Gandhian Young Technological Innovation Awards GYTI(2015)

Gandhian Young Technological Innovation (GYTI) Awards

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We are thankful to JSW as one of the sponsor of GYTI 2015 besides SRISTI. GYTI 2015 sincerely thanks Organising team of Festival of Innovation (FOIN) for facilitating GYTI 2015 at Rashtrapati Bhavan on March 8, 2015. We thank all the staff of the office of the President of India for guidance and support to showcase the emerging genius of tech youth of our country during FOIN.

Last but not the least we are thankful to all the 1700 plus nominated innovators, their team members guides and institutions who enriched GYTI 2015 and ensured that young innovators play much more crucial role in national development in days to come.

- Prof Anil K Gupta

Founder, Honey Bee Network
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Introduction

The Indian renaissance strongly rest on the originality, innovative spirit, social, industrial, ecological connect and willingness of technological youth to break the disciplinary and institutional boundaries for producing meaningful solutions to the persistent social problems. Such a situation can not arise if the undergraduate and post graduate students do not know what others have done, how to build upon that, and which problems have defied solution so far. In the spirit of Open innovation pioneered by Honey Bee network more than 25 years ago, SRISTI (sristi.org) created a portal techpedia.sristi.org which has pooled around 200,000 titles and summaries of the engineering and other technological projects. It has become more difficult now for students to do repetitive work. More importantly later learning among students from each other has increased tremendously. The linkage between grassroots innovations and student projects are not strong enough yet but we hope that this will change soon. The National Innovation Clubs set up in central universities, NITs, IITs, IISERS etc., under the guidance of Honourable President of India have to search, spread, celebrate innovations and sense the unmet social needs. These clubs may help in bridging the gap between unmet social, ecological and industrial needs of society and the tech youth.

To harness the creative potential of millions of young students and celebrate their creativity Gandhian Young Technological Innovation(GYTI) Awards are given to the innovative students annually. Gandhian Young Technological Innovation Awards (GYTI), 2015 by SRISTI set a new benchmark for scouting and appreciating outstanding innovations by young students across universities in UG, PG and PhD level. Team GYTI led by Hiranmay reached out to nearly 4000 colleges of higher learning across the nation seeking nominations for this coveted award. GYTI 2015 received nominations from 159 universities from 28 states and six Union Territories across the country. We received 1700 nominations in 50 Technology domains covering all segments of science and technology. More than 150 expert reviewers participated in the online and offline review process to select the best projects in their field. Eminent Professors from IITs, NITs, IISc, ICT, MIT Boston, UC Berkeley, Stanford University, Harvard University, State Technological Universities and Central Universities of India reviewed the nominations at different stages. Domain experts from MNCs and private sectors like GE, ST

Microelectronics ,Pfizer, Cadilla, JSW,TA-TA Steel and many others companies shared their reviews on each innovation selected after stage one review. Many national agencies like DRDO, ISRO, CSIR, BARC, defence forces, reputed medical Institutes and professionals from strategic R&D wing of Govt. of India also reviewed the nominations. After a very methodological review of all nominations, 43 nominations were selected for GYTI 2015 out of which 17 teams were adjudged for award and 26 for appreciation. Both the awarded and appreciated nominations were in three categories a) MLM (More from less for many) award b) Sristi socially relevant technological innovation award and c) Technological-edge award.

We are happy to report that Biotechnology Industry Research Assistance Council (BIRAC, DBT) and SRISTI have entered into a MOU (March 4, 2015) to support select innovations in biotech/health sector. BIRAC-SRISTI GYTI award of Rs. 15 lacs will be given to five technologies and five others will be appreciated. has decided to award and appreciate few selected innovations in the area of Bio Tech, Biomedical and allied sectors from the nominations of GYTI 2015. Similarly five selected innovations among the finalists will receive support of Rs. 50,000 as Hari Om Ashram Prerit, Prof A.K.N.Reddy award 2015. Dr Amulya K N Reddy, an eminent scientist at IISc, Bangalore, inspired many generations of the scholars and scientist to pursue socially relevant research and development. His foresight can be imagined by one instance of Ungra project for sisal processing. He had conceived that workers who processed sisal in a painstaking process will hold equity in a unit that he had visualised being set up to use IISc technologies to develop multiple products in addition to fibre (Gupta, 1984, 1989). He once observed that technology carries the genetic code of the society in which it evolves. One needs to work at several levels to change the code of the technological trajectory had to be changed. He set up ASTRA at IISC which motivated several generation of students at this premier institute to engage with social problems. Perhaps first community biogas plant was set up in Ungra under his guidance way back in early eighties. We at SRISTI are privileged to commemorate his memory through this award.

This year the GYTI awards are being given away on 8th march 2015 at Rashtrapati Bhavan during Festival of Innovation (FOIN). The selected

innovations in GYTI 2015 will also get help from Social Innovation Fund (SIF) at SRISTI as per the need and merit. Techpedia team at SRISTI with the help of Honeybee Network volunteers will mobilise world class experts to handhold each one of them to take their ideas to the next stage. Unless student ideas and prototypes move to the next stage, they will not be able to create just 'value for money, but also value for many' as suggested by Dr R A Mashelkar. GYTI reaffirms that thousands of students are indeed equipped with multiple skills and sensitivity to develop frugal, social relevant innovations and breakthrough innovations. SRISTI and Honey Bee Network are poised to leverage the potential of such tech youth to help them strengthen Make in India mission and Innovate in India dreams of Indian society.

We thank all the well-wishers of Honey Bee Network who often responded to our request for comments on weekends and amidst their very busy schedule. Whatever merit exists in GYTI award, entire credit goes to these reviewers and those volunteers who spread the word about this platform and worked in the background, to help in the prior art search and process the feedback. Without their help we could not have done justice to creative ideas. I must also add that many worthy ideas could not be recognised this year only because the research pursued for the process had not yet become technology or needed further validation. In some cases, we may have made exceptions though. These awards put to naught the popular myth about so called employability of our engineering graduates. True that many of them are not employable, they are actually capable of generating employment for others, if we could invest in their ideas liberally. I look forward to see many of the awarded ideas becoming a basis of new tech enterprises in the years to come.

It is a matter of great satisfaction for us to facilitate those GYTI winners of previous years who have been selected as Innovation Scholar in Residence at the President's house. Their two week residency will also begin on March 8, 2015 along with writers and artist in residence. This is an unique opportunity that President Pranab Mukherjee has provided to creative innovators, writers and artists to interact with each other and create a new idiom of Indian renaissance.

I congratulate all the winners but complement those even more who

may not have been awarded but who have shared their ideas with us and the world at large through techpedia.sristi.org platform. Without such a spirit of open innovation, we will not be able to create a vibrant spirit compatible with Indian dream to become an economically developed, compassionate and collaborative society.

