. The scanner will accomplish two tasks: accessing the tokens and authentication of transaction. During transaction the information like name of product, transaction id, amount of money are tokenized by the payment gateway, in other words instead of these information, a token will be generated. Customer can access this token through mobile app either through the QR code or manually entering the code. The app will be connected to the hardware will demand the fingerprint authorization of the user. If the fingerprint matches then a successful authorization message will be sent to the gateway consisting of unique id of the customer's account granted by the bank, if it doesn't match

after some limited trials then failed authorization message will be generated. The gateway then sends that message to the bank with the amount to be deducted. Bank will check the account from which the amount to be deducted based on the finger print. After verification the required amount is deducted and sends a message to the gateway consisting of a unique id for the customer. Gateway then sends the message of successful transaction and unique id to the customer. This id will be used for future transaction.

This way the whole transaction is secured by two tokenization methods and biometric security. As the merchant and payment gateway do not store the account information of the customer, it is nearly impossible for any hacker to steal the information. The customer will also find this method convenient as they don't have to input a lot of sensitive information.



**Fig: Pictorial Overview of our work**

The process starts with the purchase of the hardware. After purchasing the hardware the user need to install the App on their mobile and to establish the setup between the hardware and the App. In the setup procedure the App will store the finger print of the user in the secure element in the hardware and then it asks for the banking information (name of the particular bank, unique customer ID that given by the bank) of the user. That information of the user will be transferred to the payment gateway. Then the payment gateway will communicate with the mentioned bank and transfer that information to the bank without storing them. Then bank checks the information and sends an

OTP to the user's registered mobile to verify the customer. After this the customer need to enter the OTP to the App, which will reach to the bank but via payment gateway. After completion of verification process the bank will generate a token against the customer's bank account the customer and sends to the payment gateway. Then payment gateway will send this token to the App and it will store this.

When the customer purchase something from any e-commerce site or merchant then in the payment process the merchant will send all the information (transaction ID, Amount) regarding the transaction to the payment gateway. Then the payment gateway generates a token against that information. The customer gets the token in the app using QR code or manually entering the Token. Then the App decrypts the Token and asks for the finger print authentication from the user. If the finger print matches then it send a confirmation message to the payment gateway, which contains the Token provided by the bank for transaction and also the unique device information. If the fingerprint does not match, then it will try for some time and then declines the transaction. The payment gateway authenticates the message and if everything seems alright, then it sends the Token to the concerned bank.

The Bank verifies the information and matches the Token with the Database. If match found then the Bank approves the transaction and send the Success

Message to the Payment Gateway. If the Token is invalid, then the Bank declines the transaction. When the Bank approves the transaction, it changes the previous Token with a new generated Token. The Success message also contains the newly generated Token, which is sent to Payment Gateway by the bank. The Payment Gateway then sends the new Token to the customer, which is stored in the App for the future transaction.

**Impact to society:**



Our methodology of online payment framework will have a huge impact on the society for mainly the following two reasons:

- **Reliability:** As Internet transactions are geographically distant, mutual understanding, to make the transaction a success, we must trust each other. This method enhances the trust of customers on the e-commerce sites.

**Development of electronic commerce:** As this method is secure through two ways: Tokenization and Biometric, this method is highly confidential, which will increase the authenticity of the electronic commerce and thus play an indispensable role in the development of electronic commerce.

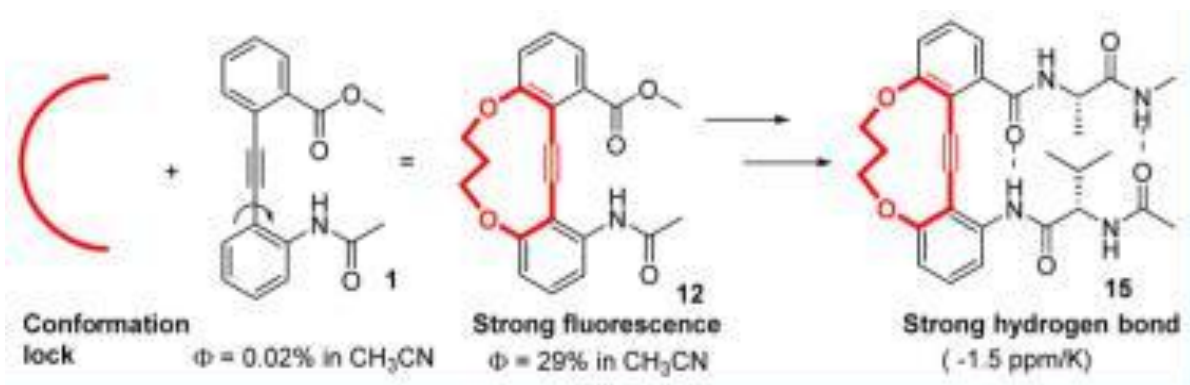
### **Future scope-**

In true real-time processing, a combination of features, including integrated systems and gateways, addresses liquidity issues and minimizes delays, while preserving online transaction integrity. This work has a lot of scopes to be integrated in future. If the hardware can be miniaturized and can be integrated inside the chip of smart phone the marketing of it may reach the highest peak as Smart phone is the mass produced electronic device. Some of the scopes may be listed as follows –

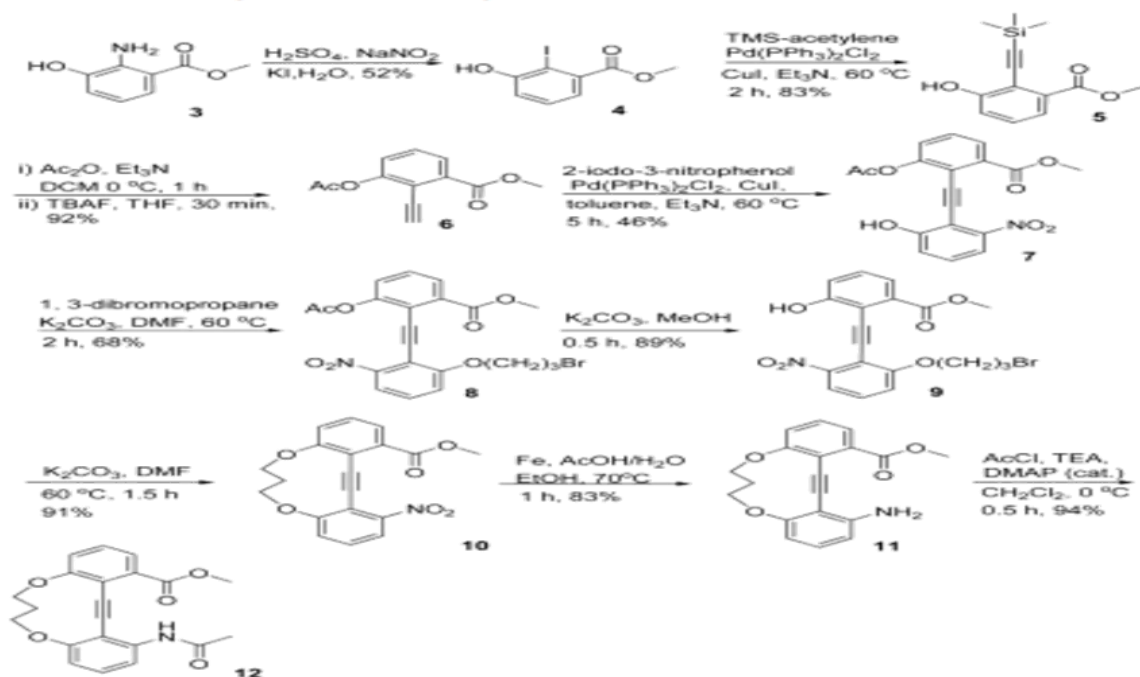
- Integration of the concept in multipurpose card like Bitcoin.
- Replacement of Bluetooth with Visible light for high speed data communication.
- NFC based charger for the paper battery used in the hardware.
- Dynamic tokenization is used as the finger print data.

### **Conformationally Locked Tolans, $\beta$ -Sheet Structures, and Photophysical Properties by Dr. Ananta Kumar Atta**

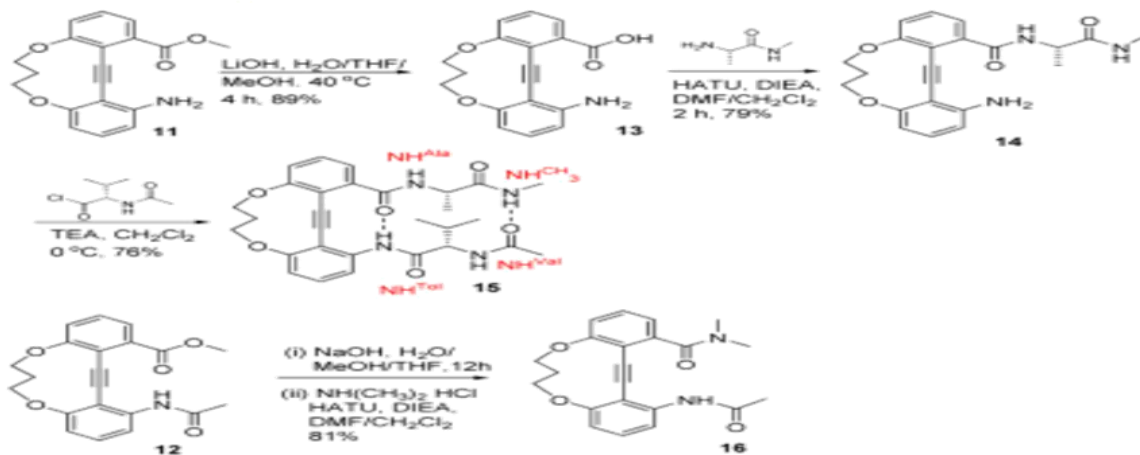
Conformationally locked tetrasubstituted tolans were synthesized by introducing a tether on the tolan. To demonstrate the utilities of these motifs, a  $\beta$ -hairpin structure (**15**) was synthesized, and its additional stabilizing effects were evaluated. Moreover, the photophysical properties of cyclic tolans and their  $\beta$ -sheet structure were investigated. The fluorescence quantum yield of cyclic tolan **12** is >1000 times stronger than its congener **1** in CH<sub>3</sub>CN.



### Scheme 2. Synthesis of Cyclic Tolans 11 and 12



### Scheme 3. Synthesis of Short $\beta$ -Hairpin 15 and 16

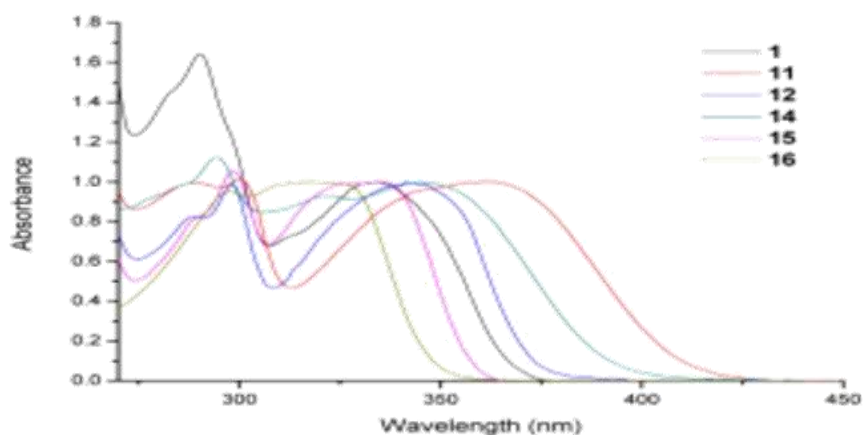


**Table 2. Spectroscopic Data and Quantum Yields of 1, 11, 12, 14, 15, and 16 in CH<sub>2</sub>Cl<sub>2</sub>**

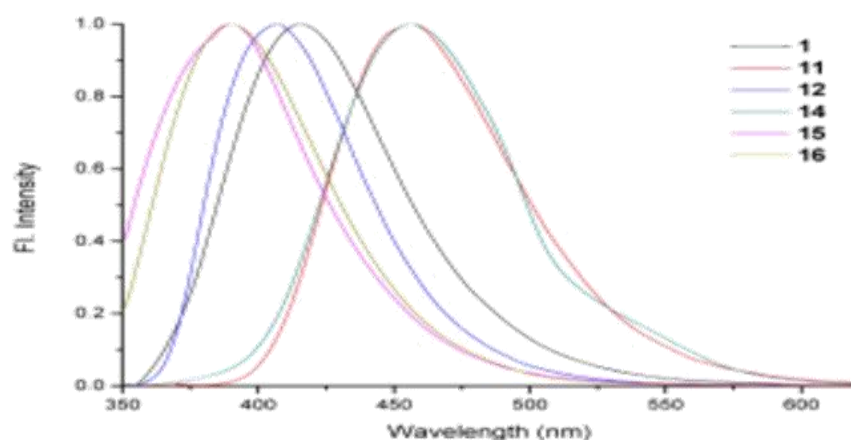
	1	11	12	14	15	16
$^{abs}\lambda_{max}$	334	363	341	345	336	318
$\epsilon$	16100	12700	14300	10386	19700	21667
$^{em}\lambda_{max}$	419	453	406	456	390	390
Stokes shift	85	90	65	107	54	72
$\Phi$ (%)	0.03	14	33	44	3	1.2
$\Phi$ (%) <sup>a</sup>	0.02	3	29	25	2	0.5

<sup>a</sup>Quantum yield was obtained in CH<sub>3</sub>CN. Unspecified units are nm except  $\epsilon$  (cm<sup>-1</sup> M<sup>-1</sup>).

(a)



(b)



**Figure 2. (a) Normalized UV–visible absorption spectra of compounds 1, 11, 12, 14, 15, and 16 in CH<sub>2</sub>Cl<sub>2</sub>. (b) Normalized emission spectra of compounds 1, 11, 12, 14, 15, and 16 in CH<sub>2</sub>Cl<sub>2</sub>.**

[This work has been published in Organic Letters, 2015, 17 (24), pp 6222– 6225, Jung-Ho Hong, Ananta Kumar Atta, Kwang-Bok Jung, Seul-Bi Kim, Jungseok

Heo, and Dong-Gyu Cho]

### Green Networking by Shri Anish Kumar Saha, CSE

Most of the networks are less energy efficient and many times resources are underutilized. For example, the link utilization of even busy networks is also underutilized and thus shows energy inefficient management. We can define the problem as mixed integer programming optimization problem or

Integer Programming Problem. Different flows are dynamically routed to minimize the number of edges in a network under certain constrain and put unused edges in sleep state. Here we used Software defined networking as network architecture. An example is as below,

Objective function:

Minimize  $= \sum n_i \text{Edge}_i$

Subject to,

Constrain 1: Path selection constrain

$\forall i \text{ in } \{1,2, \dots, f\} \sum \forall j \text{ in } \{\text{Alternative\_path } path_j\} = 1$

Constrain no 2: Edge selection constrain

$\text{Edge}_i - A_{j,i} * path_j \geq 0 ; \forall i \text{ in } \{1,2, \dots, n\}, \forall j \text{ in } \{1,2, \dots, \text{no\_paths}\}$

Constrain 3: Bandwidth capacity limitation

$\forall i \text{ in } \{1,2,3 \dots, n\}, \sum \{ \forall j \text{ in } \text{alternativepath}_k (A_{j,i} * path_j * dk) \} \forall k \text{ in } \{1,2, \dots, f\} \leq \text{Capacity},$

The model may have degrade the quality of service, because of different delays presence in transmission. Our approach is to consider Queuing delay in our model as constrain and maintain QoS.

# NIT CALICUT

## Report on the activities of Robotics Interest Group (*RIG-NITC*)-

### An innovation Club of NIT Calicut

Robotics Interest Group (*RIG-NITC*) was started initially as a learning group in December 2011, by a group of students interested in robotics from various branches of Science and Engineering. This innovation group was later officiated under the Mechatronics/Robotics Lab, NIT Calicut in July 2012. Presently the group comprises of around 45 students pursuing different undergraduate courses.

Under the guidance of Dr.Sudheer A.P, Assistant Professor, MED the group has been able to learn, execute and showcase multitude of robotics based projects in different fields like robot kinematics and dynamics, image processing, communication systems, augmented reality, electro-encephalography an electromyography,human-robot interaction, under-water robotics, localization and mapping etc.

The first major event taken up by the group was a workshop on “introduction to robotics” for the first year students of NITC in august 2012.The same has been conducted successfully in the years 2013, 2014 and 2015 as well inside and outside the institute. In the year 2012-13, the group’s participation in Robocon-2013(national level robotics contest) was the first time for any team from Kerala.A year later, in March 2014, after months of preparation we participated in Robocon 2014 at Pune, finishing a creditable position among a group of around 90 teams from all over India. One of the main source of funding for RIG activity is through TEQIP-NITCalicut.

The group has been active in the field of sharing knowledge through workshops/seminars with the people in and around NIT Calicut and has successfully exhibited its projects at various institutions including schools for the past 3 years. **RIGNITC** has been developed some conceptual products designs, which are in the final stage of implementation.

The following and the competitions in which the group has participated and won awards:

- RoboCon 2012, 2013 & 2014
- Swasraya Bharat Innovation Competition
- SAVISHKAR 2015 (i-fast 2015)
- Students Autonomous Vehicle Competition 2016
- FESTO Productivity Contest

Some of the honors for RIG:

- Free training offered on PLC and Automation by Siemens
- Free training offered in vacuum technologies by Schmalz
- Sponsorship of 10000 INR by TEXAS Instruments
- Representing NIT Calicut for Innovation club's meet at Rashtrapati Bhavan in 2015
- Won 3<sup>rd</sup> prize at world wide FESTO Productivity Contest
- 'Best Innovation award' at Swasraya Bharat Innovators and Incubators meet
- 'Best paper award' at ICCICT 2015
- Borche Best paper award 2015
- 12 research papers published till date
- Applied for 2 patents and 5 are in line for applying

There are other active clubs such as "**club Unwired**"-in association with the SAE India Chapter set up in NIT Calicut and "**Aero Unwired**" encourage students to take up technical projects in all aspects of engineering. Workshops were conducted on aero modelling, water rocketry, and coding and Remote Controlled vehicles. The intention is to put to use what has been studied in the classroom: to gain a firsthand practical experience. This involves taking up research projects and taking part in various technical competitions organised by other universities in India.

#### **Major projects done by the group till date:**

1. **Patentable industrial gripper**(Summer 2012): vertical axis friction gripper which can lift 10 times of its own weight.
2. **Digital Image processing based projects**(Summer 2013): ball follower robot, face detection, gesture controlled robot.
3. **5 DOF mobile manipulator** (Summer 2013): Completely automated with the capabilities of line following, pre-programmed picking, transporting & placing of objects, controllability through keyboard, wireless signals and speech commands.
4. **Speech recognition robot 'RIGGU'**(Summer 2013): a robot which recognizes our speech and carries out certain tasks.
5. **Shopbot**(Summer 2013): Shop automation robot based on Global System of Mobile(GSM) Networks. Receives orders as SMS and retrieves product from the stack
6. **Pneumatic 2D image plotter** (Summer 2013): Able to place lines & points with 5 mm accuracy using image processing, regression analysis, and pneumatics.
7. **Wall climbing robot** (Summer 2013): The robot is a 2 DOF open link mechanism that can traverse over the walls and roofs by using Suction Grippers.(TEQIP sponsored)
8. **SLAM (simultaneous localisation and mapping)** (Summer 2013): Able to localize and map itself simultaneously. Creates an occupancy grid map using Open Slam algorithm.



9. **Autonomous tennis playing robot**(2013-14):TEQIP sponsored major project of 2014 batch mechanical and production engineering students. A robot capable of autonomously hitting an approaching ball of a specified colour.
10. **Line Inspection Robot** (2013-14):TEQIP sponsored major project of 2014 batch of mechanical engineering students. A Robot meant to inspect faulty power lines.
11. **Biomimetic knife fish robot**(Summer 2014):underwater robot which mimics the motion of a knife fish robot.
12. **Biomimetic tuna fish robot**(Summer 2014): underwater robot which mimics the motion of a tuna fish robot.
13. **Feature extraction and Classification**(Summer 2014):This project deals with signal acquisition along the scalp, processing of raw data, extraction of features and classification.
14. **Rubik's Cube Solver**(Summer 2014):Solves a 3X3X3 Rubik's cube automatically in less than 6 minutes, based on image processing using MATLAB (TEQIP Sponsored).
15. **Self-balancing robot**(Summer 2014):A platform that balances itself on 2 wheels controlled using PID (TEQIP sponsored).
16. **Wi-Fi enabled extension box**(Summer 2014): An internet of things based project, where one can control any electrical device connected to this Ext. box over the internet.
17. **3D Printer**(Summer 2014): A low cost rapid prototyping machine with 100 micron resolution and a workspace of 20x20x20 cm<sup>3</sup>
18. **Underwater Jet Propulsion Robot**(2014-15):a TEQIP sponsored major project of 2015 batch of mechanical engineering students. A Jet Propulsion Robot made using unconventional actuators like Pneumatic Artificial Muscles.
19. **ECG on Mobile**: A device which can take ECG signals from different parts of the body and show it on a mobile app.
20. **Abhram**: An image sharing app which lets you transfer images on your finger tip.
21. **GPS Tracking Device**: A GPS and GSM based Tracking device which gives the location of the device when an SMS is sent to a registered Mobile Number.
22. **Motion Capture Glove**: A Mechanical hand which can mimic the motion of another parent hand which is wearing a glove with sensors.

# NIT DELHI

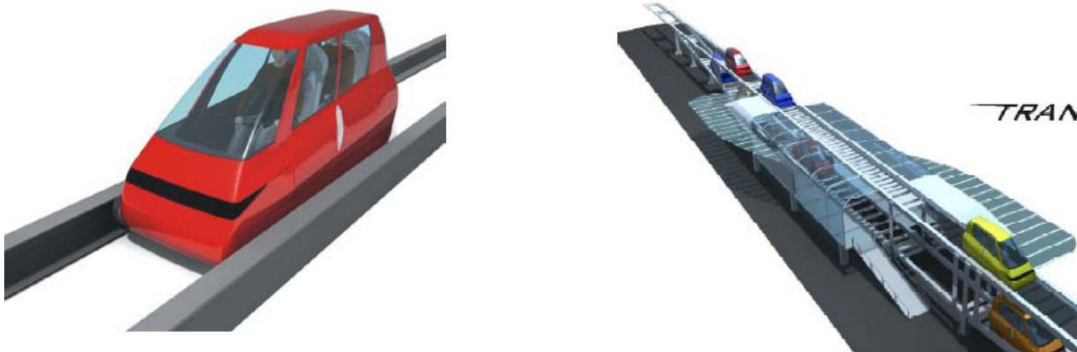
## ACHIEVEMENTS OF INNOVATION CLUB

In a very short span of time and with restricted available resources (as NIT Delhi is presently working in transit campus) the students and faculty members of NIT Delhi have indulged themselves in several innovative activities. Under the banner of 'Innovation Club' students have developed various innovative projects and participated in various events organized all over the country. The details of some of the ambitious and innovative projects on which the students are working are given below:

### **Autobots:**

Autobots is an elevated wheeled 2-seat track guided motor driven PRT system with a maximum speed of 60 Km/h, coupling into train-like formations and decoupling to disperse at city ends. Once demonstrated, the transit system has the potential to:

- Take away entire commuter congestion in our urban sprawls
- Drastically reduce fossil fuel dependence
- Increase mobility swiftness supply phenomenally
- Construct transport infrastructure for the entire city for the cost of a single Metro alignment
- Make large & distant tracts of land and housing more efficiently accessible
- Provide social parity in mobility to further access equity in opportunities
- Reduce the day-to-day cost of transport by at least half compared to automobiles.

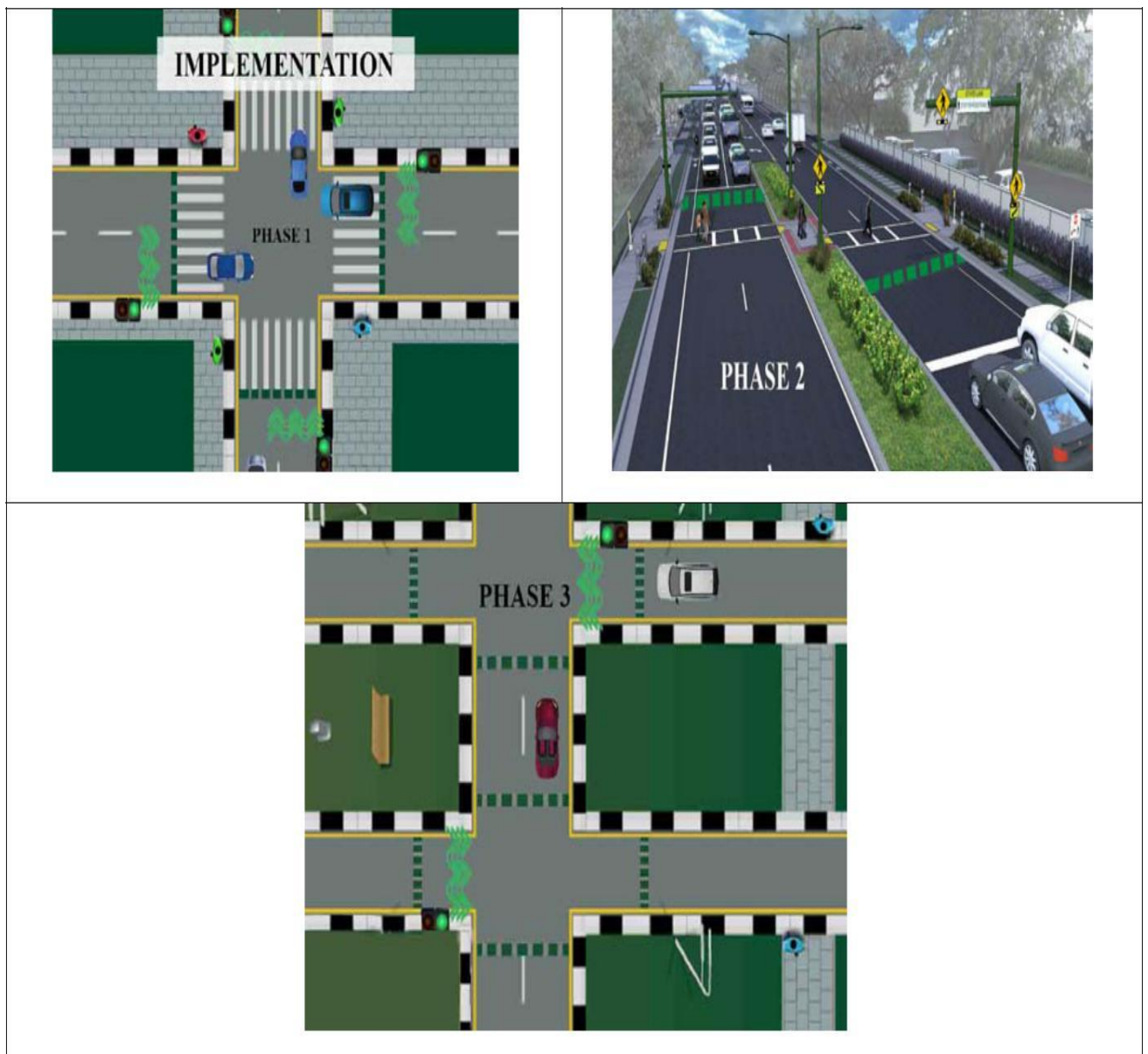


### **Piezo Based Traffic Management System for Indian Roads:**

Traffic monitoring system developed so far are primarily focused on structured traffic that is not the case in a country like ours. Development of overhead structures

can't be considered as a viable option since it increases the cost substantially, the same goes for under the road construction. Necessity to analyze traffic pattern, near real time reporting and simultaneous conduction of smooth traffic flow. This project is about:

- Design and development of novel method to control traffic congestion and observe related traffic violations based on instantaneous vehicular event pattern.
- Initiation of an event on the traffic lights based on the current vehicular density sensed through a network of camera and Piezo based sensors.
- Simultaneous detection and reporting of any Traffic violations.



## **SCEPTRE – Hand Gesture Based Self Learning Universal Remote Control:**

This project is about a self-learning device capable of controlling a diverse variety of remote operable instruments through hand gestures. The motivation behind this project is:

- Eliminates the need for multiple remotes
- Wide Range of recognition for different device commands
- Facilitates those, old or challenged to intuitively interact with their surroundings

## **Li-Fi (Light Fidelity):**

This project explores the wireless communication along a spectrum of visible light. Light emitting diode transmits data which can be registered by special equipment, and that can be used to provide the wireless connectivity. It is estimated to provide a speed up to 10Gbps, which is almost 250 times faster than broadband connection. The vast availability of LED lightbulb will provide the connectivity everywhere and every time even at the places like airplane and hospitals, for example.

## **EVENTS ORGANIZED BY INNOVATION CLUB**

In-order to keep the students updated with the recent technological developments and motivate them to think innovatively, Innovation club regularly organizes various events. Following events are regularly organized on alternate weeks by the 'Innovation Club' of the institute:

### **TechToday:**

TechToday, aims at familiarizing the students with the upcoming technologies and create the spark of innovation in their minds.

### **In-ci-de-(inside circuit description):**

This event aims at describes the circuitry and working of various electronic devices and their circuitry.

### **Inngineer of the week:**

In this event students are given exposure to the upcoming innovations in the world, it is expected that the students will come forward with great ideas to solve the everyday problem. Every week a new problem is posted for the students to think of innovative solutions for the problems.

### **Expert Talks:**

Experts from industries are invited to deliver expert talks on state-of-the art technologies being used in industries. Club also invites young entrepreneurs to motivate

the student to go for startup companies. Following events and talks are organized to promote entrepreneurs and Start-ups:

1. Career Launcher conducted 'Young India Challenge' to create 4ntrepreneurial spirit among the students of the institute and create the startup ecosystem.
2. Interactive talk with Mr. Somvir, CEO of start-up 'Magister' to let the students know about start-up ecosystem and the challenges faced.
3. Club has planned to conduct 'TedxNITD' which aims to share ideas, philosophies, knowledge and experiences of the unheard heroes of our nation for their contribution in Technology and Entrepreneurship.
4. Club has planned to conduct an Inter College Innovation Challenge to trigger the
5. innovative minds of the students where they need to come up with prototypes/models of their ideas.

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# NIT DURGAPUR

“Don't watch the clock, do what it does, keep going”.

Aarohan with its 14<sup>th</sup> edition needs no exordium for its companions. The fest stages a wide range of opportunities for its sectators. Being the 2<sup>nd</sup> largest of its kind it has been leading the light of instilling a culture of science, technology and innovation among the youth of the nation. With our mission to provide the young minds a platform to participate and compete with each other to explore their talents in their own individual fields of excellence, we have been igniting sparks in the minds of young India.

Centre for Cognitive Activities, the squad behind this four day technical extravaganza has produce opportunities and generated scope for the ignited minds to not only nourish and nurture their scientific knowledge and technical acumen but also the business aptitude from time to time the club has polished its facilities to keep in pace and in some way even move ahead of the existing colonies of science. Acting as an arena for the fiends of science, the crazy going spirit of the club and its members is responsible for making this club the 2<sup>nd</sup> largest in eastern India. The club consists of 5 sections namely CORE, ROBOCELL, DESIGNING-WEBDEVELOPEMENT CELL, a RESEARCH & DEVELOPMENT CELL AND E -CELL. With RESEARCH & DEVELOPMENT CELL being the latest extension. Every year the club organizes loads of periodic workshops and lectures by proficient professionals and eminent personalities.

The CORE CELL oversees the activities of the club. Arranging as well as conducting various technical and managements workshops/events round the clock throughout the year inside and outside the college along with arranging for sponsorships and monetary aids for the club and AAROHAN comes under the core cell. Publicising the clubs events is one of the foremost responsibility of the core cell.

The ROBOCELL get their hands full by organising workshops on mechanical/wired robots for beginners wherein complete robotics kits are provided and participants are taught the art of compiling a bot. A pre-Aarohan autonomous robotics workshop, generally in collaboration with professionals from the field of robotics, is held. Stand-alone events that test one's prowess in robotics, based on application skills of the workshop knowledge are held.

The DESIGNING-WEBDEVELOPEMENT CELL is subdivided into:

## **1. Web Development Team**



This team is responsible for the development, design of the various websites associated with CCA, the Aarohan official website and various online publication and propaganda of the events of the club. It also devises interactive online events, which see about 3000 online participants, for Aarohan.

## **2. Design Team**

This creative team is entrusted with the development and designing of the various offline propaganda means for CCA as well as for Aarohan-The Annual Techno Management Fest of NIT Durgapur. It designs the sponsorship and talk show brochures for Aarohan, flyers, pamphlets, event posters and flexes for Aarohan.

The ENTREPRENEURSHIP CELL inculcates the spirit of entrepreneurship in students. Developing leadership qualities among students. Motivating the students to come up with feasible and practical business plans. Helping bridge the gap between the industry and academics. Developing a strong network of entrepreneurs, venture capitalists, corporate executives, senior professionals and individuals who are directly or indirectly related to Entrepreneurship are few of the efforts made by them.

The RESEARCH & DEVELOPMENT CELL, newly formed releases the official science magazine of NIT Durgapur, Cognito which is the medium of voicing the bright innovative minds of the budding generation of researchers and inventors on their own terms. It is also responsible for organizing science exhibition and seminar by IEEE.

The club secured patronage of the United Nations Educational, Scientific and Cultural Organization (UNESCO) under the Indian National Commission in the past year.

# NIT GOA

## Achievements of Innovation Club NIT Goa

National Institute of Technology Goa hosts a vibrant and active “Innovation Club” within the institute. Both B.Tech. and M. Tech students are part of the same and are actively involved in its various activities. Two of our students Mr. Anudeep and Ms. Chinmyee have received first prize of Rs. 25000/ for their project in **SAVISHKAR - iFAST2015**, which was a National level Innovative project exhibition held at NIT Bhopal, on 26-28 February, 2015. Another two students Ms. Neha Bisht and Mr. Viraj Naik have won first/runner-up prizes for their project entitled **Non-surgical Brain Controlled 3DPrinted Prostheses** at a national level competition entitled “**Goa Idea and Innovation Competition (Gi2C)**”, held as part of **4<sup>th</sup> Bharatiya Vignan Sammelanin** February 2015 in Goa.

Another batch of Mr. Mukul B. and Mr. Virat C have won second runner-up prize in the same “Goa Idea and Innovation Competition (Gi2C)” for the project “**Dristi- A low cost Braille Hand Glove**”. Mr. Elavala Satish from electrical engineering department and Mr. Abhishek Reddy Mandadi of electronics and communication engineering represented NIT Goa at the “International Leadership Workshop” and “Optics and Photonics Conference” held at San Diego, California, USA during August 2014 and 2015 respectively.

Mr. Chandra Sekhar Kuruba and Mr. Tanay Amonkar of computer science and engineering have secured Bronze medals in the **WebSim - WorldQuant Challenge** contest getting 85th and 93rd respectively in the country. Two of our students Mr. G Nithin Kumar and Mr. Anudeep Kumar Reddy have recently filed patents in technology domain of,

SUPERCONDUCTING PERMANENT MAGNETIC MOTOR

PHOTONIC INVERTER

Mr. Sahil Ramchandani and Mr. Tejan Karmali, B.Tech. first year students won the 1<sup>st</sup> prize in National BIZ QUEST, a fierce intellectual competition, held at Dempo College of Commerce and Economics, Goa on 6/01/2016. They received a cash prize Rs.50,000/- and Tablets.

To live up to the spirit of “Innovation Club” and maintain great enthusiasm amongst its participating members, NIT Goa organizes various intra and inter institutional

competitions and showcasing of projects developed. NIT Goa celebrated Innovation Day – 2016 along with Rashtriya Avishkar Abhiyan (RAA) programme on 25/01/2016.

## NIT HAMIRPUR

# Innovation Ecosystem, NIT Hamirpur

### Wireless Switch Board

Kumar Vishal Rai, NIT Hamirpur

**Problem Addressed**

- Switch Boards are obstruction to use whole wall surface
- Require more space management due to presence of switches

**Solution Proposed**

Using Android phone, turning on and off of all the appliances connected to a switch board

**Components**

- Android Application
- Coordinator
- Switch Board with Receiver

**Whole Setup**

**Methodology**

### Auto Cooling Chair

Raman Raj kant , Rachit Upadhyay ,NIT Hamirpur

By simple changes in the chair and adding some external things a simple chair changes to an auto cooling chair. All the basic thing used is simple fan some connecting wires and power source and bit of wisdom.

Salient features

- 1> Affordable
- 2> Eco-friendly
- 3> Energy Efficient
- 4> Comfortable
- 5> Easily Portable
- 6> Safe to Use....

### INNOVATION ECOSYSTEM

#### AUTOMATIC PLANT WATERING SYSTEM

**Advantages**

- Optimum level of moisture can be maintained for different climate
- No need of manual supervision

**Components**

- Soil Moisture Sensor
- Control System
- Watering System

**Working**

The control system receives the signal from sensor, analyzes it and triggers the pumping system to supply water as per requirement thus maintaining optimum moisture level in the soil

**Market Price of Sensor**

Our Sensor costs just **Rs. 3**

**Team Members:-**

- Glan Singh
- Ayush Kumar
- Himanshu Rajput
- Nishant Dogra



### Pine Needle Briquetting Machine

- Pine Needles Briquetting/press making by hand is an old activity of hilly regions.
- Used as fuel for cooking purpose.
- Utilization of Dry Pine Needles, which are a major cause of forest fires in hilly areas.
- The process of making pine briquettes needs manual labor along with hot burnt pine needles, so there is a possibility on part of today's generation to get their hands dirty as the process is quite messy in nature.
- The Pine Needle Briquetting Machine was developed to complete the process without directly touching, low noise.
- Machine runs without use of electricity.

**Modification**

### SOLAR FOOD DRYER

**Specifications**

1. 25 kg capacity
2. Very low power consumption. 211W to run pumps and fan and 1 kW electric back up.
3. Can be used to dry any fruit or vegetable like Amla, Mouramba, Apricots, Mint, Gourd, Mango, Bitter Gourd etc....
4. Works 24x7 so as to give high output.

**Further Work**

1. Testing of solar food dryer in winters and making necessary changes if required.
2. Implementation of solar dryer in other areas like cloth drying, room heating etc....

**Made By**

Shivam Chawla  
Kuldeep Kushwaha  
Ravi Sanket  
Rakesh Choudhary  
Vicky Garg  
**Mentor**  
Dr. Varun Goel



Rajnish Shrivastava, Director  
( Chief Coordinator)  
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## NIT JAMSHEDPUR

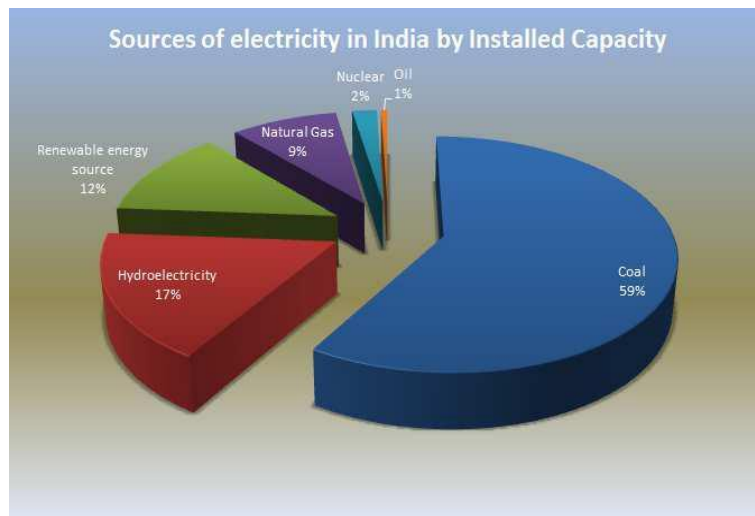
# PRODUCTION OF ELECTRICITY BY USING GRAVITATIONAL AND MAGNETIC ENERGY

- Name of collage: NIT Jamshedpur
- Team leader: Sam meta. Sai saran
- Team members: Dikshakumariagarwal, Neetukumari, P. Sindhusaisree, B. Vineetha, B. Pr asanti, Gauravkumarsingh, G.Rajkumarbhargav.

## INNOVATION CLUB

### INTRODUCTION:

As we all know that we cannot imagine a day without electricity, and this also a fact that we cannot rely on the conventional sources for the production of electricity and the nonconventional sources are not that efficient to render the production at greater extent. For example, India and some of the developing countries meet their electricity needs by either buying it or producing it by Coal and other conventional sources.





According to a survey it has been found that the utility **electricity sector in India** had an installed capacity of 278.734 [GW](#) as of 30 September 2015 in which renewable power plants constituted 28% of total installed capacity and Non-Renewable Power Plants constituted the remaining 72%.

So it is important to find an alternative method of production of electricity.

As we know that electricity crisis is the major concern now a days. We the students of **NIT Jamshedpur** are working on an innovative and exclusive method for solving the crisis with the help of an everlasting source i.e. GRAVITY. The setup of our project is not region specific which is a major drawback in the cases of production of electricity using solar energy, Hydro energy and Wind energy etc.

### INNOVATION:

Creation of rotational torque by using the two basic principles of magnetism and gravitational attraction is the innovation in this project. This sounds similar to other ways of electricity production but it is quite different and incomparable with the rest of ways.

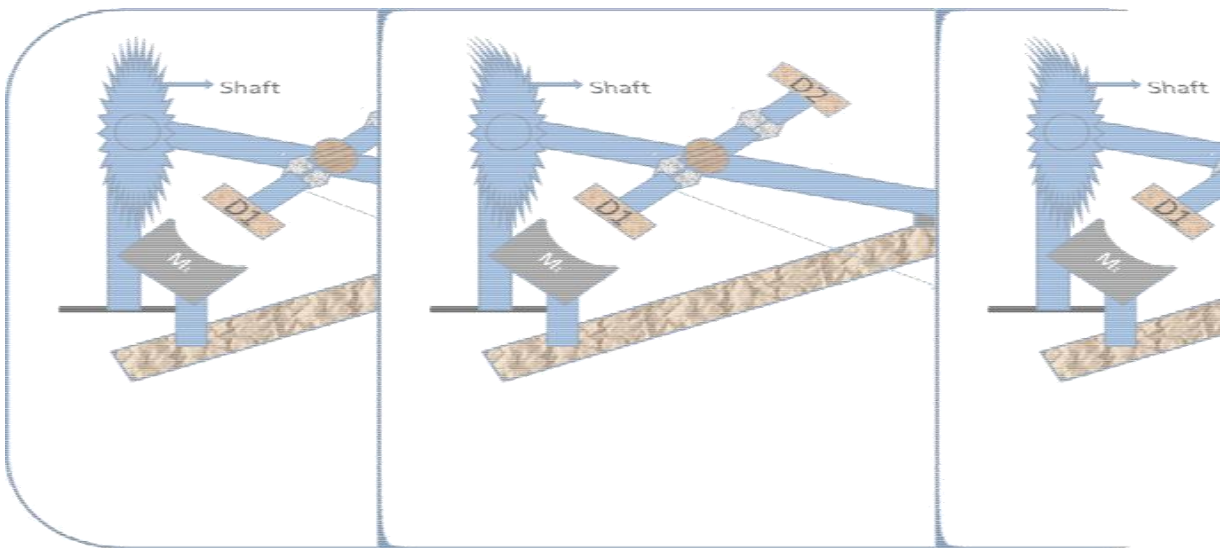


FIG:-SIDE VIEW OF APPRATUS

### RELEVANCE TO INDUSTRY, BUSINESS AND ACADEMIC INTEREST:-

- The model of our project could be used for production of electricity with one time in stallment cost and almost no maintenance cost.
- It contributes to business of the same and it is a matter of research as well.

The model proposed here could prove to be one of the main stream process of production of electricity which could replace the conventional process that are being followed now in the market which are expensive and hazardous to environment.

### **SOCIAL IMPACT:-**

The production of electricity from our model is purely eco-friendly.

It will be able to provide electricity to those areas where there is a shortage of sufficient sources for electricity production.