Prof Anil K Gupta
Founder, Honey Bee Network
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CONTENTS

AWARDS

APPRECIATIONS

Appendix

GYTI 2015 Awards

MLM (More from less for Many) award

Sristi socially relevant technological innovation award

Strategic innovation and /or technological-edge award

BIRAC SRISTI GYTI award

HARI OM Ashram Prerit Dr. A K N Reddy award

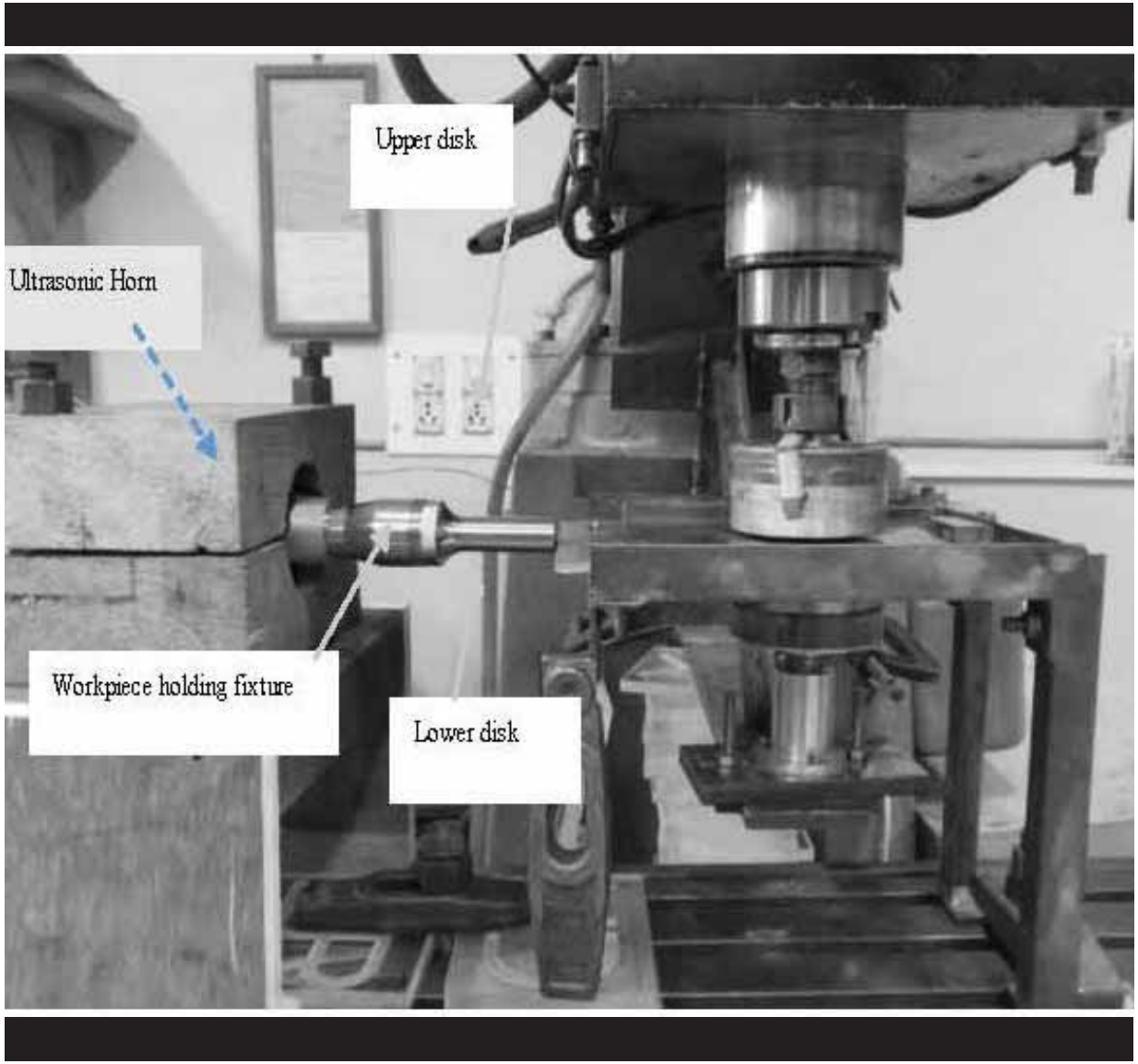
Prateek Kala, Sumit Kumar
Indian Institute of Technology, Delhi

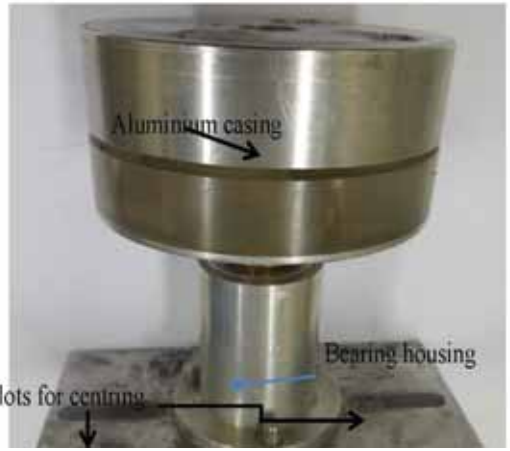
Guide
Dr. P M Pandey

Double Disk Ultrasonic Assisted Magnetic Abrasive Polishing Device

Innovators, Prateek and Sumit, have invented a device that could potentially bring down the cost of production of electrical goods. Their invention relates to a double disk, ultrasonic assisted, and magnetic abrasive polishing device. In particular, it follows the idea of using a magnetic abrasive polishing process to planar workpieces. Its role of polishing non-ferromagnetic workpieces lends it a special prominence in the electrical and electronic industry (including copper, aluminium, magnesium, and their alloys - brass, silicon wafers etc.). Cost of production of the device is relatively lower since it can be made from inexpensive materials like permanent magnet, aluminium casing etc.

The device has already been patented, and Prateek and Sumit hope to continue developing it. Their next step is to systematically integrate the device with an automated system and process window to develop various other types of work material.





Left : complete device
Top : Lower disk
Above : Upper disk


Aravind Kumar Rengan,
Amirali B. Bukhari
Indian Institute of Technology, Bombay

Guide
Prof. Rohit Srivastava

Biodegradable LiposAu Nanoparticles for Photothermal Ablation of Cancer

An alternate for chemotherapy that is non-invasive and cost-effective? Innovator Aravind Kumar Rengan and his team have invented a technique of using bio-degradable liposau nanoparticles for the photothermal ablation of cancer. By experimenting on animal model, Aravind and his team have reported that biodegradable plasmon resonant liposome gold nanoparticles (LiposAu NPs) are capable of killing cancer cells through photothermal therapy. Thus, implying their therapeutic potential in cancer treatment.

For the immediate future, Aravind and team, are waiting to start the phase 1 of human clinical trials. They are also in the process of patenting their technology. Further, recently their work was featured on NDTV.