### **ACHIEVEMENTS:**

**This idea of Thermocol model achieved 2nd prize in the “Exposition” an event in Annual techno management fest of NIT JAMSHEDPUR ,OJASS’15.**

**This idea won 1<sup>st</sup> prize under innovation in an event “EUREKA” of “KSHITIJ-the Asia’s largest annual techno-management fest IITKHARAGPUR’16.**



This project got selected for E-Cell of our college, NIT JAMSHEDPUR in 2016.

**THANK YOU**

# NIT KURUKSHETRA

## National Institute of Technology Kurukshetra

Innovation Club of National Institute of Technology Kurukshetra was established in May 2014. Presently, the club focuses in all areas of science, technology and engineering. The Institute encourages students to innovate. The institute has recently invited innovative ideas from UG and PG students and shortlisted groups/students will be encouraged to continue to work towards product development. The Institute is organizing an Entrepreneurship and Startup Awareness with Boot Camp programme for the students of the Institute on 30.01.2016 with an aim to encourage interested students setup their own Startup Enterprises Some of the areas where Innovation club members, faculty of the institute and students are as:

### **Dye sensitized solar cells**

Global population growth, economic development, scarcity of fossils fuels, and environmental concerns have surged the demand for green energy technologies such as, wind, geothermal, hydro power, photovoltaics (PV) and fuel cells. Among these PV has emerged as an important player. Current PV conversion technologies have challenges in terms of material utilization, long term stability, conversion efficiency, energy storage density and most importantly cost competitiveness (\$/Wat). Compared to many non-conventional PV schemes, silicon based PV has certain inherent advantages as silicon is abundant material, non-toxic and environmentally benign. However, dye-sensitized solar cells (DSSCs) have been shown to be better alternative over silicon if price/performance ratio is compared. Nevertheless, unlike silicon or other technologies, it can absorb diffused sunlight and fluorescent light and can convert it efficiently into electricity. DSSCs can also work in cloudy weather and low-light conditions where silicon and other traditional cells fail. Our approach will deal with various problems to enhance the efficiency, and to make these cells to work during night.

### **Nanostructured bulk thermoelectrics**

The huge demand of energy has posed a great challenge for the world to look for non-conventional sources of energy. Moreover there is a strong requirement of pollution free, cost effective and sustainable sources of energy because of ever increasing emission rates of CO<sub>2</sub> and other greenhouse gases. Thermoelectricity seems to be

choice of technology since there is direct conversion of heat to electricity. There has been tremendous growth in the field of thermoelectrics during the last 10-15 years and it is now developing continuously. Thermoelectric devices have found new dimensions with the introduction of nanostructures in thermoelectric materials. Due to quantum confinement effects on charge carriers their energy spectrum gets influenced leading to enhanced thermopower. The scattering of phonons at the boundaries of nanostructures serves to reduce the lattice thermal conductivity below the alloy limit, making it possible to have thermoelectric devices with  $ZT > 1$ . The major impact of nanostructuring seems to be on phonon transport properties rather than electrons. To enhance the thermoelectric efficiency currently we focus on the oxide materials and devices due to their stability at elevated temperatures.

### **Hybrid energy harvesting systems**

Developing technology to meet society's energy needs is challenging and meeting this need through carbon-free energy sources will likely require a mix of energy generation schemes

including, wind, geothermal, hydro power, direct solar-to-electric energy conversion (photovoltaics), thermoelectrics etc. Our current approach on hybrid energy harvesting systems is limited to dye sensitized solar cell and nano-thermoelectrics. In this area we are exploring the possibility of new devices which can harvest the sun light and heat together.

### **Nano-science and nanotechnology**

Synthesis and characterization of oxide nanomaterials for above projects, lead-free piezoelectric energy harvesting materials, solar and thermal energy harvesting materials, biological energy harvesting, emerging materials and technologies for energy harvesting, etc. are some of our near future research interests.

# **NIT MEGHALAYA**

## **INNOVATION CLUB, NIT MEGHALAYA**

**NIT Meghalaya has set up an Innovation Club, with the goal of nurturing the grass root level innovators young minds and. The club tries to provide a platform to take-up the day-to-day problems of the society and come-up with innovative ideas and develop solutions on those.**

**The innovation club of NIT Meghalaya has organized various events in this endeavour of the Institute-**

- **various guest lectures by renowned scientists, academicians**
- **exhibition related to innovation by the students of various schools of the locality**
- **quizzes, technical workshops**
- **technical competition to encourage the students of the region**



# NIT PATNA

## INNOVATION CLUB OF NIT PATNA

Innovation Club in our college is a cluster of various societies classified on the basis of streams taught in our college which provides a platform for all the budding engineers to showcase their talent and to encourage a competitive environment for overall development of student. The list and achievements of various societies are as follows:

- **American Society of Mechanical Engineers(ASME) NIT PATNA Chapter**, is a professional association, an engineering society, a standards organization, a research and development organization, a provider of training and education, and a non profit organization. ASME Student Chapter NIT Patna, inaugurated on 18 April 2013, the first of its kind in college is accredited with organizing variants of event in the college premises under its ambit in a brief tenure, which includes Pro-e classes, industrial visits, workshops, quizzes etc.

Our College Team, **Acceleration** participated in **ASME's International Human Powered Vehicle Challenge(HPVC) 2014 & 2015**. It provides an excellent opportunity for students to demonstrate the application of sound engineering design principles in the development of sustainable and practical transportation alternatives. In the HPVC, Students work in teams to design and build efficient, highly engineered vehicles for everyday use-from commuting to work, to carrying goods to market.

### ***Achievements:***

- I. **2<sup>nd</sup> Rank in the Design Event in HPVC 2015 among various teams participated from all over the country held at DTU during Jan 2015**
  - II. **6<sup>th</sup> Rank Overall and 1<sup>st</sup> in all IITs and NITs in HPVC 2014 at IIT Delhi out of participated 39 teams.**
- **SAE INDIA NIT Patna Collegiate Club**, The Society of Automotive Engineers NIT Patna collegiate club was inaugurated in September 2014. SAE emphasizes on the transport industries such as automotive, aerospace and commercial vehicles. To promote and enrich the knowledge of students in this domain it also organizes various events such as SUPRA, BAJA, EFFI Cars, EFFI Cycle. Presently it has 65 members under the guidance of two faculty members.

Our College Team, **AAVEGA**, is a group of 25 budding Mechanical engineers from NIT Patna SAE Collegiate Club, National Institute Of Technology, Patna, who have taken the initiative to participate in Formula Student SUPRA SAE INDIA 2015. The formula Student aims at building of a racing car within the college premises to provide the budding engineering student to get a exposure to tentative engineering concepts and uplift their understanding of concepts. Team AAVEGA is determined to perform brilliantly in the SUPRA, and gain a valuable experience along with sharpening our skills and creativity with every passing year. Team AAVEGA stood 55th in Virtual Supra SAEINDIA 2015.

***Achievements:***

- 1. Team AAVEGA stood 19<sup>th</sup> overall out of 105 teams in Supra SAEINDIA 2015 and 2<sup>nd</sup> among all the NITs and IITs held at Chennai Madras Motor Racing Track**

➤ **Institute of Electrical And Electronics Engineers(IEEE)**, an association dedicated to advancing innovation and technological excellence for the benefit of humanity, is the world's largest technical professional society.

IEEE-NIT PATNA is a newly registered student branch (Student branch code-13191 and school code-60060786) under Kolkata section of IEEE With the active participation of the students and the faculty members, the branch is ready to launch its wide range of technical activities in the days to come.

# NIT PUDUCHERRY

## INNOVATION CLUB AT NIT-PUDUCHERRY

Innovation club at NIT-Py is an interdisciplinary club which primarily focuses on collecting innovative and creative ideas from students and transforming them into worthwhile projects. The ideas hence gathered can be put to meaningful use with careful approach and meticulous efforts to develop industrial standard products and obtain commercial outcomes.

### VISION

To create a platform where optimum knowledge and experience can be shared through experimentation of new ideas.

To develop industrial standard projects with collaborative efforts from students and teachers alike.

### MISSION

To encourage active participation from every interested student in implementing the selected best ideas.

To provide financial aid to students with best creative ideas so as to encourage their endeavors of developing realizable projects.

To inculcate among students the basic skills of leadership, project management, marketing, entrepreneurship etc.

### INNOVATION CLUB ACTIVITIES

Innovation club collects innovative ideas from the students in the beginning of every semester.

The members of the innovation club find the suitable persons from all the departments of NITPy to guide the projects.

Innovation club will try to provide financial assistance for the selected projects with the approval of Director, NITPy.

Innovation club will request the experts in different fields from IITs, other NITs and industries to exchange their ideas for the projects undertaken by our students.

The following projects are in progress by the students in the year 2016 under Innovation club, National Institute of Technology Puducherry:

S. No	Team	Class	Project Title	Project guide
1.	Angom Thajalembi, Rojita Chingakham and Seerat Kaur Sidhu.	IV EEE	Intelligent Traffic Lights Based On RFID	Dr. T.Vinopraba, Assistant Professor,  Dept. of EEE

<b>S. No</b>	<b>Team</b>	<b>Class</b>	<b>Project Title</b>	<b>Project guide</b>
2.	S P Nanda Gopal and Buyya Sai Krishna	IV EEE	Vibration Energy Harvesting using Piezoelectric Material	Dr. T.Vinopraba, Assistant Professor, Dept. of EEE
3.	Jibin John Babu and Sandeep K Ninan	IV EEE	Maximum Power Point Tracker using P&O	Dr.K.Chandrasekaran, Assistant Professor,
			Algorithm	Dept. of EEE  Dr. Kaladhar Kola,  Assistant Professor, Dept. of Mathematics
4.	Koonireddy Rohit and Tilak Aditya Gani  Reddy	IV EEE	Implementation of Artificial Neural Network Based Maximum Power Point Tracker for a PV-Cell	Dr.K.Chandrasekaran,  Assistant Professor, Dept. of EEE  Dr. Kaladhar Kola,  Assistant Professor, Dept. of Mathematics

5.	Vikash Jangir and Nihal K	IV EEE	A Low Cost Moisture Sensing Unit for Smart Irrigation Applications	Dr.G.Koperundevi, Assistant Professor, Dept. of EEE
6.	Ganesh Krishna Teja and S. Giribabu	IV EEE	Energy Efficient Boost Converter	Dr.G.Koperundevi, Assistant Professor, Dept. of EEE
7.	Vijesh Jayan, Vijaykumar and Vinai Krishnan R	IV EEE	Theoretical and Experimental Analysis of Combined Electric Power Generation and Seawater Desalination using Solar Parabolic Dish Collector (SPDC) System	Dr. N. Sendhil Kumar, Assistant Professor, Dept. of ME



8.	Ashwani Kumar, Giridharan S, Hari Haran M, Sridhar L and Rajkiran J	III ECE	Simple Weather Station	Dr G Lakshmi Sutha, Assistant Professor, Dept. of ECE
9.	Ashwani Kumar, Giridharan S, Hari  Haran M, Sridhar L and Rajkiran J	III ECE	GPS based Border Alert System for Fishermen with Boat Speedometer	Dr G Lakshmi Sutha, Assistant Professor,  Dept. of ECE

S. No	Team	Class	Project Title	Project guide		
10.	Nikhil Kumar and  Vignesh D	IV ECE	Real Time Motion Sensing and Hardware  Control	Mr Malaya Kumar Nath, Assistant Professor, Dept. of ECE		
11.	Rohith Sangineni,	III EEE	Construction and  Application of Table Top Van De Graff Generator	Dr	Amrtha	Bhide, Professor, Assistant Department of Physics
12,	J. Mahaboob  Hussain and  Mastram Meena	IV ECE	Modular Home Automation using Face Recognition, Gesture Recognition and Motion Tracking	Mr	Malaya	Kumar Nath, Assistant Professor, Dept. of ECE

# NIT ROURKELA

## Profile of Innovation Club: TIIR-NIT Rourkela

### Objective(s):

- To create awareness among the students & graduates of the importance of small and medium business houses towards community development.
- To identify potential Entrepreneur and nurture and support them to develop independent self sustaining business.
- To foster linkages between the parent institution, Industries and R&D institutions in the region and other related organizations engaged in promoting small and medium enterprises (SMEs) including NGOs & other voluntary organizations
- To catalyze and promote development of S&T based enterprises and promote employment opportunities.

### Core- Competence: Technology & Scientific Research

**Thrust Areas:** Smart City Products, Renewable Energy, Electronics, RFID / Embedded system.

No. of Academic Dept: 21	Academic Support Centre: 07	Centre of Research: 09	Centre for Industrial Electronics & Robotics
			Centre for Development of Nanomaterials
Programs: B.Tech., B.Arch., M.Tech., M.Sc., MBA, MA, PhD, Postdoc			Centre for Cryogenic & Superconducting
			Engineering
Total number of teaching faculty with PhD qualification: 261			Centre for Industrial Refrigeration & Air
			Conditioning
Total number of non-teaching with PhD qualification: 02			Centre for Renewable Energy Systems
			Tissue Engineering Centre
Undergraduate Student Strength: 3474 Postgraduate Student Strength: 1207 Doctoral Student Strength: 749 Total Student Strength: 5430			Steel Research Centre
			Centre for Computer Vision & Pattern
			Recognition

**Management Team /Governing Body:**

- Prof. Sunil Kumar Sarangi, Chairman & Patron, TIIR
- Prof. Bibhuti Bhusan Biswal, Dean, Faculty welfare & Head, TIIR
- Prof. Rajeev Kumar Panda, Coordinator, TBI-TIIR, NIT Rourkela
- Prof. Banshidhar Majhi, Dean, Academic
- Prof. Chittaranjan Patra, Dean, Planning and Development
- Prof. Kishore Chandra Pati, Dean, Student Affairs
- Prof. Bidyadhar Subudhi, Dean, Alumni Relations & Resource Generation
- Prof. Gopal Krishna Panda, Dean, Research & Consultancy

**Infrastructure available (Land, building, rooms, library etc.):**

The details of infrastructure of TBI (TIIR Building):

- Site Area: 9572.05 sq.mt.
- Built-up Area excluding basement: 13741.779 sq.mt
- Air-conditioned area: 6060 sq.mt
- Non- Air-conditioned area: 7681.8 sq.mt
- No. of stories: G+3

**Incubation Facilities:** Computer Lab, R&D Lab, Scientific instruments, devices, telephone/fax, 24\*7 wifi internet

**Services offered (Advisory, technical, management etc.):** Faculty & Research Student support

**Association with other agencies:** NSTEDB, MSME, P&C Dept. Govt. of Odisha, FICCI, ASSOCHAM.

**Present activities of Innovation Club-TIIR:****Centres-**

1. Innovation & Entrepreneurship Development Centre (IEDC) funded by National Science & Technology Entrepreneurship Development Board (NSTEDB), DST.
2. Business Incubation Centre funded by MSME, Govt. of India.
3. Innovation cum Incubation Centre to be funded by P&C Dept., Govt. of Odisha
4. Technology Business Incubation (TBI) to be funded by DST-MHRD.
5. Seed support fund scheme to be funded by Technology Development Board (TDB)

Events/activities being organized:

1. National Entrepreneurship Summit (NES) being organized annually since 1995.
2. Entrepreneurship Cell (E-Cell) set up in 1981 & E-cell activities organized on frequent basis

3. Business Plan & Arthyan competitions held annually to motivate student entrepreneurs.
4. Entrepreneurship Awareness Camp being organized twice a year.
5. Faculty members are encouraged to take up entrepreneurship and product development assignment in different field of science and technology & Incubatee space is offered to individual faculty interested in product development.
6. Seed money is offered to faculty entrepreneur interested to take up product development.
7. Regular Industry-Institute-Interface program are conducted to understand the industry specific technology issues and to offer possible innovative solutions.
8. Institute recognized the Best Under-Graduate & Post-Graduate Product oriented Project to motivate students to take up product development seriously that may lead to entrepreneurship.

### **ENTREPRENEURS INCUBATED BY Innovation Club-TIIR**

**Minz Chemicals Pvt. Ltd.:** Working on development of new protective materials for civil structures. Collaborative faculty from NIT, Rourkela–Civil Eng.,Chemical Engineering.

**Phoenix Robotix Pvt. Ltd.:** Working on technology driven industrial safety and environmental condition monitoring systems. Collaborative faculty from NIT, Rourkela – Electronics & Comm. Engineering, Electrical Engineering, Industrial Design.

**Ikshate Technologies:** Working towards developments of new apps for human convenience through social networking. Collaborative faculty from NIT, Rourkela – Computer Science & Engineering, Electronics & Communication Engineering, Metallurgical & Materials Engineering, Industrial Design, Electrical Engineering.

**Poly Refractories Pvt. Ltd.:** Working on developing modern refractory materials for metal industries. Collaborative faculty from NIT, Rourkela – Civil Engineering, Ceramic Engineering, Chemical Engineering.

**Sarvesh Refractories Ltd.:** Working on developing new refractory materials for steel industries and monitoring health condition of refractory linings. Collaborative faculty from NIT, Rourkela – Ceramic Engineering, Chemical Eng, Electronics & Communication Engineering.

**Hostel Cart.Com:** Developing e-commerce systems for supplying various commodities to hostel boarders.Collaborative faculty from NIT, Rourkela – Computer Science & Engineering, Electronics & Communication Engineering, Electrical Engineering.

**Estinno:** Developing innovative domestic consumables and products. Collaborative faculty from NIT, Rourkela – Electronics & Communication Engineering, Mechanical Engineering, Industrial Design.

**Datawise Management Service Ind. Pvt. Ltd.:** Working on data mining and data base management.Collaborative faculty from NIT, Rourkela – Computer Science & Engineering, Electronics & Communication Engineering, Electrical Engineering.

**Details of patents granted during last five years:**

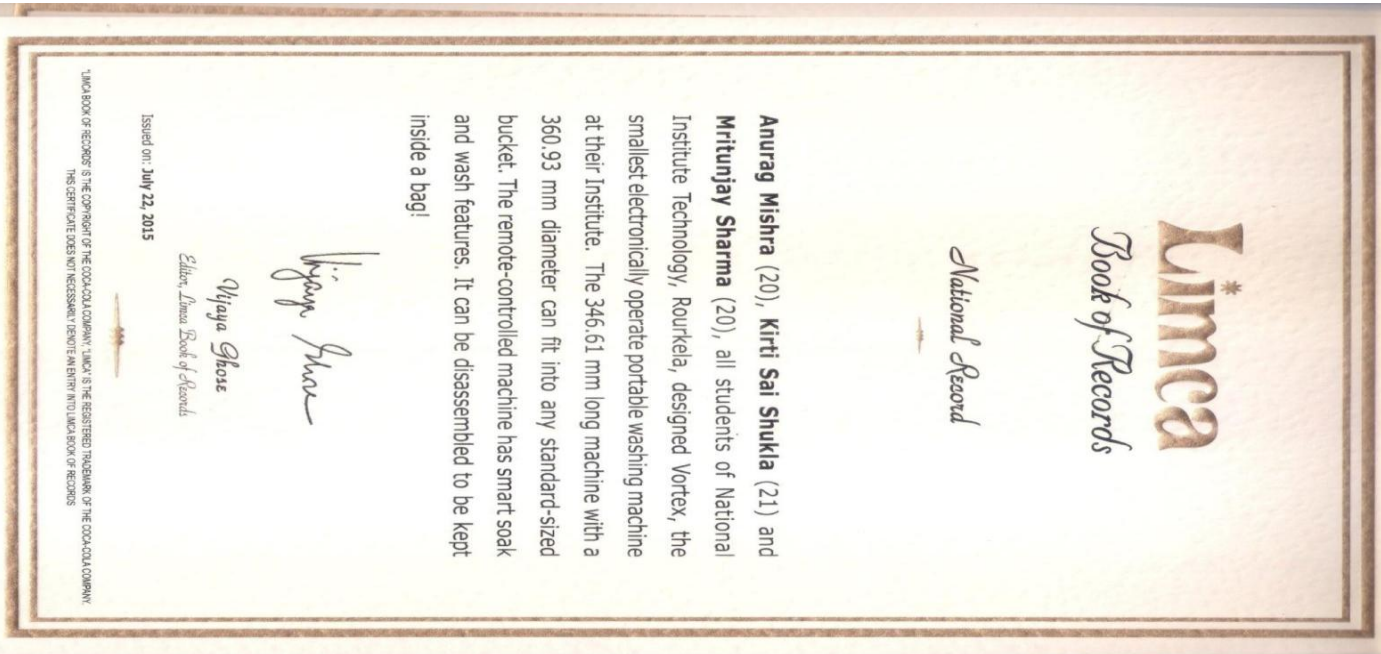
- R.K.Singh, K.P.Shadangi, 'Production of fuel oil from Polanga (calophyllum inophyllum) seeds' Application no. 1379/KOL/2010, publication date 04/03/11 Issue no.09/2011.
- R.K.Singh, A.K.Panda, 'Catalytic conversion of waste polypropylene to liquid fuel' Application no. 674/KOL/2011 publication date 24/06/11 Journal no.-25/2011.
- R.K.Singh, Vikranth Volli, 'Production of fuel oil from Sesame (Sesamum Indicum) De Oiled Cake' Application no. 91/KOL/2012, publication date 16/03/2012.
- R.K.Singh,Sachin Kumar, 'Catalytic Conversion Of Waste High Density Polyethylene to liquid fuel' Application no.8/KOL/2010, publication date 08/03/2013, Journal no.10/2013
- A.Sahoo, Rajesh Tripathy, 'Design of Fluidized bed biomass gasifier (COLD AND HOT MODELS)' Application no. 7/KOL/2010, publication date 08/03/2013, Journal no.10/2013
- S.Murugan, Arun Kumar Wamankar, 'Process of Producing synthetic fuel (Carbodiesel) from carbon black and use the same as alternate fuel for CI (diesel) engines' Application no. 213/KOL/2013.
- D.R.K.Parhi, Alok Jha, 'Design and Development of low speed solar car for city ride' Application no. 214/KOL/2013.
- Kirti Sai Shukla et. al., Ultraportable Mini Washing Machine, ' Application no. 916/KOL/2014

**R& D and industrial consultancy track record  
(5 best applied R&D/Industrial Consultancy undertaken)**

Name of the project	Sponsoring agency	Amount Sanctioned Rs. Lakh	Amount Released Rs. Lakh
Review of executional design of buttressing work of Dhanras Ash pond.	NTPC	13.2	13.2
Design of Buttressing and ash utilization in raising of Katikala ash pond	Sterlite Energy Ltd.	11.25	11.25
Design of Butterssing of VI ash dyke of NTPC, Vidhyachal	NTPC	12.28	12.28
Retrofitting & Redesigning for enhancing capacity of katikala ash pond	Sesa Sterlite Limited.	11.25	11.25
Surface Runoff Study for 15 open Cast Mines of MCL & Preparation of Management Plan	Mahanadi Coalfields Ltd., CIL	29.71	29.71
Buttressing of Lagoon-II at ash Dyke	NTPC	20.37	20.37

## Innovative Products Developed by Student Entrepreneurs

1. Ultraportable Mini Washing Machine
2. Automated Gupchup Machine
3. Weather Station



4. Smart Pill Box
5. Uquiz Complete Solutions
6. Cloud connected led display
7. Intelligent multipurpose smart helmet
8. Development of low cost and light weight portable led projectors with inbuilt power supply
9. Cost effective portable multi-gas detectors



10. Hand gesture based pc control
11. White space radio for remote and rural broadband connectivity
12. Cost effective ultra-portable universal battery charger

## Recognition:

### Achievements of TBI Incubatees

#### Phoenix Robotix Pvt. Ltd:

- One of the top ten participants for [Innovate for Digital India Challenge](#) conducted by Intel DST and mygov and felicitated by the President of India and Union Minister Mr. Ravi Shankar Prasad for the product 'Aurassure'.
- Successfully completed three month accelerator program by UC Berkeley and CIIE, IIM Ahmedabad.
- Successfully created more than 30 industrial client in Western belt of Odisha.

#### Estinno:

- Limca Book World record holder for manufacturing World's smallest washing machine.
- Recived an Indian patent for the 'Vortex': Portable washing machine.



# NIT SILCHAR

## National Institute of Technology Silchar

Assam, India, PIN-788010



### Indovation lab at NIT Silchar



The idea of Design & Innovation center has been conceived from the meeting with Prof. Shyam Pitroda on National Mission of Innovation at MHRD, New Delhi. The importance and significance of design and innovation in universities and institute of national importance like NITs and IITs are well elucidated during the meeting.

Prof N V Deshpande, Professor, Mechanical Engineering and Director, NIT Silchar visited University of Illinois Urbana Champaign (UIUC), one of the top 10 institutes in the world, and had a detailed discussion with HoD, Mechanical Engineering, UIUC on 6<sup>th</sup> June,2012. The discussion centered on the methodologies of developing state of the art Design and Innovation Center in various institutes in India, and at NIT Silchar to be precise. On return from USA, Research Park was initiated and a subject was introduced on Design for 1<sup>st</sup> year B Tech, ME in July, 2014 as an Audit Course.

A credit course on Product Design is also introduced for PG Courses of Mechanical Engineering. The syllabus of the course is designed based on 35 years of academic and research experience of Prof N V Deshpande in the domain of product design and innovation, in consultation with industry such as TATA Technologies Ltd.

Assistant Professor, Wasim Arif, ECE was assigned to IDC , IIT Bombay for two days workshop on design and innovation. The workshop was attended by reputed faculty members form IDC, IITB and NID, Ahmedabad and other successful entrepreneurs who showcased their success story. The visit was meant to learn the technical know-how about design courses and laboratory

set up in IDC-IITB . The target was to initiate a similar laboratory and course for design and product prototype at NIT Silchar.

The National Policy on Start-ups and innovation was attended by Prof N V Deshpande and Assistant Professor Wasim Arif in IIM Ahmedabad which was chaired by Prof Anil Gupta, IIM Ahmedabad who is one of the key person behind Honeybee Network and entrepreneur movement in India. NIT Silchar is happy to contribute its input regarding innovation and startups to the draft during the meeting. The trip was followed by a visit to Venture Studio, Gujrat University where the modalities of funding, crowd funding required for startups and incubators of all kind in the society were learned. The visit ignites NIT

Silchar to open up **INDOVATION LAB (Indian Innovation Lab)** to promote innovation and innovation driven product development.

The name of the center is given as INDOVATION LAB which is incepted from INDIan InnOVATION. The 'I' of every Indian is able to change the growth story of our country with Innovation in all fields.

The Venture Academy is working as a single window for idea generation, establishment of plan, product prototype and start-up enterprise formation. The academy is equipped with Mechanical Devices, Electronic measuring instruments and gadgets, computer terminals with wi-fi connectivity. The academy already started with product prototype development and start-up business model. The BOG has approved Rs.1.00 Crore for Venture Academy to initiate its objective to produce incubators and innovators from NIT Silchar

In its 3 Months of existence, Venture Academy-Indovation Lab has come up with some notable achievements as follows:

**Speaking Walls:** Six Undergraduate students of NITS has started up their venture named as SpeakingWalls. The company has got empanelled in Amazon.com and also received their registration confirmed. The Speaking Walls is an online art and design solution provider and has a very high potential to be a successful venture.

**Solar Tree:** Inspired by the tree structure Prof N V Deshpande has developed a Tree like arrangement where the branches are equipped with Solar panels. This will open up the vertical space for implementation of large scale solar energy. Presently a DC fan is connected to it and is under field test for product level prototype development. The mechanical structure is build by a villager under the mentorship of Prof N V Deshpande.

**Solar Water Heater:** A solar water heater without PV Solar Cells is been developed by a villager named Nandu. He designed the entire structure and assembled few components by himself. The water heater is capable of generating hot water of 86<sup>o</sup> c- 90<sup>o</sup> c and is capable of supplying 200 liters per hour. The low cost model has got appreciation and Indovation lab is planning to manufacture the Water heater as a product for Technology Transfer.

**DC Fan:** A fan running on DC source is designed by Assistant Prof. A K Goswami. The main target of such project is to avoid the DC to AC conversion loss and expenditure involved around. The aim of the project is to produce a low cost affordable DC fan which will run on solar with optional hybrid energy system.

**Wheel Chair:** A solar powered wheel chair is designed by Subham Jain and his team mates which has gotan European Award and a Patent has been filed. The wheel chair is running on PV solar plates mechanically embedded on the wheel chair.

**Solar powered wheelchair:** This invention provides a wheelchair with foldable solar panels. It has a pair of side frames which supports the foldable and adjustable solar panels each of 80W. Secured to the side frames are a motor drive system, a pair of rear wheels, a pair of castor mounted front wheels, a pair of footrest and a battery support assembly that supports at least one

battery. The invention uses 144W motors instead of 320 W motors used conventionally. This project was awarded the *Innovative Student Projects Award 2013* (Bachelor's Level) by the

*Indian National Academy of Engineering and the Best Undergraduate Students' Project on Renewable Energy 2013( 3<sup>rd</sup> Prize Worldwide)* by the European Renewable Energy ResearchCenters (EUREC)

**Drones:** The project of UAV (Unmanned Aerial Vehicle) or drone is running under Assistant ProfessorWasim Arif. The aim of the project is to develop a indigenous algorithm for a controlled drone which can transfer stream video for video surveillance. The drone is equipped with various gas sensors to detect the presence of toxic gas profile of an area. The group is also working on a plan to open up a startup venture to manufacture autonomous remote controlled toys for Indian market manufactured in India.

**Skill Development:** Venture Academy is also looking after skill development and creation of jobopportunities for the people in the NE region.

**Solar Maintenance-**A two days solar maintenance is organized under Venture Academy. A manual is prepared in four languages, **Asamese, Bengali, Hindi and English**. A solar maintenance manual of such multilingual format is unique and is well appreciated by many visitors. The trainees are from local villages and NIT Silchar is planning to offer the maintenance of all the PV Solar Street Lights and 200 KW solar power plant to those successful interested trainees through a suitable mechanism.

**Soldering:** Venture Academy is preparing a draft for MoU with Indian Soldering Association for a certificate course on soldering. The North East being a major focus of various projects is estimated a shortfall in skilled soldering manpower. This initiative is likely to create a window of better job opportunities for the local people.

**Arsenic and Iron Removal Plant** : Technology transfer from CSIR and up gradation of an Arsenic and Iron Removal Plant is undertaken under Venture Academy and Department of Chemistry, NIT Silchar. The project is to develop an Iron and Arsenic Removed water treatment plant at NIT Silchar for its stake holders and extend it to neighborhood villages in future with all suitable measures and cooperation from local administration.

**Low cost e-health monitoring system:** A low cost embedded system for health monitoring system is undertaken under Assistant Professor Wasim Arif which will provide a feasible solution for villagers to reach good doctors online. The module is equipped with various sensors for medical analysis of patient. The module will be sending the sensory data to a remote console which will be plugged to cloud and registered doctors will be able to see the test report and a printable prescription will be delivered at patients end. The embedded module will be a unique solution and also aims to be used for water quality measurement via sensors using the basic architecture.

NIT Silchar also started **Research Promotion Cell** with a mission to promote innovative projects at undergraduate level. The response of RPC project proposal is overwhelming with more than 30 projects have been submitted this year. The idea and creativity presented by our students is encouraging and the responses substantiate the importance of RPC and Innovation Lab at NIT Silchar.

#### **Research promotion cell (RPC)**

The genesis of the Research Promotion Cell by the National Institute of Technology, Silchar in the year 2012 has been a phenomenal step towards materializing Innovation. The cell dedicates itself for development of ideas in the field of science and technology. It provides research support to B.Tech./M.Tech./M.Sc. students for pursuing exciting and Innovative research. The principal objectives of this body of research includes:

- Promotion of professional and academic and activities.
- Provide career guidance to students
- To involve young brains in Science, Engineering and Technology development process.

Facilities:

- Research Promotion Cell has a dedicated air conditioned computer Lab with Wi-Fi and dedicated Internet access which remains open for 24 hours and provide a perfect atmosphere for research and innovation.
- Funding is provided for equipment, consumables, travel, staff/labour charges and contingency.
- Research Promotion Cell not only provides support to the research oriented students, but also informs all the students of NIT Silchar for various internships opportunities in

India and abroad through its facebook page. This has benefitted not only students of NIT Silchar, but also students from other colleges too.

**Projects: Certain research projects undertaken by the students include:**

- Refrigerated Automatic Pet-feeder Solar powered bamboo Rickshaw
- Design and development of efficient Tea- plucking machine Gesture recognized robot
- Focus and positioning system using Automated Robot.
- Development of new triaxial cell for determination of sheer parameters of soil.
- Study on improvement of bearing capacity of soft clay using goecell reinforcement.

**The projects that have been completed by 31.3.2015 include:**

- SPARSH (Solar Powered Automated Route Sensing Hexapod)
- Effect of different substances present in water bodies on corresponding geotechnical properties of soil.
- Characterization of bituminous mix by recycling and cost analysis. GSM based Automation and Control.

**NIT Silchar also received two prestigious projects.**

IEDC- Innovation and Entrepreneurship Development Center which is going to support innovative projects and ideas. The center funded by DST , Gol.


Start-Up Center: NIT Silchar is also received approval of the Start-Up center under DST and DHE. NIT Silchar is among the 18 start up center in the country and is committed to put all its effort to create an ecosystem of entrepreneurs and start-ups in this part of the country. The start-up center will promote the young technopreneurs and social grassroots entrepreneurs to grow and create employability for larger community in the region.

NIT Silchar is organizing a Awareness Campaign in three places during the first and second week of February for school children regarding innovations and start-ups expecting more than 6000 students to participate. The event is in association with local administration.

Nit Silchar already invited proposals from interested entrepreneurs for discussion and idea presentation which was very successful as we received 25 start-up project proposals from students, local entrepreneurs, villagers.



25 start-up and entrepreneurs turned up  
8 start-up ideas from students: potential



**National Institute of Technology Silchar**  
Assam, PIN-788010

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**Call for Project Proposal**

**Scheme: Research Park (under 'Start Up India' initiative)**

**Funding Agency: NIT Silchar**

National Institute of Technology Silchar invites project proposal under **Research Park (under 'Start Up India initiative)** scheme to promote young entrepreneurs for the development of the North East region of the country. The main aim of this scheme is to give a platform for young entrepreneurs to grow and create employability. The scheme is unique and first of its kind in the country which aims to solve some of the focused problems of NE region through cutting edge scientific and technological innovation. The project aims to foster the scientific, technological and innovator community to work for the betterment of social and economical standard of north east India.

Project Proposals under the given scheme can be submitted in the prescribed format on or before **26 February (Friday), 2016 upto 5 P.M. Late submission will not be considered for the current year**

Innovation Lab is organizing National Innovation Summit-2016 during 10-12<sup>th</sup> March, 2016 which aims to provide institutional platform for scouting, spawning, sustaining and scaling up the grassroots innovations across the country. It is committed to making India innovative by documenting, adding value, protecting the intellectual property rights of the contemporary unaided technological innovators. NIS 2016 is to celebrate innovations and entrepreneurship of young Indians & offer them a direction towards their goal.



The brochure cover features a blue geometric pattern at the top. The text 'NATIONAL INSTITUTE OF TECHNOLOGY SILCHAR' is positioned at the top left. The central logo reads 'inOvation' with 'L A B' below it, and 'in association with' underneath. Below this, four logos are listed: NRDC, PMMM-NMTT DHE Govt. Of India, TEQIP-II Govt. Of India, and START-UP CENTRE DST, DHE Govt. Of India. The word 'presents' is centered below these logos. A horizontal line separates this from the main title 'NATIONAL INNOVATION SUMMIT 2016' in large blue letters. Below the title, another horizontal line is followed by the dates '10th-12th March' and the word 'BROCHURE'. At the bottom, a row of logos includes GDG Jalandhar, Lackerearth, palaash, 91springBOARD, and YOUR STORY.

NATIONAL INSTITUTE OF TECHNOLOGY SILCHAR

inOvation  
L A B  
in association with

NRDC

PMMM-NMTT  
DHE  
Govt. Of India

TEQIP-II  
Govt. Of India

START-UP CENTRE  
DST, DHE  
Govt. Of India

presents

NATIONAL  
INNOVATION  
SUMMIT 2016

10th-12th March

BROCHURE

GDG Jalandhar

Lackerearth


palaash

91springBOARD  
ON STRATEGY OUT

YOUR STORY  
INSPIRE  
INNOVATE  
ICANTE



### Venture @cademy - Indovation Lab®



The invention provides a wheelchair with foldable solar panels. It has a pair of side frames which support the foldable and adjustable solar panels each of 80W. Secured to the side frames are a motor drive system, a pair of rear wheels, a pair of caster mounted front wheels, a pair of footrests and a battery support assembly that supports at least one battery. The invention uses 144W motors instead of 320W motors that are prevalent at the moment in the solar powered wheelchairs.

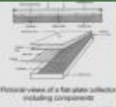
**Best Undergraduate Students' Project on Renewable Energy 2013 (3rd Prize Wheelchair)** by the European Renewable Energy Research Centres (ERREC) Association.

The project 'Solar Powered Wheelchair' was awarded the Innovative Student Projects Award 2013 (Bachelor's Level) by the Indian National Academy of Engineering.

Filed Patent for 'Solar Powered Wheelchair' at the India Patent Office 832/KOL/2013 on 12th July 2012

**SOLAR POWERED WHEELCHAIR**

**SOLAR WATER HEATING SYSTEM**



Consists of a collector to collect solar energy and an insulated storage tank to store hot water. The solar energy incident on the absorber panel coated with selected coating transfers the heat to the riser pipes underneath the absorber panel. The water passing through the risers gets heated up and is delivered to the storage tank. The re-circulation of the same water through absorber panel in the collector raises the temperature to 80° C (Max) in a good sunny day. The total system with solar collector, storage tank and pipelines is called SWHS.

Life: 15-20 years

Approximate cost: Rs.15000-20,000 for a 100L per day capacity system

**SOLAR WATER HEATING SYSTEM**

### Indovation Lab- few projects undertaken



Solar DC Fan



E-Bikes



Low Cost Bamboo Storage House for Local Fruits



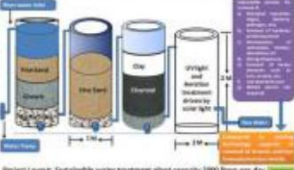
Solar Bamboo Rickshaw



IoT Drones for Surveillance

### Venture @cademy - Indovation Lab®

#### SUSTAINABLE WATER PURIFICATION PLANT @ MADHUTILLA VILLAGE



**Project Layout: Sustainable water treatment plant capacity 2000 litres per day**

It is a mini Unmanned Aerial Vehicle(UAV).It consists of highly sophisticated sensors,algorithms and wireless systems.The copter is targeted to be used for surveillance, toxic gas profile measurement, disaster management etc. The project aims to upgrade the existing model with innovative algorithms and design. It is planned to form an incubation in collaboration with Indovation Lab,NIT Silchar, for product development of autonomous aerial vehicle and autobots.

### Skill Development :

#### NITS-CIT (National Institute of Technology Certificate in Information Technology)



**Course Objective:**

To up skill the rural and unskilled people with basic computer literacy

**Course Outcome:**

High expectation to enable them finding vocational and entrepreneurship opportunities by observing themselves in indispensable employability.

SKILL DEVELOPMENT

### Pine Apple Food Processing Unit:



NITS association with Barak Valley Pineapple Growers Association will open new avenues for skills development & generate employment opportunities in the entire NE region.

- ✓ Handicrafts
- ✓ Food Processing Units

NITS is aiming to develop a state of the art Pineapple food processing unit at *Lakhimpur*- renovate and reopen the closed factory.

GOING RENEWABLE

### Renewable Mission : Solar Training for employment

In view of Hon'ble PM's vision and Govt. of India's initiative in Solar Energy-NITS started empowering villagers with training on Solar for employment






**Two days skilled development program on Solar system at Venture Academy-Indovation lab**

**Manual in four languages**

The aim of the workshop was to strengthen the knowledge & skills of villagers from nearby villages on solar system

SKILL DEVELOPMENT

### Photochemical Machining :



Institute has initiated R&D projects in collaboration with **Bamboo & Cane Development Institute, Agartala** and **Bhabha Atomic Research Centre, Mumbai**.

Training on Photochemical Machining is conducted by NITS

ALTERNATIVE ENERGY

### Renewable Mission :

#### Kitchen Waste Bio-Gas Plant:



Kitchen waste of 300 capacity boys hostel-8 is used for Bio-Gas plant which is using for hot water generation.



### A NIT Silchar and C-DAC- Mohali collaboration:

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To provide specialized health care services to the rural population in Mihar, Assam, C-DAC, Mohali is establishing telemedicine Consultation Centers (TCC) at NIT Silchar & two villages on a pilot basis.

It is proposed to establish TCC at 3 locations namely

- Cachar Cancer Hospital & Research Centre (specialist node) CDHC,
- Rabu/Mahalluli
- Takagram/Whanga (remote node) at Mihar.

### Solar System Manufacturing Unit



### Women's Income Generation Center, Manipur



### Shree Ganesh Associates Pvt. Ltd.

#### SOLAR WATER HEATING SYSTEM

Consists of a collector to collect solar energy and an insulated storage tank to store hot water. The solar energy incident on the absorber panel coated with selective coating transfers the heat to the steel pipes underneath the absorber panel. The water passing through the steel gets heated up and is delivered to the storage tank. The circulation of the water through absorber panel in the collector raises the temperature to 80° C. Above a given spring day, the total system with solar collector, storage tank and pumpsets is called SWHS.

Life: 15-20 years  
Approximate cost Rs.15000-20000 for a 100L per day capacity system.



Flat Site



Security Shed

### Innovated at NITD

#### SW sparkling

**Key Performance Indicators**

Water production	100 LPH
Water cost	₹ 0.05
Energy cost	₹ 0.05
Water quality	100%
Water purity	100%
Water safety	100%
Water health	100%
Water taste	100%
Water smell	100%
Water color	100%
Water clarity	100%
Water hardness	100%
Water alkalinity	100%
Water pH	100%
Water conductivity	100%
Water resistivity	100%
Water total dissolved solids	100%
Water total suspended solids	100%
Water total phosphorus	100%
Water total nitrogen	100%
Water ammonia nitrogen	100%
Water nitrate nitrogen	100%
Water nitrite nitrogen	100%
Water iron	100%
Water manganese	100%
Water copper	100%
Water zinc	100%
Water calcium	100%
Water magnesium	100%
Water sodium	100%
Water potassium	100%
Water chloride	100%
Water sulfate	100%
Water fluoride	100%
Water boron	100%
Water selenium	100%
Water iodine	100%
Water bromine	100%
Water strontium	100%
Water barium	100%
Water calcium	100%
Water magnesium	100%
Water sodium	100%
Water potassium	100%
Water chloride	100%
Water sulfate	100%
Water fluoride	100%
Water boron	100%
Water selenium	100%
Water iodine	100%
Water bromine	100%
Water strontium	100%
Water barium	100%

Investment: **₹ 1,00,000/-**  
Presently having a registered office in Bangalore, India.

### NPS Water Purification Technology

Advanced Technology Developed for: Acreche, Iran, Florida, etc.



Water Purification



Water Purification



Water Purification


**Advantages:**

- This technology is automatically operated
- May be operated manual or continuously
- Are easy to install, operate and maintain
- Are used to treat water for homes, apartments, hotels, restaurants, offices, schools or communities
- Can be used to treat water for domestic use
- May be used for emergency relief
- May be easily transported

**Cost:**  
₹ 100,000/-  
₹ 200,000/-  
₹ 500,000/-

### Projects

#### SOLAR POWERED RICKSHAW (SOPR)



**Expected Outcomes and Benefits**

1. Simple design, rugged and light structure.
2. Efficient Plug-in charging facility.
3. Solar panel, Fuel generator and Dynamic charging facility.
4. Suitable and for better cost tracking.
5. User needs of driving like peddle + motor, Peddle + charging through dynamo, Peddle charging + motor.

**HOW TO MEET THE NEED OF THE MARKET AND TO GAIN PROFITS:**

- It has high probability of success due to its light weight and rugged for local transport.
- Easy to fabricate, easy to modify.
- Attractive design and price which is need of the market.