NIR LASER
BIODEGRADABLE Au NANOSYSTEM

Ms. Rashmi Jain, Mr. Vivek Makwana, Ms. Komal Patel

B V Patel, PERD Centre

Guide

Dr. Amita Joshi & Dr. Manish Nivsarkar

Targeting lymphatics to treat HIV using lipid based formulations

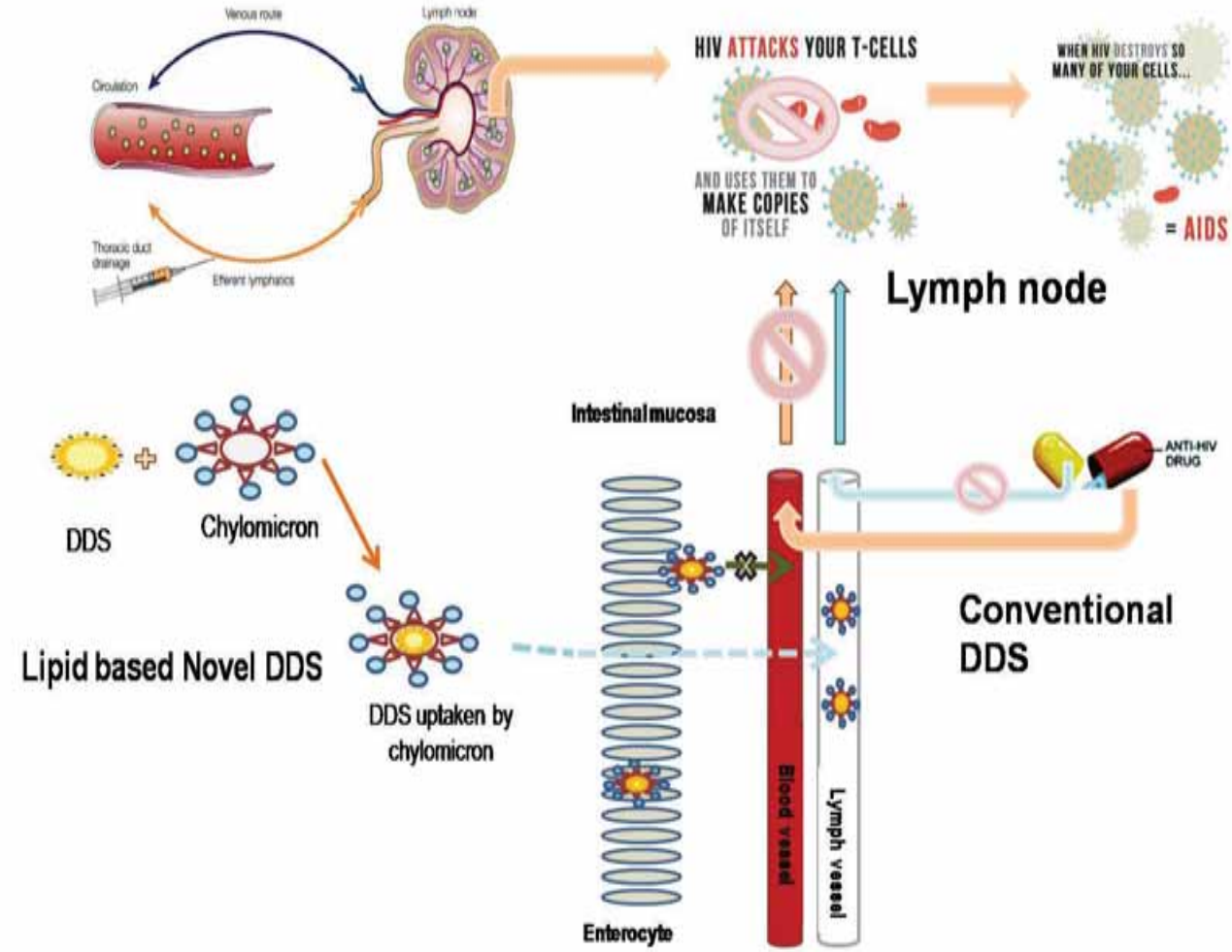
Treatment of Human Immunodeficiency Virus (HIV) is often rendered ineffective because the virus is localized in certain inaccessible compartments of the body such as the Central Nervous System, and the lymphatic system. Due to this, conventional drug delivery cannot be maintained for the necessary duration of time in the therapeutic concentrations required. Therefore, conducting research to make drugs that target the lymphatics directly is the need of the hour.

Amita Joshi is attempting to research the potential of Self-emulsifying Nano-emulsifying Drug Delivery System (SNEDDS), a lipid based delivery system for targeting lymphatic HIV reservoirs. The SNEDDS formulations are capable of targeting drug to lymphatic system, and are a potential delivery system candidate to achieve better therapeutic outcome for the treatment of HIV and other diseases like cancer. The SNEDDS formulation was prepared using Capryol 90 olive oil, Cremophor EL, Tween 20, Transcutol, Efavirenz & TPGS. Significant amount of drug in lymph and spleen was detected, which signifies the potential of SNEDDS to target lymphatics.

The formulation has been used to make one drug that has been tested on animals. In the future, Amita plans to develop a platform technology for targeting lymphatics. Hence, they are further evaluating different drugs , with the developed formulation system. They hope establish a convenient, effective and affordable oral delivery system for the better management of HIV.

Targeting lymphatics to treat HIV

Rashmi Jain, Vivek Makwana, Dr. Amita Joshi and Dr. Manish Nivsarkar



Sabbir Khan
NIPER, SAS Nagar

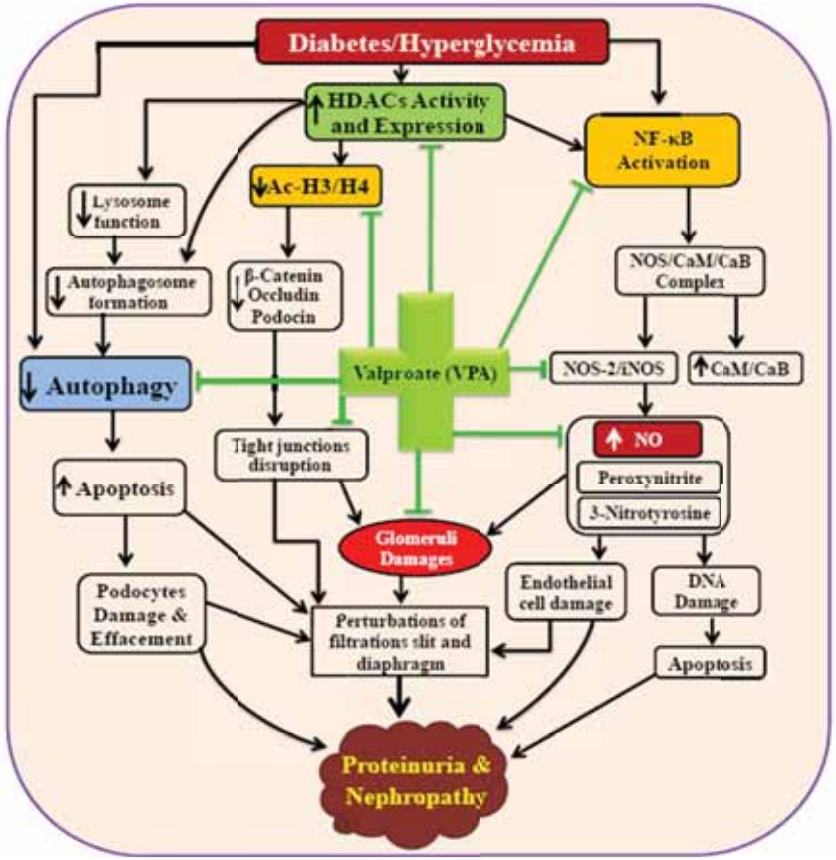
Guide
Dr. Gopabandhu Jena

Valproic acid prevents progression of the diabetic nephropathy: Elucidation of molecular mechanisms and proof of concept for promising therapeutic usefulness

Innovator Sabbir Khan has a breakthrough new drug for treatment of Diabetic Nephropathy (DN), a frequently seen complication of both type 1 and 2 Diabetes Mellitus, a disease that affects over 65 million people in India alone. Diabetic Nephropathy is a microvascular complication of Diabetes and a leading cause of renal failure and End Stage Renal Disease (ESRD) in Diabetes patients. A serious lack of efficacious treatment regimen for DN underscores the need for a concerted effort in finding a drug molecule that can prevent progression of the disease and help in managing the kidney damaging effects.

As part of the research, he has made an extensive analysis of the anti-fibrotic and renoprotective effects of Vaproic Acid (VPA). While VPA is a well known drug of choice in the treatment of migraines and epilepsy and proven to be a good HDAC inhibitor, its renoprotective effects were not known before. Sabbir's discovery, in preclinicial stage at the moment and verified by testing on diabetic rats, can lead to a revolutionary disease management paradigm in DN patients. Part of the appeal of VPA is the fact that it has already been extensively tested for adverse effects in humans in the context of migraine and epilepsy treatments and thus the otherwise long period, usually running in decades, that lies between drug-discovery to actual treatments is reduced to practically nothing..

Sabbir's work on VPA has been the subject of two international research papers by him. Further testing is required to rigorously verify the efficacy of the drug and to ascertain that it passes regulatory requirements before being made part of a standard treatment plan for DN.



The schematic diagram demonstrates the involvement of different molecular events of autophagy and NF-kB/iNOS signaling in the progression of diabetic nephropathy. Diabetes/hyperglycemia leads to over expression of HDACs, which decreased the acetylation of histone proteins thereby perturbs the glomerular filtration barrier due to podocyte and other renal cells damage. VPA can exert the renoprotective effects by facilitating the autophagy through the modulation of LC3B and/or acetylation of other autophagy proteins as well as reduces the NF-kB/iNOS-mediated damages in the diabetic kidney.

Amit ashok Vernekar
Indian Institute of Science

Guide
Prof. Govindasamy Mugesh

Novel Nano Enzyme Technology for combating Oxidative Stress Related Disorders

70% of the deaths occurring due to cancer are directly related to reactive oxygen species (ROS) or oxidative stress. Further, oxidative stress is also thought to be involved in the development of Parkinson's disease, Alzheimer's disease, cardiovascular diseases etc. In order curb the incidence of deaths due to these diseases, innovator Amit Ashok Vernekar has developed a novel nano-enzyme technology that can combat oxidative stress related disorders. Through research, his team has showed that vanadium pentoxide, an oxidant material, demonstrates remarkable anti-oxidant like activity when observed at a nano-scale. They further worked on the idea to show that since vanadium pentoxide nanowires reduce the hydrogen peroxide, through glutahione peroxidase-like activity in cell, they can prevent protein and lipid oxidation. Thus, implying that it can be useful in the treatment of the above mentioned disorders.

Amit and his team's work has been recently highlighted in the media, including newspapers like the Hindu, Times of India, Deccan Herald etc. This group ofinnovators believe that nanomedicine is an area that is gradually gaining significance in the field of medicinal chemistry and bio-chemistry, and a lot of funding is being channelized towards the same. They hope that their investigation opens up a new area for the development of nanoenzymes, which ultimately leads to the treatment of various diseases.



Shivani Gupta, DV Padmavathi, Anuradha Pal
BITS Pilani, Hyderabad Campus

Guide
Prof. Suman Kapoor

Rightbiotic :
The fastest antibiotic finder

In an effort to curb the threat that Urinary tract infections (UTIs) pose worldwide, innovator Shivani has invented 'RightBiotic' - an ultra-rapid test for determining the antibiotic sensitivity of bacterial pathogens found in human urine in the case of UTIs. The technology enables better and faster testing time, between 3 to 72 hours, for urine culture testing. Therefore, it ensures that the right antibiotic is administered from the very beginning of the treatment, and by extension, this prevents antimicrobial resistance.. It uses the basic tenets of clinical microbiology including growing the bacteria in a specialized medium, and measuring the inhibition of the growth of bacteria in the presence of the antibiotic. The detection is based on chromogenic end-points that use optical sensors. Finally, the output is analyzed using lab-developed algorithm based softwares.

Shivani believes that Rightbiotic will be a huge contribution towards the development of the healthcare industry in India, since it ensures quality diagnostic services for UTIs. Her aim is to make RightBiotic available in each and every Primary Healthcare Centre in India. She hopes that doctors would promote the idea of evidence based diagnostics, and avoid irrational/empirical use of antibiotics.


Fastest Antibiotic Finder
ON
P3
P2
P1
RightBiotic™

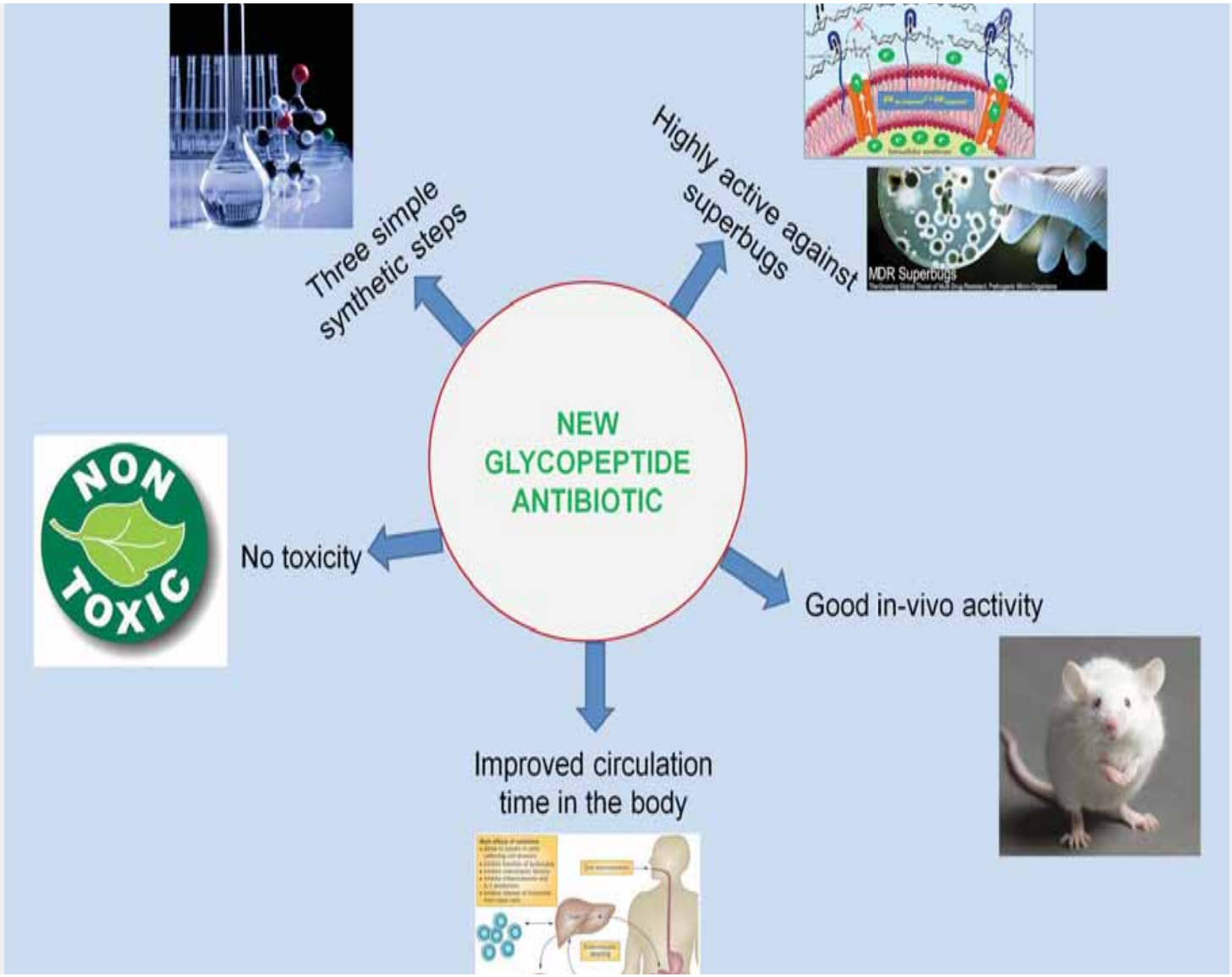
Venkateswarlu Yarlagadda, Padma Akkapeddi, Goutham B Manjunath
JNCASR