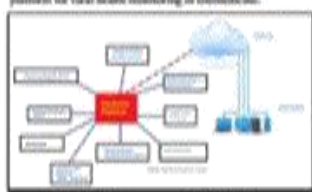
**THE FINANCIAL REQUIREMENT**

- The cost of purchase of raw material - ₹ 10000
- Product development cost - ₹ 10000
- Any other expenditure - ₹ 10000

### Upcoming Start-ups and Entrepreneurship

#### Project HEMAN

Project: HEMAN's Health Monitoring And Non-sensor platform for rural health monitoring in telemedicine.



**Objective:** The project is to develop a low-cost HEMAN's Health Monitoring And Non-sensor platform with the following medical parameters to be measured:

- Pulse and oxygen in blood (SpO2)
- Arterial oxygen (bloodless)
- Body temperature
- Electrocardiogram (ECG)
- Glucometer
- Galvanic skin response (GSR - accuracy)
- Blood pressure (sphygmomanometer method)
- Patient position (Accelerometer)
- Electromyography (EMG)

Cost per portable HEMAN unit: **₹ 25,000/-**

## LOW COST HOUSING PROJECT

### SALIENT FEATURES

- i) Low Cost
- ii) Easy to Install ( within 1 day)
- iii) High Scrap Value
- iv) Light & Portable
- v) Seismic Resistant
- vi) Fire Resistant



STEEL FRAME



REINFORCED EARTH TILES



UNIFORM REINFORCE  
EARTH TILES



STABILIZED SOIL  
COMPOUND AND GEOGRID

Overall cost = Rs. 400/- per sq feet  
for 10X10  
=250/- per sq. ft for 25X20 structure

## Eco-friendly Flexible bicycle for modern life

### Objectives:

To design a bicycle with flexible body to change the handle and seat arrangements as per requirement.

Framing a bicycle with folding option for the ease of transportation in a compact mode.

To reduce the number of bars, so that the weight may get reduced.

To design tire arrangement for better grip while turning at low speed.

It could vary its speed, feasibility and comfort according to the requirements of the customer.  
One cycle could be used for different purposes like terrain climbing, on road or off road cycling, racing, traveling, amusement etc. 21 sets of Gear arrangements

Production Cost : Rs. 12,000/-



Thank you

# NIT SRINAGAR



SRINAGAR

# INNOVATION CLUB NIT SRINAGAR



## **THE MISSION OF THE INNOVATION CLUB**

“Innovation club aims to create an ecosystem that foster and support Innovation and knowledge based entrepreneurship amongst the NIT Srinagar community leading to the creation of wealth and social value through successful ventures.”

## **INNOVATION CLUB OBJECTIVES**

Generate need based ideas (from students, entrepreneurs, grass root innovators or any technical /non technical person) for problem solving

Cultivate, develop, refine/combine and incubate ideas to provide engineering solutions in vast domain of social/technical/industrial /environmental problems

Provide technical support to innovative ideas

## **THRUST AREAS**

- Nurturing/value addition of grass root innovations
- Solution for micro and small scale industrial problems
- Energy Conservation with special emphasis on non conventional sources of energy
- Environmental protection and conservation
- Waste Management and Sanitation

## **INTRODUCTION**

Innovation, Incubation and Entrepreneurship Development Centre (IIEDC) is a Not for Profit Society at NIT Srinagar, dedicated to promote innovation and Entrepreneurship. It is a pedestal to help knowledge driven enterprises to establish and prosper under organized scientific guidance. It also facilitates swift commercialization of a product based on sophisticated technology.

The main objective of the IIEDC is to produce technocrats as leaders and successful firms that will leave the program financially viable and free-standing. These incubators “graduates” create job, commercialize new technologies, and strengthen national economies. Incubator tenants not only benefit from business and technical assistance,

they also benefit from official affiliation with the incubator, a supportive community with an entrepreneurial environment, direct link to entrepreneurs, and immediate networking and commercial opportunities with other tenant firms.

The IIEDC of NIT Srinagar seeks to provide continuous momentum towards promoting innovation in entrepreneurship. NIT Srinagar, will be an academic incubator and provide support to those business ideas which are elaborated by the students that addresses the unattended issues persisting in our society. It aims at providing a platform to young talented students, where they can bring forward their ideas in the space of science and engineering and showcase the same to industry experts to get their assistance in developing a model. It intends to nurture young minds and help their ideas gain ground through channelized guidance and mentorship by industry experts. We wish to give engineering students and industry practitioners an opportunity to interact and build a community that looks into the future.

## **Functions of IIED Centre**

- To organize Innovation based seminars, brain storming sessions, ideas generating camps, symposium, national and international level seminars and “Run for Innovation”.
- To initiate innovative student projects each year for new innovative product Development in collaboration with NIF.
- To organize Business Plan Competitions every year under IIEDC’s Entrepreneurship Development Programme Cell.
- To guide and assist prospective entrepreneurs on various aspects such as preparing project reports, obtaining project approvals, loans and facilities from agencies of support system, etc.
- To arrange interaction with entrepreneurs and create a mentorship scheme for student entrepreneurs.
- To facilitate creation of Entrepreneurship Development Programme Cell in each college to foster culture of entrepreneurship amongst students
- To arrange Industrial Trainings/ Entrepreneurship Skill Development workshops to make the innovation more liable for real time problems and go for the innovations in them.
- Promoting Innovations in Individuals, Start-ups and MSMEs along with Technology Commercialization Program.
- To act as a state body or as Technology Reference Office TRO on business opportunities, processes, technologies, market, etc. by creating and maintaining relevant data bases.

## **ADVISOR COMMITTEE**

- Chief Advisor: Chairman BOG- Dr. M.J. Zaharabi
- Advisor: Professor Rajat Gupta, Director, NIT Srinagar.

### **Members:**

- Director, NIF Ahmadabad.
- Director MSME- Jammu and Kashmir.
- Mr. Abdul Rouf Trambo, CEO Khyber Bio Culture (p) Ltd.
- Mr. Shakeel Qalender, Former president, Chamber of Commerce and Industries.
- Director Science & Technology Department, J&K State.
- Professor, Babar Ahmad, Mechanical Engg., Department, NIT Srinagar.
- Saad Parvez, Coordinator, IIED Centre, NIT Srinagar.

## **LOCAL TECHNOLOGIES DEVELOPED BY INNOVATION CLUB**

- Advanced Mobile Repairing Device
- Portable Room warmer
- Blanket Washing Machine
- Walnut Washing Machine
- Automatic Washing brush

## **PROGRAMES /EVENTS CONDUCTED IN 2015**

- Innovation awareness program conducted at NIT Srinagar
- IPR sensitisation program in collaboration with MSME.
- Students participation at NIT15 Conclave NIT Jalandhar
- NIT students participation in EDP competition, National Entrepreneur Challenge Organised by IIT Bombay (all India 5TH rank)
- Competition on NEX-GEN Abode-The future house at NIT Srinagar

Special thanks to Dr. MJ Zarabi, Chairman, BOG NIT Srinagar for his encouragement, continuous efforts and support.



# NIT TIRUCHIRAPPALLI

## Club 1: Internet of Things' (IoT) Innovation Centre

### **About:**

Internet of Things' (IoT) Innovation Centre to the institute for taking up research. The centre, essentially a research laboratory, has been set up at an expenditure of Rs. 20 lakh. The trust has not only donated the laboratory but also provided three projects to be taken up by students. Three batches of students of the institute would take up research projects on developing "smart bus", "smart house" and an Internet of

Things (IoT)-assisted car.

### **Ongoing Projects:**

- Smart Public Transport System:

The proposed project is about making a smart Public Bus Transport System. It is a step to make the bus timings less erratic. The passenger waiting at the bus stop will get to know the arrival timings of the bus they are expecting.

- Smart Home with User Feedback Interface:

The project aims to build a real-time feedback interface between the user and his/her house, to make the house more intelligent and to cater to the needs of the user. Also, it makes the user aware of the changes in various systems in the house and notifies him to take actions/automatically takes the necessary action.

- IOT Assisted Car:

For the racing cars that are assembled in our college, an electronic system needs to be interfaced so as to make the car more interactive and also allow the driver to know the internals of the car during the ride. The proposed electronic system will measure the gear oil level and the fuel level and shall send the data to the driver as well as those at the pits.

## Club 2: CEDI

### **About the club:**

Centre for Entrepreneurship Development and Incubation (CEDI), is set up to promote innovation and entrepreneurship by converting and translating technology ideas and innovation in various disciplines of science and engineering into products, processes and services for commercial exploitation and the benefit of society. To accomplish its goal, CEDI runs and manages a Business Incubator (BI) at National Institute of Technology, Tiruchirappalli (NITT) to facilitate incubation of new enterprises with innovative technologies by admitting them in BI and providing them physical, technical and networking supports and services.

### **Ongoing Projects:**

NITT- SONATA Information Event was conducted on Incubation and Seed Funding at 4.30 PM on 13th January 2016 at EEE Audi NIT Trichy.

Dr. S. Sundarrajan, Director of NITT and CEO of CEDI and Mr. Navin Jacob Mathew, Vice President, Sonata Software, Bangalore graced the occasion.

Center for Entrepreneurship Development and Incubation (CEDI), a section 8 company, promoted by National Institute of Technology, Trichy has created a comprehensive Entrepreneurial Eco-system at NIT Trichy. CEDI enables young entrepreneurs to initiate technology start-up companies for commercial exploitation of technologies developed by them in the areas of ICT and Electronics with seed funding support and facilitates the incubatee companies to access NITT's common Infrastructure facilities, departmental laboratories and other resources of NITT for their product development purposes. All the necessary mentoring and support for mobilizing funds, creating access to markets, augmenting managerial skills etc., was provided by the CEDI.

CEDI NIT Trichy and Sonata Software in April 2015 announced a partnership to promote student innovation and entrepreneurship. This event focuses on continuing Sonata's support for innovation and fostering close link between industry and academia. In addition to technical and managerial support, Sonata has committed significant funding to the extent of Rs 105 Lakhs for three years beginning 2014-15 to CEDI NIT Trichy to support technology business incubation.

### Club 3 : SCIEnT

#### **About the club:**

It tries to inspire students to innovate and help transform ideas from concept to a commercially or socially viable product, to build an ecosystem that will encourage more students to aspire and build real-world ready innovations to make a positive difference to the society.

#### **Ongoing Projects:**

##### Facilities

A dedicated space with interiors that's conducive to innovation and ideation. Cutting edge tools and equipment that span across the different disciplines, that will help build prototypes, monitoring & testing equipment, and computing resources. The wish list from the student technical clubs and vetted by the faculty advisor is in the process of being procured.

##### Projects

The college has eight student-run technology clubs which are one of the nodal points for project ideas. New project ideas can be posted through a portal and a short listing committee comprising of student reps and faculty advisor will accept the projects or short-list for evaluation if it requires funding beyond a prescribed limit. An evaluation committee comprising of a technical advisor, alumni mentor and faculty advisor will approve for funding

##### Funding

The college has provided the physical infrastructure and the alumni will provide the equipment and the running of the center. Other than the class of '90, we expect other alumni batches will also contribute to create a corpus fund for expanding the activities. Corporate sponsorships or participating in govt funded programs are also options for future.

## Club 4: Third Dimension: Aeromodelling Club

### **About the club:**

3-D , The aero modelling club of NITT provides platform for all those individuals who wish to channelize their interest towards aerodynamics

### **Completed Projects:**

#### **1. The FanWing Project**

The project was aimed at fabricating a fan-wing aircraft that uses a simple cross-flow fan mounted in the wing to provide distributed propulsion and augmented wing lift at very low flying speeds.

#### **2. The Perovskite Cell Project**

A perovskite solar cell is a type of solar cell which includes a perovskite absorber, most commonly a hybrid organic-inorganic lead or tin halide-based material, as the light-harvesting active layer, which produces electricity from sunlight or any other strong light source. It is a cheap alternative for conventional semiconductor wafer solar cells.

#### **3. The Jumping Bot Project**

The project aimed at designing a jumping robot which is basically a system where the bot would move around on two wheels on plain surfaces but has the ability to jump in case it encounters obstacles. The jumping mechanism consists of electromagnets. Its wheels use two BLDCs.

#### **4. Quadcopter**

The project goal is to design a semi-autonomous Quadcopter capable of self-sustained flight via wireless communications while utilizing a microcontroller. The main goal of this project is to build a Micro-Air Vehicle in the form of a Quadcopter. Quadcopter unmanned aerial vehicles are used for surveillance and reconnaissance by military and law enforcement agencies, as well as search and rescue missions in urban environments.

#### **5. RC Paraglider**

The aim of this project is to design a miniature radio controlled version of powered Paraglider capable of carrying a miniature camera. A parafoil is a nonrigid airfoil with an aerodynamic cell structure which is inflated by the wind, and is similar to the shape of the wings of a glider or an airplane.

#### **6. Coanda Effect Flying Saucer**

The goal is to build an autonomous flying saucer which makes use of the coanda effect that generates the UAV's lift , by blowing air over the saucer-shaped vehicle's curved surface and also to navigate it using a transmitter and receivers, test its maneuverability, capability to hover at different heights , capability to carry pay loads and consistently land it safely in a targeted location.

### **ONGOING AND FUTURE PROJECTS:**

### ***The bat***

The goal of the project is to make MAV (Micro Air Vehicle) that mimics a bat and uses echolocation for navigation (path mapping). The “Bat” employs a simpler Bat wing mechanism.

#### **APPLICATIONS:**

1. First response (terrorism, natural calamities, nuclear explosion)
2. Network jammers
3. Night guides
4. Wi-Fi Hackers
5. Fire service, Suicide bombers

### ***VTOL Gyrocopter***

The gyrocopter is an amalgamation of the existing technologies of the helicopters and the fixed wing aircrafts i.e. maneuverability and size of the fixed wing aircraft with lift due to auto-rotation of the top mounted rotor. The thrust is provided by a separate Tractor/Pusher mechanism (Propeller/IC engine/Jet Engine). This effectively separates the Thrust and the lift axis, increasing overall efficiency in terms of attainable speeds (top speed) and payload lifting capacity.

### ***Paraglider Phase 2***

This project concerns with the development of already fabricated working model of the paraglider. The main objective in making the paraglider was that it should be used for disaster management and hence keeping that in mind we are working of a few technical improvements like:

1. Food packet dropping module for flood affected regions
2. Autonomous control
3. All terrain compatibility
4. New trike design for better aerodynamic efficiency.

### ***Coanda Phase 2***

The second stage of this project involves:

1. Model for mass production and for performing disaster management applications.
2. Integration with an IoT framework being worked upon, for urban traffic management and disaster management.
3. Payload capacity research being carried out to explore signal transmission capabilities.

## **[Club 5: Builder's Hive](#)**

### **About the club:**

It is a civil Research and development club which promoted activities related environmental sustainability achievement through development of new kinds of materials of construction.

### **Completed Projects:**

1. Partial replacement of waste water in cement mortar as a sustainability measure. This project mainly aims at reusing waste water in non-structural members.
2. Making use of innovative concrete types namely translucent, floating, and pervious concrete. These models are shown as a part SANGAM. Pervious concrete has its applications in solving the huge drainage problem in major cities.
3. A miniature scale of the geodesic dome was built to impress upon the students the importance of domes, ease of construction and others

### **Ongoing Projects:**

1. Making of concrete canoe using ferro-cement. This concrete canoe is made by a team of 12 members and is for the national concrete canoe competition at IIT MADRAS on 22 august. Builder's hive will participate in this competition in the upcoming years also.
2. The replacement of geopolymers in concrete is being done and this is another attempt to address the sustainability issues in concrete making.

### **Future Projects:**

1. Revival of a dried lake
2. In a parched place like Trichy, we really need to revive our lakes. The dried up lake behind Garnet hostel will be taken as a challenge.

## **Club 6: PSI (Pure Science Initiative) Racing Team**

### **About the club:**

Started in 2005 as a club to promote scientific temper in students , PSI racing, NITT has now grown in the official racing club of our campus. With a team of 25 students who share a passion for automobiles, we have participated in many competitions like BAJA SAE India, etc.

### **Completed Projects:**



2014 BAJA SAE event held in Indore, Madhya Pradesh. Syncing of AAKASH tablet in the dashboard to present real time engine parameters to the driver. Engine parameters like engine RPM, Engine temperature, gear indicator, current speed, fuel indicator, It helps driver to monitor and control the vehicle more easily.

#### **Ongoing and Future Projects:**

1. For the next SAE BAJA event scheduled in Feb '16, going to upgrade from manual transmission to Continuously Variable Transmission (CVT).  
CVT is more fuel efficient than manual. Less power loss. Performance of the vehicle under control.
2. Real time dynamic updates about vehicle properties like transmission fluid level, fuel level, etc., to the pit so that pit stops can be timed strategically.

#### **Club 7: DC (Designer's Consortium), Product Designing Club**

##### **About the club:**

The Product Designing Club of NIT-Trichy.

##### **Completed Projects**

Designed a mechanism to take out cigarette from the cigarette and to take the tobacco out from them as an industrial project.

Designed a coin tosser which when triggered by a button tosses the coin which can be used in cricket matches.

Designed a innovative, economic and a pollution-free method to dispose sanitary pad/napkins.

Designed a mechanism to lift a box to different height at regular intervals using various mechanical components.

Design of a mechanism that can separate two different types of bottles moving over a conveyor belt

##### **On-going Projects**

Design and fabrication of a new propulsion method for a wheelchair that can be lever propelled implementing concepts of biomechanics. Optimized design and analysis of a umbrella that can be opened and closed in the reverse direction making it more comfortable for users than the existing design.

##### **Future Projects**

Design and fabrication of fulcrum bike. A bicycle that can be propelled by giving less input energy by the user. A linkage based movable bridge design, that can be lifted up and closed again by using a system of links. A bicycle propulsion method without using cycle chains and just by gears.

### Club 8: LEAP-League for Environmental Awareness and Protection

#### **About the club:**

League for Environmental Awareness and Protection or LEAP , true to their name, it has been making leaps and strides with several initiatives.

#### **Ongoing projects:**

##### **BIOGAS REACTOR:**

Considering the vast amount of organic waste obtained/collected from the all messes and with dwindling alternative energy resources in our campus, our club came up with the idea of our very own domestic biogas reactor. We have constructed a biogas digester which has a maximum capacity of 180L. The reactor/ digester was constructed using PVC barrels , pipes ,tubes, etc., and after seven days of grueling work, the reactor was finally ready for testing and running .

*Current Status of project:* Test run are being conducted; cow dung has been fed into the digester and processing is being monitored. Simultaneously, the possible ways to segregate the mess waste are being studied, so as to ensure that the reactor functions with maximum efficiency.

##### **SEWAGE TREATED WATER ANALYSIS:**

#### WHAT IS THE ISSUE?

Sewage Treatment is the process of removing contaminants from the wastewater/effluent/sewage through physical, chemical and biological processes and ultimately producing environmentally safe treated effluent.

But we observed that the water using for gardening is not sufficiently clean, which makes it unfit for watering plants. Hence our team members visited the treatment plants personally and with the expert guidance from the site engineers were able to comprehend the working of the plant and identify the possible areas where improvement in the process might be needed.

##### **GUEST LECTURE:**

LEAP organized a Guest Lecture on the 6<sup>th</sup> of August, by renowned environmentalist and nuclear chemist, Dr. G S Murthy, who gave an informative and vivid lecture on the possibilities in the avenues of "Green Energies for the Future".

## **COMPOST:**

Possible opportunities in the area of composting are being studied and analyzed. We believe that it could serve as a very effective step to create awareness about the need and advantages of composting among the student populace. The action plan is still in the discussion and analysis stage. A visit to IITM is probable in the near future to study the composting system existing on campus there.

## **Club 9: RMI: Robotics and Machine Intelligence**

### **About the club:**

This decade-old club is known for its innovation in the realm of projects, their creativity resulting in projects that are always the biggest crowd-pullers when on display. Known for its ability to venture into areas unexplored, RMI boasts of a wide range of projects that are appealing due to the originality quotient. This team of bright minds involves itself in project work, conducting events, workshops and basically propagating the love and interest for Robotics among the college students.

Ongoing projects:

### **1. Brain-Wave Controlled Robot**

#### **OBJECTIVE:**

This project primarily aims at tapping the brain signals and processing them. It does the controlling mainly by the human sensory inputs. It uses single-board computers and Matlab.

#### **APPLICATION:**

A Prosthetic Limb.

B Control of automobile based on the mental state of the person.

C Various games based on human sensory inputs. For eg: tic tac toe, anagram etc.

D Controlling a four wheeled bot.

### **2. AIR HOCKEY PLAYING ROBOTIC ARM**

#### **OBJECTIVE:**

To develop a air hockey platform with a serial manipulator at one end to autonomously track the disc and exhibit a real-time response to play with the player.

#### **APPLICATION:**

Playing platform for entertainment and learning for geeks.

### **3.SWARM ROBOTICS**

#### **OBJECTIVE:**

To devise algorithms to achieve a task by co-ordinating actions of numerous tiny robots.

#### **APPLICATION:**

Inspection of an area through efficient time conscious algorithms and verify them by implementation.

### **Club 10: Spider**

#### **About the club:**

Spider is the multidisciplinary Research and Development Club of National Institute of Technology,

Trichy. Spider's primary work is in fields of Computer Science, Electronics and Internet Technologies.

Boasting of over 60 members from various profiles like App dev, Web Dev, Algorithmic Coding and Electronics, Spider has undertaken several self-funded projects and conducted periodic workshops and tech talks for students and numerous events throughout the year.

#### **Ongoing projects:**

##### **A) App Development**

###### **1) MotorIndia and TextileIndia News Reader Android Application**

Gopali Publishers is a Chennai based publishing company whose primary aim is to provide up-to-date news on the various happenings in the world of Heavy Moving Vehicles and the Textile Industry. As a part of their increased outreach to their subscribers, they decided to get involved with Spider in the development of two Android based Applications – MotorIndia and TextileIndia. Spider App Dev team has successfully developed these two applications which will be launched in the coming month.

##### **B) Web Development**

###### **1) NITT HOSTEL ALLOTMENT SYSTEM**

The Spider team successfully built the online hostel allotment system of the college which made the allotment process hassle free.