Guide
Dr. Jayanta Haldar

Development of A Powerful New Antibiotic That Kills All Drug-Resistant Bacteria

The emergence and spread of antibiotic resistance coupled with the diminishing antibiotic pipeline has made it vital to develop novel antimicrobial agents. Venkatestwarlu Yarlagadda has developed a new antibitotic that kills bacteria rapidly, and can be used to treat the diseases caused by multi-drug resistant bacteria. It uses a simple synthetic methodology, in which the compound used kills the bacteria through a multi-faceted mechanism. The antibiotic that is developed by Venkatestwarlu and his team, if it passes all the phases of drug safety, would be really a beneficial extension to antibiotic pipeline for the treatment of a broad-spectrum of multidrug-resistant bacterial infections. Since bacteria are incapable of acquiring resistance against their new compound, they can presume that the compound could be used for far long time. Further, it would revolutionize the antibiotic development in India and globally.

The team has patented their new compound in six countries (India, USA, Australia, Europe, South Korea, and Canada), and in the future, they plan to hold clinical trials in collaboration with pharma industry and hospitals. They have also been recognized in national newspapers including The Times of India, The Indian Express, and Scroll.in.


Three simple synthetic steps
Highly active against superbugs
MDR Superbugs
NEW GLYCOPEPTIDE ANTIBIOTIC
NON TOXIC
No toxicity
Good in-vivo activity
Improved circulation time in the body

Praveena Gangadharan, Dr. Jaganathan Senthilnathan
Indian Institute of Technology Madras

Guide
Dr.Indumathi M Nambi

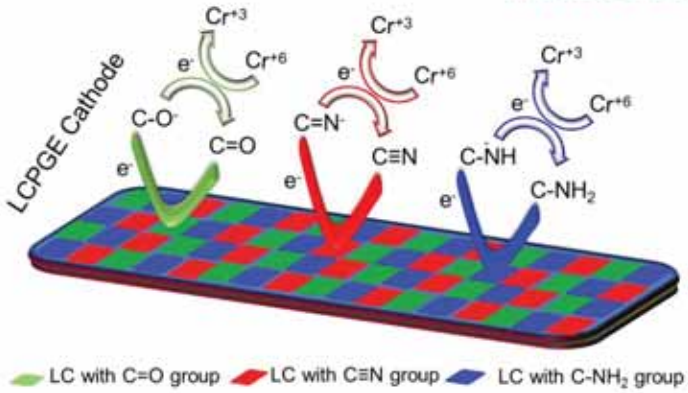
Novel technique for energy generation coupled with treatment of wastewater and resource recovery using E-waste as electrode material in Microbial Fuel Cell

Praveena Gangadharan has designed a novel technique for energy generation from Microbial fuel cells. Further, she and her team have coupled the process with the treatment of wastewater and resource recovery using E-waste as electrode material. It is known that commercially available electrodes that are used in microbial fuel cells (MFCs) to generate electrons are exorbitantly priced. Therefore, they are not suited for large-scale applications. However, the present study demonstrates that use of Liquid Crystal coated Polaroid Glass Electrode (LCPGE) material, that can be collected from waste liquid-crystal display (LCD) of computer monitors, as anode and cathode electrodes. LCPGE is cost-effective, bio-degradable and helps in the simultaneous reduction and recovery of hexavalent chromium from wastewater.

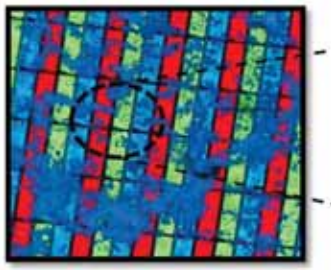
By applying the basic concept of 'using waste to treat waste', the team has managed to evolve a process that is environment friendly, and reduces the organic waste treatment cost by producing electrical energy without combustion of fossil fuels. Furthermore, energy generated by MFCs can be used for various applications that include domestic wastewater treatment, remote sensor, biohydrogen production and provide sustainable energy sources for remote areas.

Praveena and her team are currently in the process of developing pilot-scale MFCs for removal of multi-metal from water and wastewater. They are also researching to find a suitable system to store the energy produced from MFCs. A patent for the technique is currently under process.

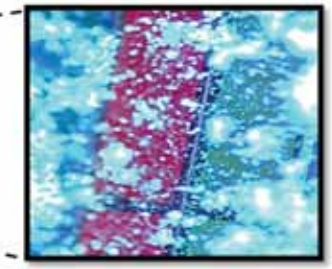
Removal / Recovery of Chromium



LCPGE Cathode Mechanism – Removal of Chromium

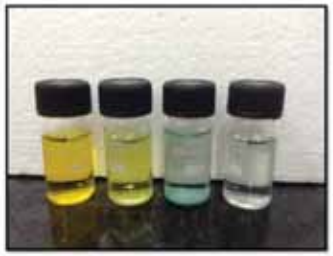


Confocal Fluorescence Microscopic Image (20X)



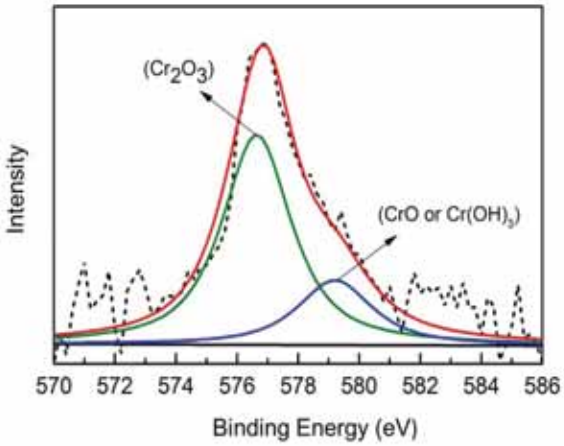
Confocal Fluorescence Microscopic I (100X)