###### **2) NITT MESS ALLOTMENT SYSTEM**

The Spider team also built the online mess allotment system of the college. This has enabled the possibility of students to switch between messes every month according to their liking.

##### **C. Algorithmic Coding**

###### **1 Optmyzr**

Optmyzr is a startup based in Bangalore founded by an alumnus of Spider – Manas Garg. Its main aim is to perform analytics on the Google AdWords platform for application in the domain of internet advertising. Spider Algorithmic Coding members were involved in designing an algorithm where searches or queries performed by users were collected and then systematically organized into tags which could then be accessible to external companies in order for them to create advertisements specifically targeting a particular niche of users who would make use of their services.

## **SPIDER TRONIX**

### **1) SMART BIKE :**

An Android App in user's smart phone will read notifications (calls and messages) received in the smart phone via Bluetooth speaker attached in the helmet. With the destination set in the phone, the helmet will give real time instructions through speaker about the way to reach it.

### **2) SMART ENERGY MONITOR:**

The Smart Energy Monitor designed aims to regulate the energy consumed by the electrical devices in a home by keeping a tab on the energy consumption. Using the wattage provided by the monitor, a need based budget can be designed which specifies the time for which each device is to be operated so that the overall consumption falls below a certain threshold decided by the consumer.

### **3) STRESS BUSTER:**

"Stress buster" is a wearable device that measures stress. With our fast paced lifestyles and ever growing work and expectations, stress level can go over the roof. Visiting the doctors miles away is a farfetched dream. Instead, this device brings him to you.

### **4) SYCLE:**

The world is facing a major challenge today. Urban transportation systems are becoming increasingly chaotic. We are currently squeezing disproportionately large infrastructure in densely populated areas which has become expensive.

The following are the main features:-

1. SELF-INFLATING TYRES
2. NAVIGATION SYSTEM
3. CALORIE COUNTER:
4. SELF SUSTAINABLE POWER SOURCE

### **6) WEARABLE FALL DETECTION, MONITORING AND ALERT SYSTEM FOR THE ELDER:**

The lack of a proper assistive environment for the elderly has often impaired their livelihood and jeopardized their lives as well. Loss of consciousness and fall-induced injury is one of the leading problems faced by the elderly.

A constant monitoring system will also work in favor of empowering them. This will not only help in immediate response to distress, but also long-term health prediction.

Our project, submitted for the IoT Challenge event of Pragyam 2015, uses the TI cc3200 IoT enabled board. The wearable fall detection system, to be worn around the waist. It uses an acceleration and tilt based fall detection algorithm, and constantly checks on the state of the patient

#### **SMART AMBULANCE SYSTEM:**

This project aims to increase the survival chances of a patient by choosing the right hospital with the adequate facilities required for treating the patient suffering from a specific medical condition. The project also aims routing the ambulance to the hospital effectively saving critical time.

#### **7) CURRENCY RECOGNITION SYSTEM:**

Can be used by the people, who want to know the denomination of a particular currency which they are not able to recognize due to factors such as,

- Numerals aren't recognizable
- Don't know the language of the country they are in

The project will be extended to the blind also.

SURF (Speeded Up Robust Features) Algorithm is used for Image Processing.

#### **8) REAL TIME TRAFFIC MONITORING SYSTEM :**

Our system counts the number of vehicles on each side of the road and identifies them according to their size or attributes.

#### **9) VEHICLE MONITORING SYSTEM:**

The system performs 2 functions-

- Estimating the Blood Alcohol Content of the driver, using an MQ3 gas sensor. It works similar to a Breathalyzer and based on the state of the driver it will allow access to the car's ignition.
- Detection of eye-blink patterns and predicting the drowsy state of the driver. This was achieved by using Open CV with Python.

#### **11) SMART WATCH**

Smart watch was fabricated with the following features for making it more user friendly. The messages from a mobile are displayed on the nokia LCD screen using Bluetooth module.

#### **MOBILE TO MOBILE CHARGER**

Our mobile to mobile charger has these 2 major advantages of being universal, i.e., charging ANY PHONE FROM ANY PHONE and allowing both ways transfer of charge if need be.

#### **12) Smart key**



This project strives to help those absent minded people who lose their keys inside their own houses and spend hours trying to locate it.

## Club 11: Delta

### **About the club:**

- Premier computing club and central web team of the National Institute of Technology, Tiruchirappalli.
- Delta Force is comprised of an eclectic bunch of programming enthusiasts, passionate about leveraging our technical expertise to develop impactful cross platform applications for both institute related activities and the community.
- Delta Force members have won several accolades, including the Facebook World Hack, Microsoft HackCon and the PayPal Hack.
- Our alumni are spread across the globe, working for the world's elite tech companies including Facebook, Google, Microsoft and Amazon. Some of our alumni are also successful entrepreneurs.

### **List Of Projects-(2014-15):**

#### **1. Mega Cloud Server:**

The Mega Cloud Download Service hosted on <http://10.0.0.120/mega> with OCTA Credentials.

#### **2.Delta Music**

A Music Server for fast music streaming online hosted on <http://music.nitt.edu> )

#### **3.Pragyan QP-Module**

A service initiated by pragyan and developed by Delta which ease thousand of students during exams hosted <https://www.pragyan.org/nitt/qp/> )

#### **4.CT-Mails**

A mailing service to student dean to circulate Notices of Exams via single time mail)

#### **5.Books Exchange App**

A portal getting ready to exchange books within fellow NITTIAN(S)

#### **6.Sports Feeds**

A portal getting ready to bring sport activities of college online)

#### **7.Moodle**

E-learnign portal hosted on <https://www.courses.nitt.edu>

#### **8.Pragyan CMS Revisions**

Content Management System written by Delta, <https://github.com/delta/pragyan>

#### **9.Notes Sharing App**

A online service to share Class notes of NIT -Trichy <http://notes.deltaforce.club/>

# RAJIV GANDHI INSTITUTE OF PETROLEUM TECHNOLOGY, RAEBARELI

## Development of a Simulator to Estimate the Product Properties from Crude Distillation Unit

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The inflexible quality requirement of petroleum products in today's highly competitive market makes estimation of product properties essential. Few simulators are already available but these are very costly and enigmatic. It is, therefore, necessary to develop a simulator to estimate the crude distillation unit (CDU) product properties using other easily measurable variables. This work demonstrates a self-developed simulator which can be used to estimate the crude distillation unit (CDU) product properties using other easily measurable variables. An algorithm for the simulator, which uses the crude true boiling point (TBP) curve and other routinely measured flow rates, temperatures and pressures in the CDU, has been designed and successfully simulated to find the properties viz. TBPs, Densities, Specific Gravities & Characterization Factors of all the CDU cuts, Flash zone temperature, Side-Stream Stripper Temperatures, Draw-off Tray Temperatures, Top Tower Temperature, Reid vapour pressure (RVP) for the distillate & Pour Point, etc. More than 20,000 lines of code has been written in HTML, CSS, PHP, JavaScript, jQuery & Bootstrap to develop this online simulator. The simulator has been tested with the available data of some authentic sources. A satisfactory match between the estimated and the measured properties clearly supports that the successful development of a self-developed simulator.

The web-link for this simulator is as follows,

<http://khanij.org/refinery-process-design/refinery-process-design.php>

**Keywords:** Simulator, Product Properties, Product Properties Estimation, Crude Distillation.

## **SCHOOL OF PLANNING AND ARCHITECTURE, BHOPAL**

### **DESIGN INNOVATIONS CENTER (DIC) WITH A FOCUS ON ARCHITECTURE AND PLANNING: SPA Bhopal**

SPA Bhopal has two thematic thrust areas in which to work based on the contextual and societal relevance of the domains and strengths and capabilities of the institute in these domains. The two identified themes are “Shelter for All” and “Universal Design Innovation for Heritage”. The following products: (a) Residential Land Suitability & Prioritising Tool;

(b) Rapid Appraisal Tool Kit for Shelter in Core City Areas; (c) **Web-Based Application on**

**‘Universal Design Audit Toolkit with Information on Accessibility and Safety of Heritage Sites’** for development, dissemination, registration and marketing.

# **SCHOOL OF PLANNING AND ARCHITECTURE, NEW DELHI**

## **DESIGN INNOVATIONS CENTER (DIC) WITH A FOCUS ON ARCHITECTURE AND**

### **PLANNING: SPA NEW DELHI**

Design-centered innovation is a force multiplier that can help the country move up in the value chain making Indian economy globally competitive. In this context, the Ministry of Human Resource Development (MHRD) launched a program to set up a number of Design Innovations Centers throughout the country. In this context the School of Planning and Planning Delhi (SPA-D) project with a focus on architecture and planning (built-environment and human settlements). The proposal is submitted with SPA-Bhopal, SPA-Vijaywada and Dr. B.R. Ambedkar University of Delhi (AUD). Major objective of the proposal is to mainstream design-centered innovation in the fields of architecture and planning education, and research and practice throughout the country. Other objectives include support design education; knowledge sharing among all stakeholders including building industry, private and public development organizations, etc.; provide platform for product development and its marketing; initiate interdisciplinary approach; and undertake inclusive and socially responsible design in built environment and human settlements. Potential products that would be linked to markets are: Neonatal Incubator for Rural India, Soochalaya: The Thinking Toilet, Resource Audit as a Tool for Energy Conservation, Learning from Rural Habitats for Low Income Settlements in Urban Areas, System Design and Workshop for Shading Devices, Integrating Building Information Modelling with Facility Management, Urban Form and Climate Change, Mobile Application to Assess Landscape Design Variables Green Building, Developing Conservation Techniques for Historic Building Materials and Systems, Toolkit for Integrating Environmental Concerns in Settlement Planning Process, Traffic Signal for Visually Challenged and Designing a GIS based model for roads maintenance system using Intelligent Transport System (ITS) tools

## TEZPUR UNIVERSITY

# Centre for Innovation Incubation and Entrepreneurship Tezpur University

The Centre for Innovation Incubation and Entrepreneurship (CIIE) was started with the objective of promoting specialized knowledge in the field of entrepreneurship development, innovation and creative ideas. The centre strives to identify talented youth and motivate them to entrepreneurial and innovation works. The centre plans to develop various innovative ideas with the students and local youths. Following are the objectives of the innovation centre.

- Incubation of smart and innovative ideas of students and faculty members
- Exploration of new areas of employment for the physically challenged persons
- Promote for enhancing the popularity and re-activate the antigens of the region

Within the last two years the students have developed the following innovative projects in association with the Innovation Centre.

- Low Cost Lift for Home, Elderly Persons and Patients
- Dehulling Machine for Multiple types of seeds
- Non-edible Oil Seeds
- Low cost bio-fuel based festival candle making process
- Hybrid tri-cycle
- Low Cost Manual paddy-thresher
- Electric car
- Hand-held and Portable E-Nose for Tea Grading
- Automated Flushing of Public Toilets

Some of the developed prototypes with brief technical specifications have been presented below.



Fig1. TU Electric Car During Fabrication

Seating Capacity: Five Persons

Drive: Independent Rear Wheel Drive

Maximum speed :  $20 \text{ km h}^{-1}$

Body material: Scrap Iron and Aluminium

Plate Transmission: CVT / Motorcycle Chain and Sprocket

Project Supervisors: Dr. Santanu Sharma, Associate Professor, ECE, Dr. Partha Pratim Dutta, Associate Professor, ME, TU



Fig.1b TU Electric Car Display/ Demonstration

Power Plant: Two 24 VDC PMDC Motor:

Maximum Power: 750 W Each

Storage Battery: 200 Ah : 02

number Differential: Electronic

Student Members: Nasim Amin, Depak Gogoi, Nishant Saikia, Rupjyoti Deka,, Hiranya Ranjan Thakur, Hemanta Pegu, Barnali Sharma





Fig.2a - Hybrid Electric Tricycle under

**Development**

Project Supervisors: Dr. Partha P. Dutta, Associate Professor, ME, Dr. Santanu Sharma, Associate Professor, ECE, Dr. Tapan K. Gogoi, Associate Professor, TU  
 Motor: 24V; 400 WDC PMDC  
 Storage Battery: 35 Ah  
 Maximum Speed: 15 km/h  
 Differential: Combination of Freewheel



Motor: 24V; 400 WDC PMDC  
 Storage Battery: 35 Ah  
 Maximum Speed: 15 km/h

Fig2b: Prototype of Hybrid Electric Tricycle

Student Members: Rituporno Gogoi, Arindom Choudhury, Debaraj Baruah, Sushant Kumar Gupta, Arindam Mahanta, Kunal Barman [2010-2014]

Achievement: 9<sup>th</sup> all India Rank in Efficycle - 2013 held at University Institute of Engineering and Technology, Punjab University from 11-13/10/2013 organized by SAE (India)



Fig.3a Hybrid Electric Tricycle CAD Model

Project Supervisors: Dr. Partha P. Dutta, Associate Professor, ME, Dr. Santanu Sharma, Associate Professor, ECE.



Fig3b Hybrid Electric Tricycle Prototype

Students: Dhurbajyoti Das, Arun Kumar Shukla, Sibasahai Shukla, Mudhuya Dutta, Chaitanaya



Fig.4 Manual Paddy Thresher  
 Supervisor: Dr. Dilip Datta, Associate Professor, ME and Dr. Uddhab Bharali, Visiting Director, CIIE, TU

Students: Arif Ahmed, Rajkumar Sarma, premkumar Srivastab, Konkon Gogoi, Mritunjoy Sutradhar, Suraj Tiwari, Gurum Dinesh



Fig.6. Portable Lift  
 Innovator: Dr U Bharali, TU



Fig.5 Improved Solar Air Heater  
 Supervisor: Dr. Partha Praim Dutta, Associate Professor, ME, TU.  
 Students: Jugal Saharia, Nayan Moni Sarma  
 Design: Hemispherical Protruded  
 Application: Efficient Hot Air Generation for Drying of Agricultural Crop

Maximum Hot Air Temperature: 65° C



Fig.7 Automated Cooking Unit Supervisor: Prof S. Bhattachyya, ECE, TU

This all innovative prototypes have been developed in-house with B.Tech/ MTech final year projects work. Moreover, some works like improved manual / electric lawn mower, manually driven washing machine, manual waste collection machine, and improved manual paddy thresher have been going under supervision of Tezpur University faculty members. Seven numbers of MSME funded project are also going under TU CIIE.



## **Innovation in Humanities**

(Achievements of the Innovation Club at The English and Foreign Languages University, Hyderabad )

The Innovation Club at The English and Foreign Languages University has been active in coming up with innovative ideas in the areas of Pedagogy, Linguistics, Language Teaching and Literature. The innovation club has both faculty and students as its members. Most of the ideas are also implemented successfully in the classroom or in projects.

### **1. Cafeteria-credit System**

The cafeteria system that is used in the MA programme at the university is a move away from the traditional curriculum and the choice based credit system that being proposed now by the UGC. The cafeteria system started in the year 2000 with the first MA programme which was conceived of after a year's debate, discussion and planning. The cafeteria credit system is an innovation which brought vibrancy and dynamism in postgraduate education. The base premise on which this system runs is that we see our students as mature individuals, capable of making their own decisions, and choosing their own career path.

While the traditional system of learning compartmentalized programmes in terms of degrees, the credit system works as a cafeteria model of learning, where the credit-based curriculum serves as a cafeteria menu. Students can select courses according to their aptitude, tastes and preferences.

The credit system requires that a student progresses in her academic programmes not in terms of time (years, or semesters), but in terms of courses. Each course, or module, is assigned a certain credit, depending on the estimated effort put in by a student. When the student passes that course, she earns the credits associated with that course. The definition of "credits" can be based on various parameters – such as the student's workload, learning outcomes and contact hours.

This system has several advantages:

- A student can earn credits at her own pace. If, in a semester, a student falls ill or cannot cope with the academic load, she can decide to study a fewer number of courses, earning fewer credits. The so-called loss can be compensated in the next semester or put in an extra semester of work to complete a course.
- A student can study in the sequence that she prefers – putting her interests first. The system sees the students as mature individuals, capable of making their own decisions.

- Students are allowed to specialize in a topic and then seek short projects or internships in that domain.
- Teachers can teach a new area and gain further expertise in that area. Multidimensional specializations in a teacher are recognized.

The cafeteria system enables mobility between institutions. Overseas institutes have already understood the necessity of providing “mobility” to their students as far as topic, institute and programme choices are concerned.

## 2. Digital Passageways: Innovative Researches in the Humanities

The university launched the website ‘Digital Passageways’ in response to the announcement ‘ Digital India’ by the Government of India, which displays various digital narrative projects and digital maps of Mnemocultures.

Teaching and research in the Humanities in countries like India is a European legacy. Millions of students study Humanities in thousands of higher education institutions in India today.

The student composition is markedly heterogeneous as the students come from divergent bio-cultural communities.

The future of the Humanities in India is contingent upon the *creative* exploration of the cultural forms (in image, music, text and performative formats) of these divergent and countless communities.

- Collective reflection and innovative research: *If human creativity and innovation, humanreflection and performance, human utterance and artefact are the concerns of the Humanities*, the research project of Critical Humanities affirms the urgency of collectivereflection and innovative research across the traditional disciplinary and institutional borders in the Indian context today.

➤ The Critical Humanities work advances a double programme: i. Critical theoretical ii. Practical institutional.

➤ Practically Oriented Critical Researches on:

- |                       |   |                            |
|-----------------------|---|----------------------------|
| • Cultures of Memory  | • | Visual Traditions of India |
| • Images of India     | • | Images <i>in</i> India     |
| • Rhythms of the folk | • | Rights to Culture          |
| • Jāti Cultures       | • | Song Cultures              |
| • Technics of culture | • | Performing                 |

- Itihasa-kavya-purana-natya

➤ The goals of Critical Humanities work are to focus on the least represented and fast receding oral, narrative and visual-performative cultural memories of divergent communities of India and develop Mnemocultural researches and teaching. The emerging research converges theoretical-practical interests to contribute to:

- a. Creation of a digital map of Mnemocultures. (A proto version of mnemocultural India has been prepared. Some others pertaining to the North-Eastern region are in the making.)
- b. Developed a Hypermedia *Panchatantra* project. Based on this to develop other Digital Narrative Projects.
- c. Projects on Epistemic Comparison of Cultures are in progress.
- d. Develop courses and programmes from Undergraduate to Research level. Over 25 courses are already developed and offered at Masters' and Research level.

These new researches aim at reconfiguring the teaching and research in the field of the humanities from the Indian cultural locations. The cultural forms of divergent communities provide scope for developing bigdata digital cultural projects: strategic traversal across digital passageways is necessary for the sustenance of critical humanities.

### 3. Development of Apps

The students and faculty of Computational Linguistics are made to interact with Computer programmers working in the industry in one-day innovation workshops during weekends. The apps that have come up during deliberations are for both academic and non-academic purposes. Some of the apps which students have tried to develop are as follows:

- i. Most frequently occurring words: This app calculates and documents most frequently occurring words and their synonyms from selected texts. This app helps the user to learn the words in different kinds of texts and know the register.
- ii. Proper nouns: This app prints proper noun distribution from files in a directory.
- iii. Food menu: This collects different tastes from the users and generates weekly-based food menu. This can be used in hostel messes and hotels.
- iv. Authorship: Looking at the words, phrases and sentences of a text, this app can identify the author.
- v. Classifying texts: From a collection of random texts, this app can group semantically-related articles.

These workshops expose the students to experts outside the university and make them ready for industry. These also motivate the students and develop the skills to work in teams.

#### **4. Student-friendly Tests**

A unique way of testing students, which is successfully implemented by one of the faculty members is the model of end-semester question paper. The question paper consists of different types of choices and questions of same level. Depending on their ability and reading, students can attempt the questions. In this, a student can attempt a 100-mark question, two fifty-mark questions, four twenty five-mark questions, or 10 ten-mark questions. Unlike traditional tests, this brings out what students actually have learnt in the classroom and gives freedom in the way they would like to express their understanding of texts.

#### **5. Pedagogic Innovations**

Another achievement of the innovation club is the publication of a magazine/book consisting of brief descriptions of the teaching tools developed by the B.Ed. students. The students are given two weeks time to come up with new tools which can be used in a classroom. After that they display the tools and explain how the usage of the tools to all the visitors from and outside the university. Later the students put together write-ups on the tools they have developed and bring out a magazine.

#### **6. Teaching techniques**

Various techniques have been evolved in language teaching and are being used in classes. These techniques are documented in the form of articles and books. Some of the techniques are: i) using authentic materials like newspapers, magazines and texts from websites ii) making students browse through websites for specific information and make presentations iii) using multimedia and iv) peer teaching.

Research students are given opportunity to teach on non-formal courses to come up with new teaching techniques and document them, which can be tested further elsewhere.



## सहरिया जनजाति (ग्यालियर) संक्षेप लोककला परिचय

विश्व में लोककला की वस्तुओं का विशिष्ट स्थान है, आधुनिक मशीनी युग में लोककला की कृतियों का निर्माण, निरन्तर आधुनिकता के कारण कम हो रहा है। विश्व में लोककला कृतियों की निरन्तर मांग है। लेकिन आज 90% से भी ज्यादा लोककला कृतियों समाप्त कि ओर है इन्हें आज सहेज कर रखने की आवश्यकता है।

मैंने वर्ष 1989 से अनेक प्रकार की हस्तकला कृतियों का निर्माण किया है। लेकिन पिछले 25 वर्षों से लोककला कृतियों बनाने में व्यस्त हूँ मैंने ग्यालियर की विश्वविख्यात सहरिया जनजाति की लोककला को सात वर्षों तक ग्रामीण अंचल में विधिवत अध्ययन विभिन्न माध्यमों एवं सतहों पर कार्य जैसे विभिन्न धातु शिल्प प्राकृतिक रंगों से कपड़ों पर चित्रकारी चमड़े व लकड़ी पर नक्काशी मिट्टी में विभिन्न कार्य सींग एव हड्डी पर कार्य इत्यादि सीखा है। ग्यालियर सहरिया जनजाति की लोककला खूबसूरत आकृतियों, सरल और सहज रूप में प्रस्तुति के कारण मेरा आकर्षित होना रहा है। इस प्रकार की शैली विश्व की अन्य जनजाति द्वारा प्रस्तुत नहीं हुई इनकी शैली में तारा, जुआ, चौपड़, ताड़ी, शराब पीना व निर्माण करना, पशु वध इत्यादि विषय पर कार्य नहीं होने के कारण ग्यालियर की सहरिया जनजाति की लोककला अपना विशिष्ट स्थान अन्य लोक कलाओं से ज्यादा रखती है।

मैं आज प्रतिदिन प्राकृतिक एवं खनिज लवण रंगों से कपड़ों पर ब्रश से चित्रकारी लोककलाकृतियाँ एवं आग में पका कर मिट्टी टैराकोटा के आभूषण निर्माण करता हूँ म. प्र. विज्ञान एवं प्रौद्योगिकी विभाग मोपाल के लिये 15-15 दिवसीय टैरीकोटा ज्वेलरी के दो प्रशिक्षण शिविर मेरे द्वारा सफलता पूर्वक किया जा चुके हैं। अभी और प्रशिक्षण शिविर होने शेष है।

मैं इन कार्यों में व्यस्त हूँ, इन वस्तुओं कि मांग देश विदेश में है। बहुत कम लागत में अत्यधिक धन लाभ होने के कारण प्रशिक्षण शिविर एवं मेरा उत्पादन का उद्देश्य लोककला हस्तकला को बढ़ावा देना तथा विलुप्त हो रही लोकहस्त कला को पुनः जीवनदान तथा आमजन तक पहुँचाना है।

हरीश धवन

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**TRIPURA UNIVERSITY**

A Brief report

On

**UDBHABON CLUB**

Formally Tripura University Innovation Club (2014-2015)



**Tripura University**  
**(A Central University)**

Suryamaninagar-799 022

West Tripura, INDIA



# UDBHABON Club

*"Innovators are the greatest creations of the Creator"*

## Tripura University

(A Central University) Suryamaninagar-  
799022 West Tripura, INDIA Email:  
tuic.tu@gmail.com



### **About Club:**

Tripura University Innovation Cluster (TUIC) has been constituted under the name of 'UDBHABON CLUB' with the vision of highlighting small innovative ideas, incubating and nurturing them for big inventions and discoveries to make life a bit easier and hassle-free. The 'Udbhabon Club' aims at four functions: a) Search, b) Spread, c) Sense, d) Celebrate innovations/ideas. The Honorable President of India **Shri Pranab Mukherjee** inaugurated the Udbhabon club and interacted with the grassroots innovators and members of the club during his visit of Tripura University on 20th June 2013.

### **Objective of the Club:**

To bring out new and emerging inventions/ideas to create a better future.

### **Functions of the Club:**

(i) 'Udbhabon Club' will act as a centre for cross-fertilizations of ideas of various departments / centres in Tripura University and as a window for ventilation of ideas by other stakeholders. This will open new vistas for collaborations and explorations which will in-turn lead to solutions for regional / national / global challenges.

(ii) 'Udbhabon Club' will provide reasonable platforms and mechanisms for the individual and group of stakeholders in the region to interact with one another and thus foster need / opportunity based innovation.

➤ 'Udbhabon Club' will give directions to small innovative ideas which might lead to usable inventions and discoveries. The 'Udbhabon Club' will guide and help students to bring forth their ideas and exchange views for further refinement and development.

### **Salient features of the Club:**

- Innovators will get an opportunity of a professional platform to display their innovation/ideas.
- Innovators would have a chance to win university, state and national levels innovation awards.

- Innovators would have support for their innovation/ideas through validation, value addition and replication by professional agencies, labs and persons.
- 
- Innovators will get opportunities to protect their innovations/ideas under IPR, copyrights, patenting by filing application through University committee (Research, Development & Patent committee) or national agencies.
- 
- Innovators would have chance to interact with the University, local communities, local govt. agencies, creative peoples and innovative minds for promoting their innovation/ideas.
- 
- Various innovative initiatives (posters, prototypes or other models) would be displayed/showcased at 'Udbhabor Club'.

**Achievements:**

i) **State Level Exhibitions on Grassroots Innovations and Ideas:** Grassroots Innovations and Ideas are community-led solutions for sustainability. We had organized three days State Level Exhibitions on Grassroots Innovations and Ideas on 25th – 27th March 2015 for better understanding of how these innovations are developed and how they can be harnessed to meet sustainability policy objectives. There we have showcased several grassroots



innovations which are developed by ordinary citizens of Tripura including high school, college and Tripura University students.

innovations which are developed by ordinary citizens of Tripura including high school, college and Tripura University students.

➤ **Visit of Innovation Club, Library and Research Laboratories:** In the program we have invited more than 300 (three hundreds) school children to visit Innovation Club, Library and various research laboratories (including State Biotech Hub, Tripura University) to demonstrate







small experiments to encourage school children for higher learning / research.

**iii) Scientific Movie Show & Quiz**

**Competition:** We have organized a QuizCompetition among the school child based on scientific movie show on 27<sup>th</sup> March 2016.

**iv) Drawing Competition on Innovation and**

**Idea:** We have organized a DrawingCompetition on innovation and idea for School children (max. age 15years) on 29<sup>th</sup> March 2015.







## Bamboo Based Ornaments

MISS GAYATRI NAMA

Department of Political Science, Tripura University,

Suryamaninagar, Tripura, India

(Mobile: 9856622747)



### Profile

Age	: 23 years
Education	: M.A in Pol. Sc. (2 year)
Occupation	: Student
Hobby	: Panting and crafting
Liking	: New designing
Experience	: 12 year
Recognition	: Young talented artisan in North-East India.

### Description of Innovation



Poura Bamboo (*Bambusa polymorpha*) is generally used for making fine handicrafts and design ornaments. Crude poura bamboo is very soft and very flexible material but chemical process is required for better longevity. In this chemical treatment, generally Boric acid and borax mixture is used for. Raw thin fibre of bamboo are usually deep into the solution for 1-2 days and then dry at room temperature for better durability.



For making jewellers, three to four years old bamboos are made small pieces like 20 to 21 inches or 22 to 26 inches. Thin fibres collected from bamboo pieces using sharp knife. After chemical treatment, the fibres are precisely make ornaments by hand. One piece of ornament take 4 to 10 days to ready for sell. The price of a jewellers made from bamboo is around 400/ to 12,000/ dependent upon design and set.

Bamboo (Bambuseae) is a tribe of flowering perennial evergreen plants of tropical or subtropical regions, hollow and woody, with prominent knots, rapid growth, which can reach 40 meters in height. Bamboo grows very fast. It is a natural renewable resource that grows twice as fast as a tree and matures within an average span of 3 years. When harvested, it need not be replanted, because it will grow a new shoot from its extensive root system. Certain species can grow up to 1 meter per day.

The bamboo economy ranging from resource generation to value added applications has supported approximately 8.6 million livelihoods in the country.

Tripura is one of the major bamboo producing states in India. Bamboo grows all across the state of Tripura covering over nearly 10 to 15 different species. Mritinga, Paura, Kanakaich, Dolu and Barak with differing properties and more amenable to higher value added products such as handicrafts, furniture and mats are grown in small pockets across the state.







## Homemade Battery Operated Green Car

**AJIT DEBNATH**

*Purba Aralia, Pratappardh, Agartala, Tripura, India*



### Profile

Age	: 36 years
Education	: 12 <sup>th</sup> std (Com.).
Landholding	: 0.35 ha
Experience	: 4 years
Occupation	: Electrician and mechanic
Livestock	: Cow
Recognition	: Local mechanic

A car is a wheeled, self-powered motor vehicle used for transportation. Most definitions of the term specify that cars are designed to run primarily on roads, to have seating for one to eight people, to typically have four wheels, and to be constructed principally for the transport of people rather than goods.



Having an electric car can save money on gasoline and can be good for the environment. He fabricated and builds an electric car using a traditional car (Tata Nano). The car has manual transmission with backwards and forwards controller. With that all other important components kept as such to run safely on the road.

The car also has enough space for electric equipments and battery for managing proper weight distribution in the car, weight of car is very important for handling on the road.

### Description of Innovation

He had removed the old parts, including engine and other related parts like tank, exhaust, radiator etc. as a result drastically reduction of total weight of the car. He kept old brakes, horn, fuse pane, transmission system. Then he mounted electric motor and coupled with the transmission section through custom designed flywheel to mate the motor's driveshaft to the transmission. Electronic motor controller (72volt) has mounted back side of the car and installed 6 batteries. They are well connected with proper cables through battery charger and other electronic circuit. Total expenditure is around Rs. 1,25,000.

His motorised car has maximum speed 70km/hr. and one time charging requires 2 unit of electricity (cost: Rs. 6.00/Unit). Full charge battery pack can run 230km.

### Practical utility of Innovation:

Last 3.5years Mr. Debnath using his own made motorised car without any major maintenance. He is claiming the vehicle has 1/15 running cost compare with same car with petrol. Every day he is driving his motorised car 35 to 50km. for his work without any major problem.

Local peoples are keep interest to make same type car for them and gave orders to Mr. Debnath by discussing with Mr. Debnath, he is now interested to make better motorised car and bike for needy poor people and for green environment.



Mr. Debnath made motorised car (Nano)





## Innovative Low Cost Rural Housing Development



**SHRI KAPIL BARAN BHOWMIK and SHRI ANUP DEO**

*Arkaneer, Shekerkot, West Tripura, India*

(Mobile: 9436127054 & 9436134939)

### Profile

Name	: Arkaneer (NGO)
Category	: Entrepreneur & Trainer
Expertise	: Precast concrete materials.
Experience	: 15 years
Focus	: Low Cost Housing for BPL Families
Users	: Govt. of Tripura & local people.
Recognition	: Low Cost Rural Housing Development.

Construction of houses in rural Tripura are usually done in a very age old process using locally available materials like mud, bamboo etc. by the rural artisans. These houses are not strong enough against earthquake, cyclone, flood etc. and require regular maintenance / replacements. Peoples, particularly some rural artisans are aware of those facts and continuously trying to overcome these problems. Some rural artisans at Arkaneer developed a model of prefabricated cement concrete houses which is simple, easy to build and stronger than the indigenous system. However as the system has been developed by rural artisans who does not have any formal technical knowledge.



### Contents of invention:

The main objective of the innovative rural housing is to propagate alternative building materials and technology in the North-East states, including Tripura with special reference to the rural remote areas.



The innovative rural housing is cost effective construction in rural housing Sector. Alternative building materials are R.C.C. door frame, R.C.C.

window frame, Ferro cement (F.C) based plates, F.C. panel tiles, MCR roofing tiles, CEB mud block, F.C. channel tiles, R.C.C. pillar, F.C. water filter, F.C. water tank, F.C. table top, F.C. channel tiles. These materials are eco-friendly and much cheaper than any other conventional construction materials.

It is a partially prefabricated system with precast thin concrete wall panels made with sand, cement, small stone grits and wire mesh / wires. These panels are used in foundation, plinth and Walls. These panels are to be fixed with small columns on the site. Roofing will be done with micro concrete roofing (MCR) tiles or C.G.I sheets over bamboo or wooden structure. Door and windows are of handmade bamboo or wooden panels. Handmade concrete tiles on rammed earth are used for flooring.

Conventional: half brick masonry wall, C.G.I sheet roofing over wooden structure, cement concrete floor and wooden doors and windows.



Innovative: Prefabricated concrete wall panel, MCR tiles roof over bamboo structure, precast concrete tiles flooring, bamboo / wooden door / window panel, concrete door frames.

### Cost comparison of a 15Ft. x 10Ft. House

Conventional System :-	Rs.	90,000.00
Innovative System:-	Rs.	52,500.00





## Homemade Motorbike from a Bicycle

**SHRI NITAI DEBNATH**

*Poangbari, Melaghar, Shipahijala, Tripura, India*

(Mobile: 9615363088)



### Profile

Age	: 34 years
Education	: 12 <sup>th</sup> std (Com.).
Landholding	: 0.75 ha
Experience	: 5 years
Occupation	: Electrician and mechanic
Livestock	: Goat
Recognition	: Local mechanic

### Description of Innovation

Motorcycles are now a day's essential vehicles in rural area in India including Tripura. But modern motorcycles are very expensive and high running cost (fuel & maintenance). The poor people cannot effort motorcycle. Mr. Debnath fabricated his old bicycle and modified as motorised bicycle using old kinetic Luna engine. He solved his long distance travel by self made motorised bicycle with very good mileages in only Rs. 12,000. His motorised bicycle has 49.8 cc engines that produce maximum output of 1.67 HP @ 4500 + 500 rpm and maximum torque of 2.9 Nm @ 3000 rpm running by kerosene (75 to 80 km /lt) and starting by petrol.

A bicycle, often called a bike sometimes referred to as a "pushbike", "pedal bike", "pedal cycle", or "cycle", is a human-powered, pedal-driven, single-track vehicle, having two wheels attached to a frame, one behind the other. Bicycles were introduced in the 19<sup>th</sup> century in Europe and now number more than a billion worldwide.

### Practical utility of innovation:

Last 4 years Mr. Debnath using his own made motorised bicycle without any major maintenance. He is claiming the vehicle has 1/10 cost of modern motorcycle available in market. Every day he is driving his motorised bicycle 35 to 50km. for his work without any major problem. Local peoples are keep interest to make same type motorcycle for them and gave orders to Mr. Debnath. By discussing with Mr. Debnath, he is now interested to make motorised rickshaw for needy poor rikshawala of the country.



Bicycle is most popular vehicle of any kind in the world including India, especially rural area due to narrow road.

Motorcycles are one of the most affordable forms of motorised transport in many parts of the world and, for most of the world's population, they are also the most common type of motor vehicle. People like to ride motorcycles for various reasons, those reasons are increasingly practical, with riders opting for a powered two-wheeler as a cost-efficient alternative and avoiding or reducing the effects of traffic congestion.



Mr. Debnath made motorised bicycle



## UDBHABON Club

*"Innovators are the greatest creations of the Creator"*

### Tripura University

(A Central University)  
Suryamaninagar-799022  
West Tripura, INDIA  
Email: tuic.tu@gmail.com



## Constituted Office Bearers of Udbhabon Club

### Prof. Anjan Kumar Ghosh

Hon'ble Vice-Chancellor  
Tripura University (A Central University)  
&  
Chief Patron  
Udbhabon Club



### Prof. Anjan Mukherjee

Chairperson  
Email: anjan2002\_m@yahoo.co.in

### Dr. Kuntal Manna

Convener and Member  
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### Mr. Shibendu Debbarma

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### Mr. Pranoy Biswas

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National Innovation Foundation – India  
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# UNIVERSITY OF ALLAHABAD

Brief Write up on Achievement of Innovation Club Member:

## **Designing and Development of Emerging Next Generation organic-inorganic Perovskite Solar Cells Technology:**

Dr. Lokendra Kumar, Associate Professor of Physics, University of Allahabad visited Purdue University, USA and jointly worked with US scientists on Emerging and Plastic Solar Cells Technology under Raman fellowship program of Government of India and USA. Emerging next generation solar cells are different from conventional Inorganic-Silicon Solar cells and a topic of great interest for potentially low cost solar energy conversion into electrical energy and possibility of many novel applications e.g. portable solar cells, and building-integrated solar cells (BISC) etc. As the name suggests, building-integrated solar cells (BISC) electric power systems not only produce electricity, they are also part of the building. The key advantage of building integrated solar panels is the marginal additional cost in installation. Emerging photovoltaic technologies including plastic solar cells and Inorganic-Organic hybrid solar cells have a unique feature of making flexible foldable semi-transparent solar panels with easy and low cost building integration. In addition, these solar cells are like plastic paints and solar cells clothing. These wearable solar cells have unique feature for some specific uses in remote areas too.

As the long-term research goal of our collaborative research is to develop optoelectronically-active Organic-Inorganic (Perovskite) materials with tailored functionalities to improve the device performance and long-term environmental stability of low-cost sustainable energy generation devices. A simple solution processed Organic- Inorganic Perovskite Solar Cells (PeSC) have emerged as the most promising next generation photovoltaic technology and a significant progress of perovskite photovoltaics with power conversion efficiency rapidly increasing within last five years. Among the perovskite solar cells (PeSC) devices architectures developed so far, the planar heterojunction configuration attracts particular attention due to its relatively simple fabrication. Although, the growth dynamics of perovskite films are far less understood at present, it is critical to gain a deep insight into film growth mechanisms to enable use of facile one step processing method that can produce high quality perovskite films.

We are working on some unanswered questions on design and operation of these technologies. We have demonstrated some efficient solar cells and studied their properties at Purdue as well as University of Allahabad. Here, the key message is the importance of understanding of basic materials properties of organic and hybrid materials and new designs to get very low cost and efficient devices.

Furthermore, I would like to make a presentation oral/poster for the demonstration of some innovative designs and discussion of operation mechanism during the meeting.

# UNIVERSITY OF DELHI



## **Innovation Projects at University of Delhi Innovation Club**

<b>Business process innovations</b>	
1.	Privatization of distribution of electricity
2.	DU metro feeder bus service
3.	Business proposal – generating a better eco-system for managing junk
4.	Learning Modules for Innovation Management
<b>Language, Culture, History</b>	
5.	Conserving endangered languages through technology
6.	From sacred to Profane - a study of river Yamuna
<b>Education modules</b>	
7.	Science and Maths module for education
8.	Mathematics learning module through photography and sports
9.	Training module for life skills
10.	Journey of mathematics through animation movie/comic character
<b>Information Technology Applications</b>	
11.	IT module for e-lending books that is acceptable to publishers
12.	RTI + citizen friendly ERP that is also acceptable to employees
13.	Reconstruction of lost art using digital technology and 3-D printing
14.	Image/Video processing system for vehicle navigation assistance
15.	Sign language to text, to speech synthesis
16.	19.Real time dynamic public bus transport scheduling, differential crew jumping, GPS
17.	Using Sanskrit for NLP
18.	Generalized ID-proofing system
19.	Making mobile apps for safety of women
<b>Projects leading to products or designs</b>	
20.	Frugal technology – village education –eliminate drop-outs
21.	Meter to measure air pressure in tyres of moving vehicle
22.	Commercially viable garbage segregation awareness campaign
<b>Infrastructure, Policy</b>	
23.	Study the inflation of India, analyse the impact of various factors (Govt purchases, RBI policies etc) and suggest models for improvement



# UNIVERSITY OF HYDERABAD

# **TECHNOLOGY BUSINESS INCUBATOR UNIVERSITY OF HYDERABAD**



Achievements and Details of TBI-UoH

**Prof. V. Venkata Ramana**  
**Coordinator, TBI-UoH**

**Central University PO Prof. C**  
**.R. Rao Road, Gachibowli, Hyde**  
**rabad- 500 046 [www.uohyd.ac.in](http://www.uohyd.ac.in)**



**Technology Business  
Incubator  
University of  
Hyderabad**

Details of Grants/Funds received from DST towards establishment of TBI at UoH

Year of starting (operations)	2010
Thrust area	Pharma, Biotech, Renewable
Total budget of the project	Rs. 396.30

Budget head	Sanctioned amount (Rs. in Lakhs)	Released amount (Rs. In Lakhs)	Spent amount (Rs. In Lakhs)	Balance (Rs.in Lakhs)
<b>DST Contribution</b>	<b>220.00</b>			
a) Capital	150.00	<b>100.00</b>	<b>160.00</b>	<b>(-60.00)</b>
b) Recurring	70.00	<b>38.66</b>	<b>28.92</b>	<b>9.74</b>
<b>UoH Contribution</b>	<b>Rs. 124.40</b>			
a) Capital	Rs. 110.00	<b>80.00</b>	<b>80.00</b>	<b>30.00</b>
b) Recurring (4 <sup>th</sup> &5 <sup>th</sup> year)	Rs. 14.40	<b>11.88</b>	<b>11.88</b>	<b>2.52</b>
<b>Target Revenue generation From TBI activities (for 5 years)</b>	<b>Rs. 51.90</b>	<b>14.50 (up to 23.11.15)</b>		
<b>Total</b>	<b>Rs. 396.30 Lakhs</b>			

**Present incubatees:**

S.NO	Ventures/ Incubatee	Thrust area	Products developed and patented (up to 2014-15)
1	Crystalin Research Pvt Ltd	Pharmaceutical Solid state Chemistry	5
2	Vitas Pharma Pvt Ltd.	Drug Discovery	2
3	Savior Therapeutics Pvt Ltd.	Diagnostics	Under development
4	Aptus Therapeutics Pvt Ltd	Drug Discovery, Agri products, Cosmetics	2 (eco friendly cosmetics) 2 (sustainable Agri products)

<b>5</b>	<b>Prof. Periasamy School of Chemistry, UoH</b>	<b>Renewable Energy</b>	<b>1</b>
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## **High lights of the achievements of incubatees of TBI-UoH**

### ***Patents generated by M/s. Crystalin Research***

1. Stable Cocrystals of Temozolomide  
N. J. Babu, P. Sanphui, and A. Nangia  
Application No. 2303/CHE/2009, filed on 23/09/2009  
Posted on IPIRS web site on 05/03/2010.
2. Stable and Soluble Amorphous Forms of Olanzapine  
R. Thakuria, N. J. Babu, and A. Nangia  
Patent application No. 747/CHE/2010, filed on 22/03/2010.
3. Stable Cocrystals of Temozolomide  
A. Nangia, P. Sanphui, and N. J. Babu  
PCT/IN2010/000613, filed on 14/09/2010  
WO 2011/036676 A2, published on 31/3/2011.
4. Novel Polymorphs and Cocrystals of Curcumin  
A. Nangia, P. Sanphui, N. R. Goud, and U. B. R. Khandavilli  
Provisional Patent Application No. 3190/CHE/2010 dated 27/10/2010  
Provisional Patent Application No. 3467/CHE/2010 dated 18/11/2010  
Provisional Patent Application No. 1154/CHE/2011 dated 05/04/2011  
Complete Cognate Application under filing in October 2011
5. Temozolomide Hydrochloride Dihydrate  
A. Nangia, P. Sanphui, N. J. Babu, N. K. Nath, and U. B. R. Khandavilli  
Provisional Patent Application No. 1652/CHE/2012 dated 27/04/2012.  
Complete cognate application filed on 25/04/2013.
6. Solid State Forms of Andrographolide  
A. Nangia, K. Suresh, and N. R. Goud  
Provisional Patent Application No. 3328/CHE/2013 dated 26/07/2013

### ***Patents generated by M/s. Vitas Pharma***

1. 1 US patent granted, 2 in the national phase in India, USA, Europe and Canada, 1 new patent filed.
2. 1 molecule completed non-GLP Toxicology assessment, 2 molecules in lead optimization.
3. 2 ongoing grants from BIRAC(BIPP grants)
4. 1 new grant approved from Wellcome Trust for a diagnostic product.
5. Seed funding raised from the Indian Angels Networks.