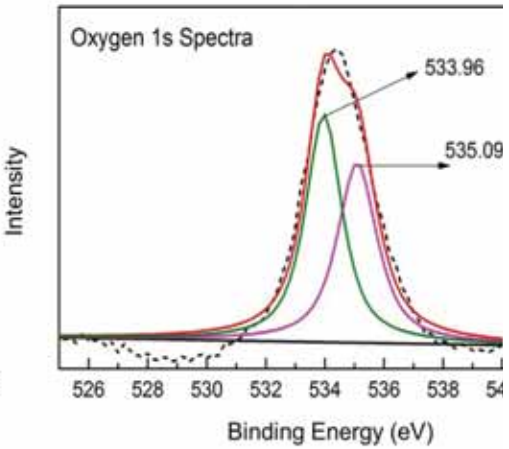
Chromium Precipitated on LCPGE Cathode



Effluent Chromium

Recovered Chromium





X-ray Photoelectron Spectroscopy of Recovered Chromium

Kranthi Kumar Maniam
Indian Institute of Technology, Madras

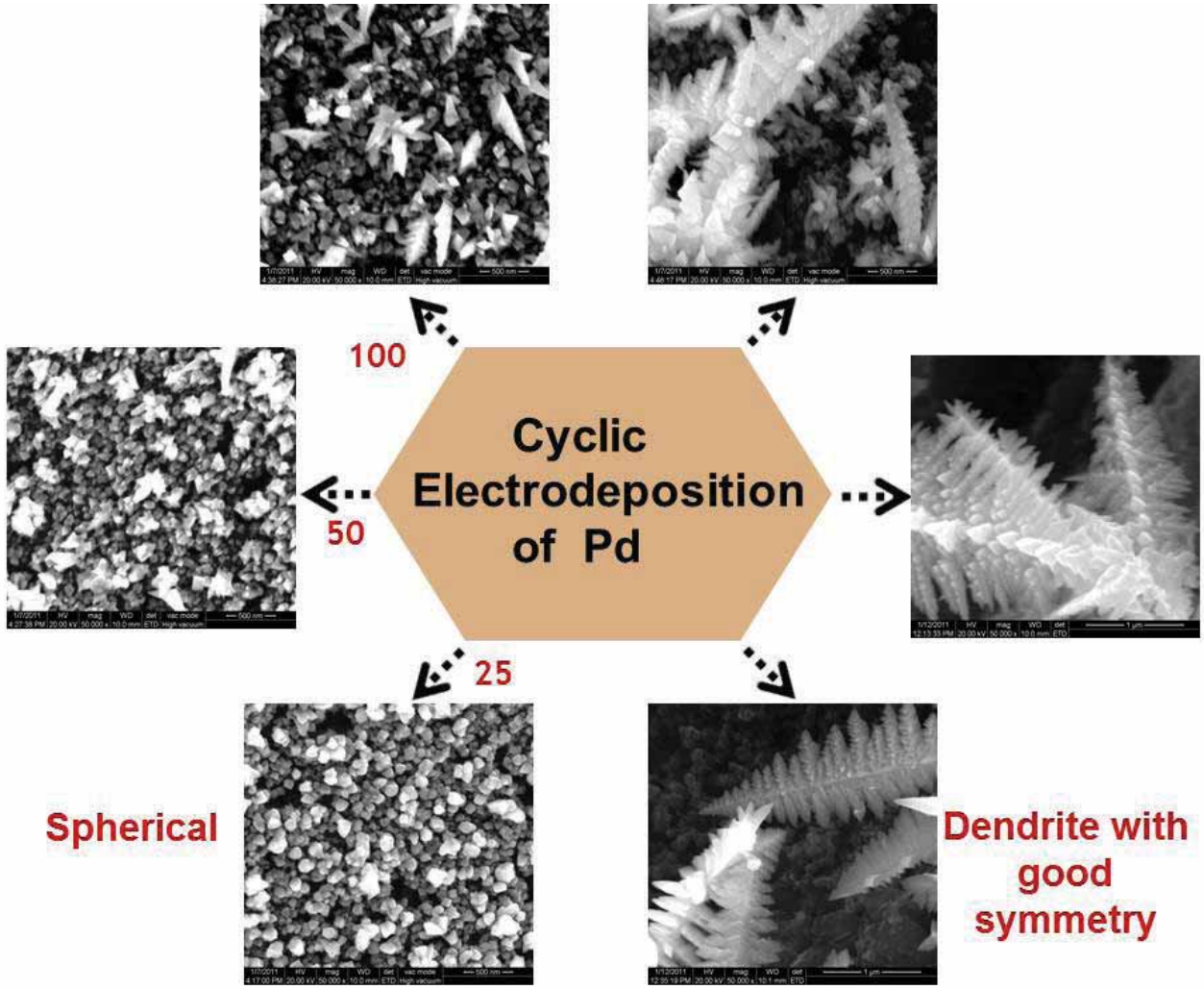
Guide
Dr.Raghuram Chetty

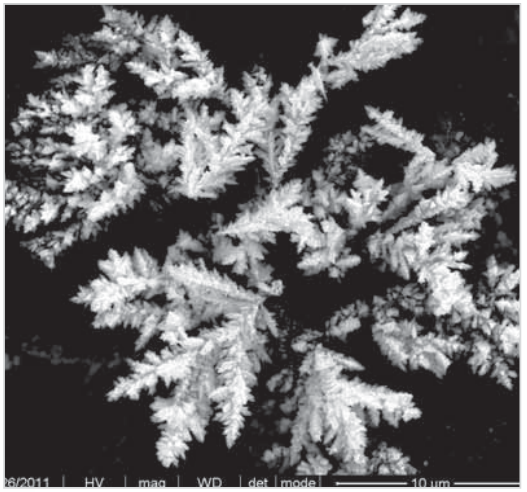
Development of Shape Controlled Palladium Structures as Electrocatalysts for Fuel Cell Applications

Synthesis and fabrication of noble metal (Pt, Pd) structures such as flowers, dendrites, thorns etc. on carbon based substrates is a key challenge for electrocatalytic applications such as fuel cells. Therefore, Kranthi Kumar Maniam has proposed the synthesis of Pd structures (including dendrites) with customized morphology on electrochemically activated carbon supports (such as carbon black, carbon nanotubes, wood apple carbon and graphene). The technique can be implemented by adopting a template free methodology, and using two different electrochemical techniques - cyclic voltammetry and constant voltage. The Pd dendrites synthesized by electrochemical methodology showed increased surface area, and displayed close to three-four fold increase in electrocatalytic activity towards formic acid oxidation and oxygen reduction in comparison to conventional Pd deposit.

There are many benefits to the proposed research including the potential of tailoring the morphology of palladium, from spherical to dendritic. It can also help in the development of the dendrites in terms of their growth. It is easily available as it can be obtained from a variety of carbon supports, such as, in-house built wood apple carbon, graphene, carbon nanotubes, Vulcan.

Kranthi has already patented his research, and in the future, he plans to work on the shape control of non-Pt catalysts such as such as wood apple carbon and other emerging materials such as graphene. He believes that non-Pt catalysts have the potential to significantly develop electrocatalysis research.





Morpholgical Transitions for Pd Supported Vulcan

Shiva Kumar H R
IISc, Bangalore

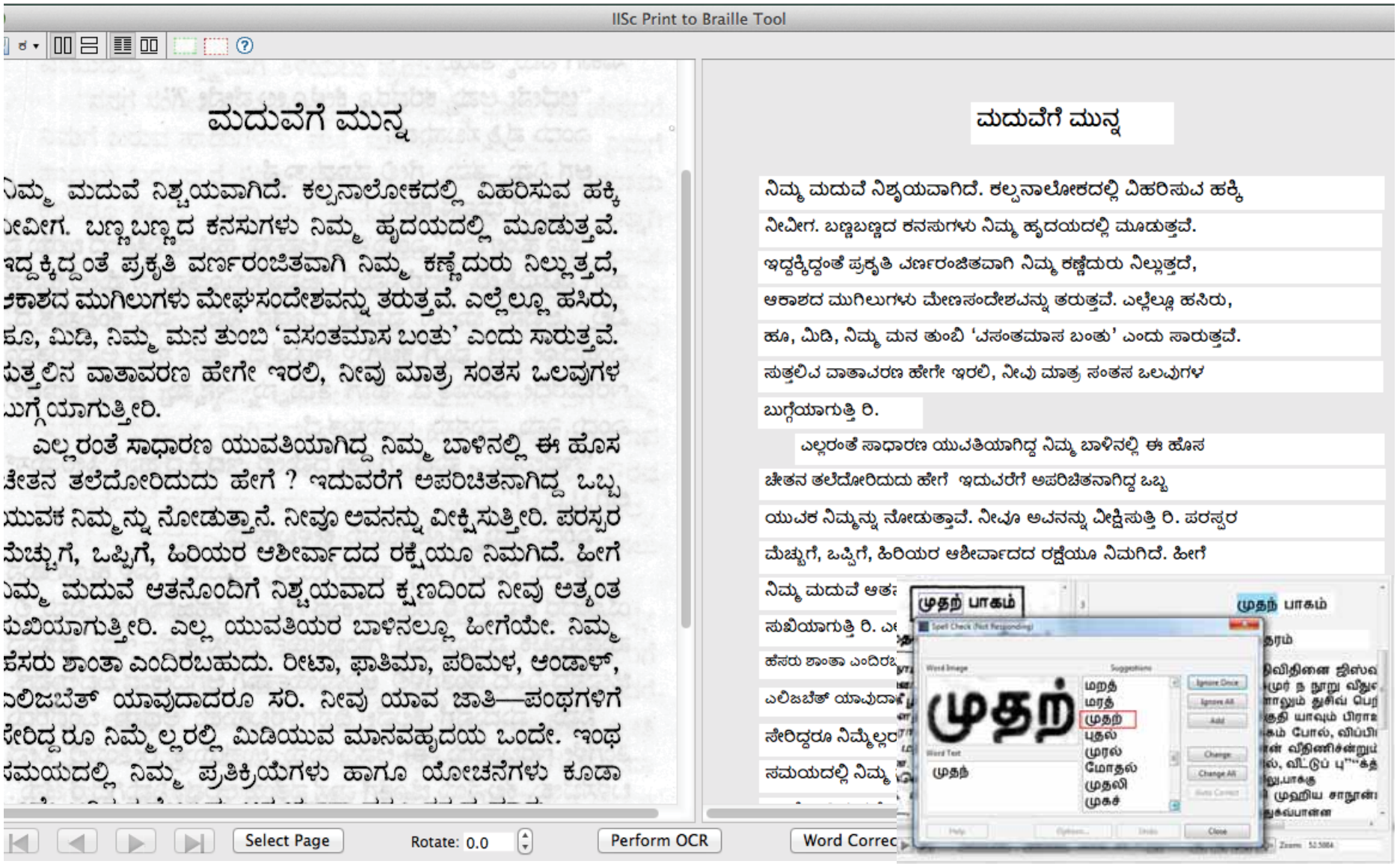
Guide
Prof. A G Ramakrishnan

Gift of New Abilities

Books for which e-text is not available cannot be accessed by visually challenged people. Moreover, converting these printed texts into unicode by manual typing will be very time consuming and costly. However, with Shiva Kumar H R's innovation, 'Gift of New Abilities', converting any printed text to e-text that can be read through speech software, or as a braille book, is now a possibility.

Gift of New Abilities is a versatile tool that has a user-friendly interface for the rapid and efficient conversion of printed books to Braille books using compatible plug-in OCRs for any language. The tool is developed in Java using Eclipse SWT and runs on Linux, Windows and Mac operating systems. This GUI and editing tool has been developed as an open source project, and is available under the Apache 2.0 license from code.google.com.

Currently, the tool can only convert printed text in Kannda and Tamil into Unicode. However, Shiva is keen to expand his research, and make the tool available for other Indian languages including Hindi, Telugu, Malyalam, Bangla, Marathi, Oriya etc. Gift of New Abilities is in the process of being patented, and Shiva hopes that his tool succeeds in making knowledge accessible to all.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ಮದುವೆಗೆ ಮುನ್ನ
Select Page
Rotate: 0.0
Perform OCR
Word Correc

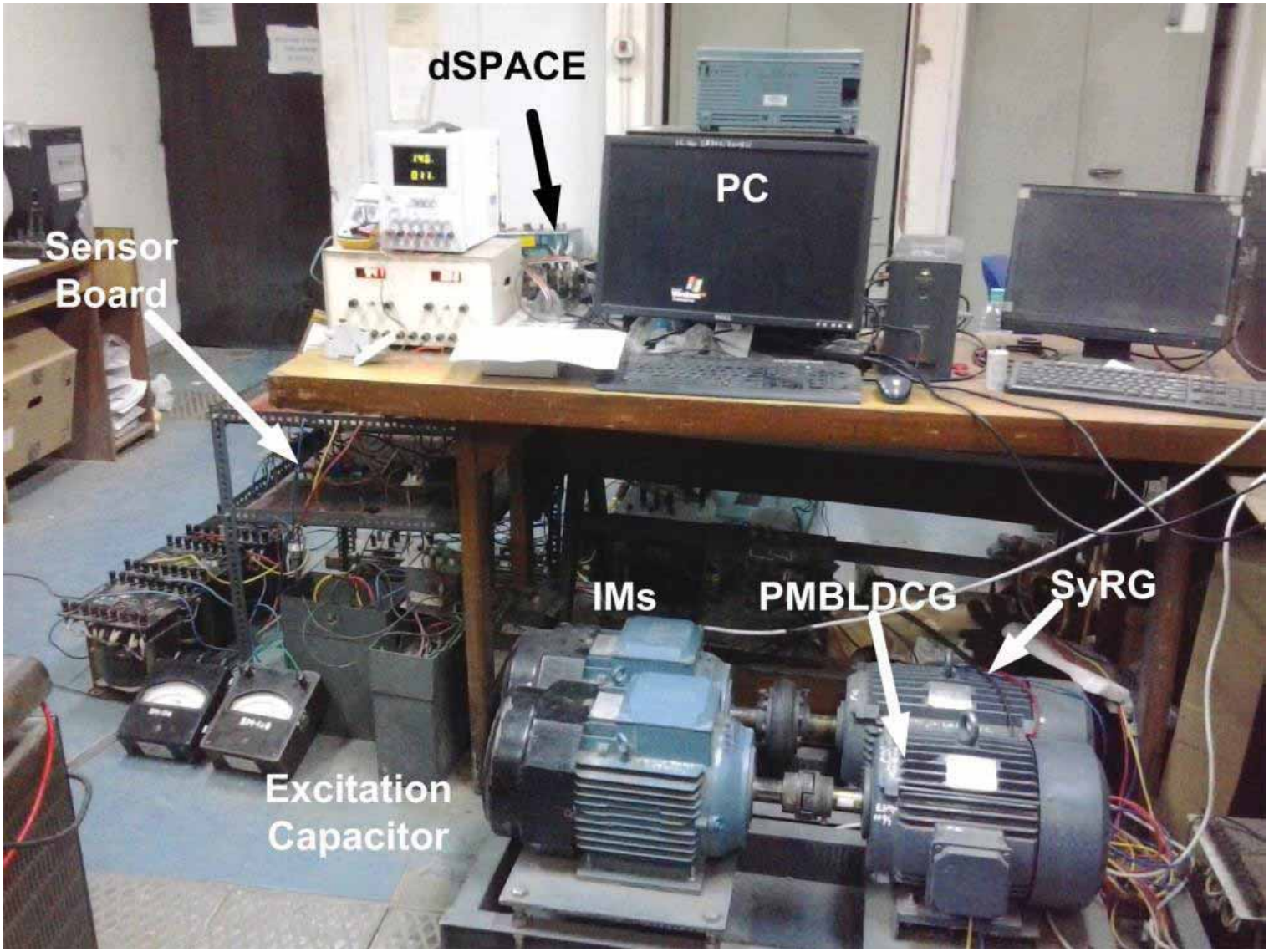
Krishan Kant
Indian Institute of Technology, Delhi