### ***Patents and Product Development By M/s Aptus Therapeutics***

Patent filed: A FIBROUS GROWTH MEDIUM FOR AGRICULTURE AND HORTICULTURE  
FIELD OF INVENTION



The invention in general relates to superabsorbent polymer products. In particular this invention relates to the use of superabsorbent polymer products in coco peat. Aptus therapeutics Pvt Ltd., has developed new advanced micronutrient foliar solution for wide range of crops. The final results proven high yields after application at different regions of Telangana and Andhra Pradesh. This technology is ready for commercialization.

#### **External outreach activities/events/seminars organized by TBI-UoH:**

2013: TBI-UoH in collaboration with IIMA, ET & DST, organized a One day work shop on POWER OF IDEAS on 17<sup>th</sup> November 2013 for the selected people at UoH campus. Nearly 15-20 prospective entrepreneurs have been identified in the proposed thrust areas.

2014: Entrepreneurship development workshop at School of Management Studies and School of Life Sciences involving experts from Biotech/Pharma and Financial institutes on 24<sup>th</sup> March 2014.

2015: TBI organized an Innovation workshop in collaboration with Millennium Alliance, USAID, TDB, FICCI on 13<sup>th</sup> Feb 2015, nearly 100 students and 10 faculty from university and from outside participated in this program.

2015 : TBI in association with The Indus Entrepreneurs (TiE) – Hyderabad Chapter, and The Entrepreneur Zone (TEZ), Hyd on 24<sup>th</sup> September 2015 organized entrepreneurship awareness program for students, faculty and researchers at UoH .

2015 TEZ in association with TBI-UoH and School of Management studies and TiE is conducting **CRESCENDO** All India Business plan competition event at SMS, UoH on 4<sup>th</sup> December 2015 to encourage the entrepreneurial spirit among university community.

2015: TBI-UoH in collaboration with IIMA, ET & DST TBI-UoH organized a one day work shop on 15<sup>th</sup> October 2015, POWER OF IDEAS for the selected people at UoH campus and also from outside. Nearly 200 people attended the event and nearly 5-10 prospective entrepreneurs have been identified in the thrust areas such as IT.

2016: TBI-UoH in collaboration with The Entrepreneur Zone (TEZ) commenced 2<sup>nd</sup> batch of training program for budding entrepreneurs. Nearly 30 students from UOH and outside were enrolled for this program.

**New Applicants applied for incubation in the financial year  
2015-16 at TBI-UoH**

<b>S.NO</b>	<b>Ventures/ Incubatee</b>	<b>Thrust area</b>	<b>Promoter</b>
<b>1</b>	<b>Dr. Agri Bio Innovations Pvt Ltd.,</b>	<b>Nutraceuticals</b>	<b>Dr. Nishanth</b>

2	--- (company name yet to be registered)	Therapeutic enzymes	Vijay Gunasekaran
2	IgY Immumologix Pvt Ltd.,	Immunology	Dr. Adi Reddy
3	Hercules Biotechnology Pvt Ltd.,	Molecular Biology (Transgenic animals)	Dr.Madhav kavuri
4	Dr. Srinivas Kurukuti (Dept of Animal Sciences, UoH)	Drug Discovery	Dr. Srinivas K
5	Dr.ArunaSree Jenya BioSciences Pvt Ltd.,	Drug Discovery	Dr. Aruna Sree
6	Prof. B. Ramachary School of Chemistrv, UoH	Chemistry	Prof. B. Ramachary
7	Prof. S. Dayananada Dept of Animal Sciences, UoH	Microbiology	Prof. S. Dayananada
8	Prof. Manjula Sritharan Dept of Animal Sciences, UoH	Life Sciences	Prof. Manjula Sritharan
9	Prochemoorganics Pvt Ltd.,	Chemistry	Dr. Ramesh Patnam
10	Dr. N.S. labs Pvt Ltd.,	Chemistry	Dr. Srinivas
11	Biosimis Pvt Ltd., (Yet to be registered)	Life Sciences (cancer biology)	Dr. L. Sudarshan Reddy

#### Future Goals:

To accommodate 5-10 potential and innovative applicants for incubation services at our TBI in the present financial year 2015-16.

Assistance required from DS T

Financial support from DS T is required to scale- up the TBI activities further.

- An extension of the project for a further period of five years is requested
- Requesting to release the second installment of capital grant and further installments of recurring grant
- Request to approve and release an equipment grant in addition to the present capital grant to procure few high end equipment which certainly helps the TBI to attract more number of potent entrepreneurs.

Prof. V. Venkata Ramana  
Coordinator

TBI-UoH.  
18.02.16



TBI

UNIVERSITY OF HYDERABAD

TIDE



Technology Business Incubator & Technology Incubation and Development of Entrepreneurship Festival of Innovations, Rashtrapati Bhavan, 15<sup>th</sup> March 2016

TBI

- Funded by DST and UOH, Operations at TBI@UOH started in the 2010
- Currently five ventures are incubated from a mix of Biotech and Pharma
- 8 patents were filed by the incubatee start-up companies
- Two technologies/products are ready for commercialization
- 10 plug-and-play ready labs over a covered area of 6000 sqft
- The incubator encourages invites start-ups with POC ready and faculty form Univ. to translate ideas from lab to market
- Learning ground for students in entrepreneurship and innovation

TIDE

- Funded by DIT and founded in the year 2012 on UOH campus
- Electronics, Information Technology and Communications Technology
- Innovative ideas with established proof of concept are given seed funds
- Two Cos. are incubated in Multimedia Apps and Teaching aids
- Through incubator the Cos. Get access to trained students, access to infrastructure and Industry-University collaboration
- Translation of ideas form IT lab to new communication technologies



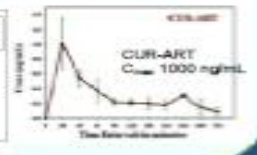
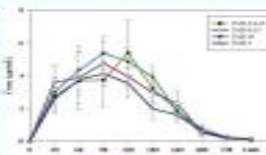
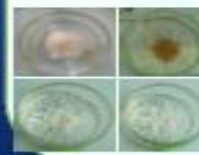
- Vitas Pharma is a drug discovery and development company focused on identifying and developing the next generation of antibiotics that overcome multidrug resistance
- Novel chemical scaffolds designed to overcome resistance
- Structure guided drug design used to identify novel scaffolds
- Company has received 2 Grants from BIRAC and has filed 2 international patents
- Vitas Pharma recently raised a seed round of funding from the Indian Angel Network
- Company has been recognized at various forums
- Interference Conference on Antimicrobial Agents and Chemotherapy, Washington DC, Sep. 2014
- Confederation of Women Entrepreneurs of India, October 2014 & BioPharma Asia, Singapore, March 2015

Project	Feasibility	Hit	Lead	Toxicology	Clinical
V7-01	██████████	██████████	██████████	██████████	██████████
V7-02	██████████	██████████	██████████	██████████	██████████
V7-03	██████████	██████████	██████████	██████████	██████████
V7-04	██████████	██████████	██████████	██████████	██████████
V7-05	██████████	██████████	██████████	██████████	██████████

- Novel chemical scaffolds identified using Structure Guided Drug Design
- V7-04 is a combination of approved antibiotics
- Scaffolds have low resistance frequency and mutation prevention concentrations
- In vivo efficacy has been established for V7-02 and V7-03 programs
- Intended indications: Skin and soft tissue infections, Hospital acquired Pneumonia, UTI



- The business theme of Crystalin is Chalk2Salt – To take insoluble drug molecules and transform them into high solubility solid forms
- 5 Patents were filed & several research publications
- Completed pre-clinical testing and BABE (Bio-Availability Bio-Equivalence) of anti-cancer drug Temozolomide cocrystal (BiPP)
- Developing fast dissolving Curcumin Formulation as Anticancer agents for oral therapy (IKP seed fund and SBIRI)
- First in Class Type 2 Diabetes (T2DM) molecules based on GPCR pathway through Drug Repurposing (BIG grant)



APTUS Therapeutics

- Human skin equivalents for alternatives in animal research
- Natural product like derivatives for psoriasis and vitiligo
- Novel Active pharmaceutical ingredients & Nutraceuticals



UMA's Secret Sauce: Middle Stratum Operations (MSO) Based Computing and Novel Architecture

Patent Pending



UMA wins on all four counts

UMA – Unprecedented Performance at Ultra Low Power Consumption

NeoScript Technologies Technologies

Portal for learning programming with automated and remotely assisting aid for Teachers and colleges for consistency in proficiency



Well furnished Conference room and office space ,Chemistry-Biology labs for incubates

- HPLC – analytical and preparative
- Bio reactor
- Orbital shaker
- Deep Freezers (-20 °C, -80 °C)
- High speed centrifuge
- Lyophilizer
- Biosafety cabinets
- Rotavapour
- Polymerase Chain Reactor
- Spectrophotometers
- Sonicator
- ELISA reader
- CO<sub>2</sub> Incubators
- Phase contrast Microscope
- Upright Microscope
- Bacterial incubators
- Ultra centrifuge



Game Changers of Innovation Program at UOH

Prof. V. Venkata Ramana, Coordinator TBI  
Prof. G. Rajaram, Coordinator TIDE  
Dr. B.S. Ramakrishna, In-charge TBI &TIDE

Innovators and Doers

Dr. Radha Rangarajan, Vitas Pharma  
Prof. Ashwini Nangia, Crystalin Research  
Dr. B. Praveen, Aptus Therapeutics  
Prof. K. Venu, Manjeera Digital Systems  
Prof. Vipin Singhal, VRV Technologies



# VISVA-BHARATI

## Visva Bharati

### Brief write up on achievement of Innovation club member nominated

Innovation clubs have already been set up in the university and more to come.  
E.g.

- Farmers Sunday HAT under Rathindra Krishi Vigyan Kendra /Palli Siksha Bhavana;
- yoga and Meditation Centre;
- Taran-tal Sports Centre.
- Annual Art fair by the students of Kala-Bhavana in the name of The celebrated artist Nandalal Bose;
- Sangit Sabha by the students and faculty members of Sangit Bhavana
- Science awareness programme for school students by the faculty and students
- Linkages with Innovation Incubators of Incubation Centres e.g.

Rabindra Sangeet Gaveshana Kendra has been started functioning involving students and faculty members of Sangit Bhavana, Rabindra-Bhavana and Patha-Bhavana

Linkages with Innovation Incubators of Incubation Centres e.g.

Rabindra Sangeet Gaveshana Kendra has been started functioning involving students and faculty members of Sangit Bhavana, Rabindra-Bhavana and Patha-Bhavana

### Members of the Innovation Club

1. Prof. Sudhendu Mandal, Provost of Sciences & Agriculture, V.B. – Chairman Adhyaksha,
2. Rabindra-Bhavana, V.B - Members
3. Adhyaksha, Kala-Bhavana
4. Adhyaksha, Sangit Bhavana
5. Adhyaksha, Siksha-Bhavana
6. Adhyaksha, Palli Siksha-Bhavana
7. Adhyaksha, Palli Samgathana Vibhaga
8. Adhyaksha, Vinaya –Bhavana
9. Adhyaksha, Bhasha-Bhavana
10. Adhyaksha, Vidya-Bhavana



**VISVESVARAYA NATIONAL INSTITUTE OF TECHNOLOGY  
(NIT NAGPUR)**

## Application for attending the Innovators Rashtrapati bhavan

**Name:** Khushdeep singh  
**ID no.** 15925



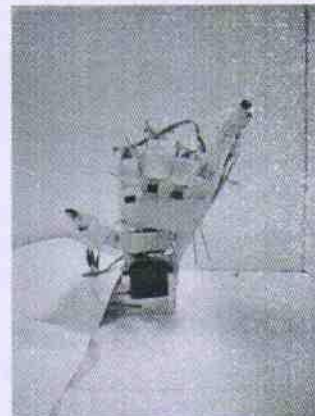
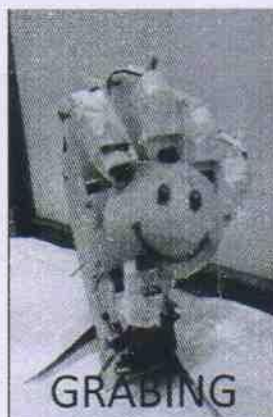
I am a 3rd year undergraduate student of Electronics and Communication Engineering at Visvesvaraya National Institute of Technology. The document includes the work on development of an **Prosthetic hand** under Dr.K.M.Bhurchandi (Under Centre of Excellence, Electronics dept.) that can be used as a cost effective device for amputated people.

**Need for Innovation:** The current available Prosthetic hands are very expensive and thus cannot be commercialized. India has large amount of amputated people and thus a vital role is to be played in this area of society.

**Challenges:** Human hand replication is very challenging task in terms of Manipulation concepts and Feedback controls involving infinitely many feedback points. Accurate kinematics and Haptic Sensing implementation using single actuator in an confined area increases the cost.

**Innovation:** In view of these aspects we developed an Prosthetic hand using readily available Tendons as Non-linear parameters for driving the fingers. An algorithm for finger actuation involves fingertip sensors thus providing virtual vision. It is developed using cost efficient 3D printing technology.

**Tasks Achieved:** The hand is capable of performing American Sign language demonstrations. Object grasping includes various configurations such as Power grasp for objects with rectangular and circular profiles, Tripod and Column grasps for small size objects, Precision open loop grasp for tiny objects.





## Khushdeep singh

B.Tech , Third year

Electronics & Communication Engg.

Visvesvaraya National Institute of Technology, Nagpur, Maharashtra.

Contact No:- (+91)9011876806

Email Id :- khushdeepvnit@gmail.com

Date of Birth 26th Jan 1994

### **ACADEMIC RESULTS:-**

- CGPA till 5th Semester:- 8.03/10
- 12th Board Overall % marks (HSC Board, Maharashtra):- 77.33%
- 10th Board Overall % marks (SSC Board, Maharashtra):- 91.45%

### **ABOUT ME:-**

The world around us fascinates me and can be created with Engineering aspects ! Engineering is my life and it is my Passion to design systems involving Control theory and Algorithms. Meanwhile I also help others in this field, that strengthens my concepts. In future I would pursue Graduate studies in Systems Engineering.

*Belief: Life is full of iterations, more you do better you become !*

### **INTERNSHIP:-**

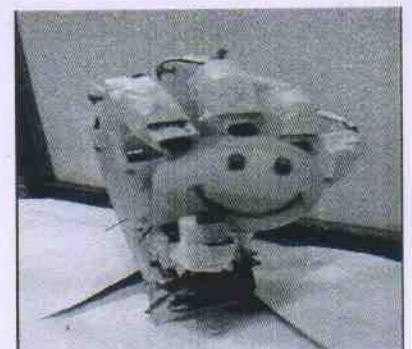
- Centre of Excellence (CoE), Electronics Dept. VNIT, Nagpur (May- Sept 2015)  
Project Under Prof.K.M.Bhurchandi, Electronics Dept. VNIT on Design, Control and Fabrication of an Robotic Hand.
- Robotic lab , Mechanical department VNIT, Nagpur (Nov- Dec 2015)  
Project under Dr. Shital S.Chiddarwar ,Mechanical Dept. VNIT on Autonomous quadcopter.

### **PROJECTS\***

(\*click to access the video)

#### 1) Development of an 3D printed Robotic hand (May - Sept 2015)

- 6 DOF actuated using High torque RC servo motors. TSOP infrared sensor integration at finger-tip for enabling the individual fingers.
- Use of Tendons provided flexibility of final joint positions required for compliant gripping .
- The system was designed using CAD modeling software Solidworks and fabricated using a 3D printer with MakerBot 3D printing software.
- TIVA-C ARM-Cortex TM4C123GH6PM microcontroller for programming using Code Composer studio (CCS) software.
- American Sign language demonstrations with Power grasp, Precision closed loop grasp, Tripod and column grasp, Thumb grasping tasks demonstrations.



#### 2) Design & Control of Autonomous Quad-copter (Nov 2015-present)

- A Quad copter capable of Flying on its own and doing standard maneuvers.
- CAD modeling Design in Solidworks.
- Simulations in VREP software with PID controller implementation in xyz axes and about Yaw rotational axis.
- BLDC 1400 KVA motors and 3300 mah,11.1 V LIPO battery.



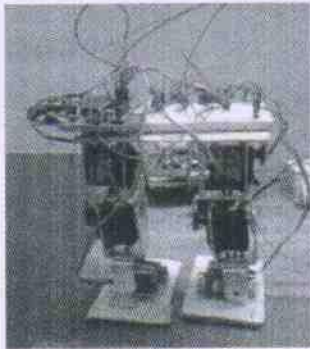
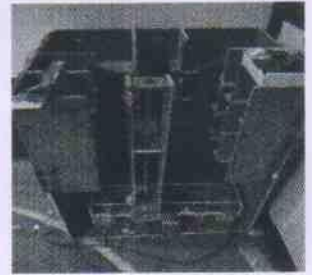
Recommended

Shital



3) Smart Storage-Retrieval system aimed for household purposes:-  
(Sept- Nov 15)

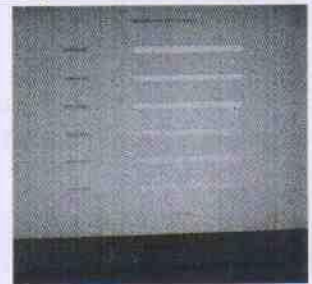
- Actuated using DC geared motors with 12kg-cm torque at 12 volts.
- 3 motors driving 3 perpendicular axis via power screw mechanism.
- Actuator controlled using a MOC7805 encoder and programmed with ARM Cortex TIVA C-series TM4C123GH6PM microcontroller.
- Input platform led to the placement of object in specified box.



4) Design, Fabrication and control of BIPED Robot

- A 6DOF robot capable of walking, actuated using RC-servo motors and fabricated on CNC machine with Aluminium sheet using G-code generator software.
- Developed using CAD modeling software Solidworks and programmed using AVR Atmega16 microcontroller.
- Development of an Graphical user interface (GUI) for servo control using Python on Linux platform.

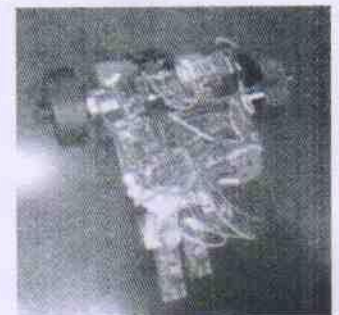
(Oct-Nov 2014)



5) Maze Solver Robot

- Robot capable of navigating & finding path in maze .
- Path recognition using five Infrared sensors arranged in triangular pattern for efficient algorithm, controlled using AVR Atmega16 microcontroller.
- An efficient line following using PID controller implementation with manual tuning according to theoretical results obtained via MATLAB simulations , generating Graphical plots of actuator speeds w.r.t time of Second degree transfer function.

(Sept 2014)



6) Other Robotic projects :-

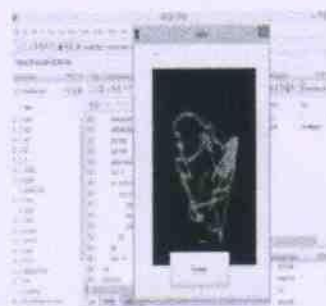
(2014)

- Line follower robot: A robot capable of navigating a white path built using basic analog components like Op-amp, Power transistors, darlington pairs, Infrared sensors and DC motors .
- Sound detector robot: A sound sensor module consisting of Microphone, amplifier, peak detector and buffers used for detecting input sound signal.
- Algorithm developed in Atmega8 microcontroller for different functionalities of actuators.
- DTMF controlled robot: Multiple actuators control using mobile as a DTMF transmitter and DTMF decoder system integrated with AVR Atmega16 mcu.



7) MATLAB based projects:-

(2013)



- **Virtual Drawing Pad**:- The program detects the marker's movement using camera. Tracks and plots the centroid of the area identified as a marker onto the virtual pad.
- **Object Detector**:- The object of calibrated color is detected using camera and a object boundary was displayed.



## EXPERIENCES:

- Apart from college academics I have undertaken Notable online courses including:  
**Introduction to Haptics** ( Stanford University )  
**Embedded Systems- Shape the world** ( Texas A&M university )  
**Linear Algebra** ( MIT open courseware )  
**Computational Science and Engg.** ( MIT Open courseware)  
**Circuits and Electronics** (MIT Open courseware)  
**Control Systems**

Member of **Innovation lab** (IVLabs) at VNIT, Nagpur. 'IVLabs' concentrates on innovative ideas and projects in the field of Robotics. <http://www.ivlabs.in/>

- Active member of IEEE Student's Chapter at VNIT, Nagpur. Have conducted workshop on **Basic Electronic Circuits , Mechanical designs, Image processing, Atmel microcontrollers** and **Basics of Robotics** organizing these event for about 150 students throughout the academic year in college.
- Participated in Autonomous robotics event in **AXIS'14** -technical festival at VNIT,Nagpur as well in **Tryst'14** and **Tryst'15**- technical festival at **IIT-Delhi**. Organized the same in **AXIS'14**.

## SKILLS:-

- Experienced in C,C++, Python, **MATLAB** and **VREP** programming .
- Conversant with Embedded C programming. Have experience with many microcontrollers, e.g **Atmega** series, **Texas Instruments - ARM CortexM4** and **MSP430**.
- Electronic circuit simulation software : **Proteus , Multisim**.
- Design and development of Circuits involving **SMD** components using **KiCAD** software.
- Can **design** and **debug Electronic circuits** efficiently.
- Basic Image processing skills using **MATLAB**.
- I am extremely hardworking & can work for long hours for task completion.