Guide
Prof. Bhim Singh

Reduced Converters And Brushless Generators Based Standalone Microgrid For Rural Electrification

Krishna Kant's innovation addresses the problem of electrification of rural/ remote areas along with systems that are running on diesel generator. His proposed work deals with the design, control, and implementation of different standalone microgrid systems for the remotely located areas. The proposed micro-grid topologies include Diesel-Wind, Diesel-Wind-PV, Small Hydro-Wind and Small Hydro-Wind-PV. The different micro-grid topologies use DG set, wind, PV, and small hydro energy resources. They have a simple and robust design that has been made considering the capability of residents to pay, and the maintenance issues that may emerge in remote locations. The idea uses brushless generators in all topologies to make them robust and maintenance free. The integration of different resources in different micro-grid topologies is carried out using minimum power electronics (no. of controlled switches), that reduce the losses and simplify the control. The control algorithms are also developed for system integration, voltage-frequency regulation, power quality improvement and stable operation under various disturbances like load variations and fluctuation in energy from renewable sources.

The topologies can also be used in other applications like telecommunication towers which are presently supplied using diesel generator only, small townships, zero energy building, some industrial load etc. These proposed systems reduce the emission in the populated areas. All the topologies are implemented in lab and wide variety of results are obtained to test the system under different situations. Krishna has already patented his research work and he believes his research has the potential to create a direct technical and social impact.


dSPACE
PC
Sensor
Board
IMs
PMBLDCG
SyRG
Excitation
Capacitor

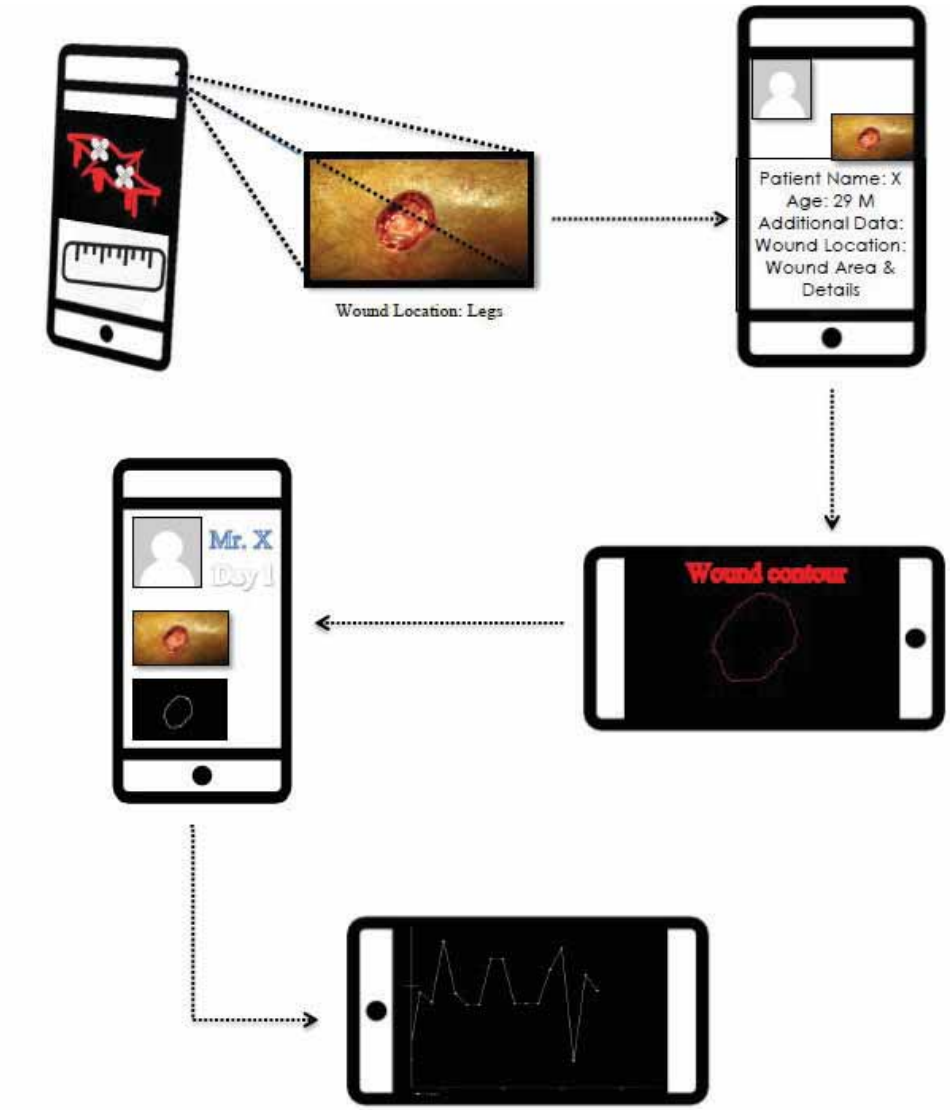
Abhiraj Gupta
MIT, Manipal

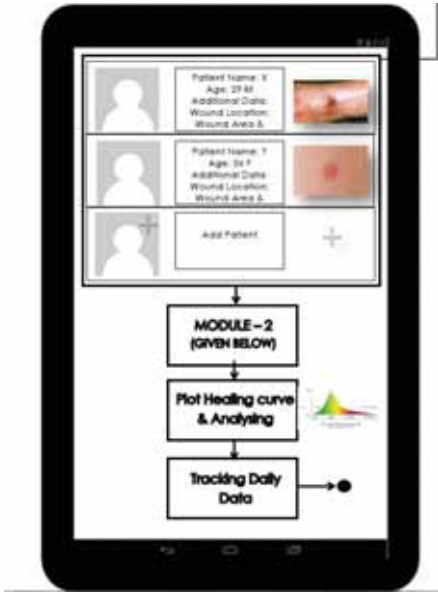
Guide
Dr. Chandan Chakraborty

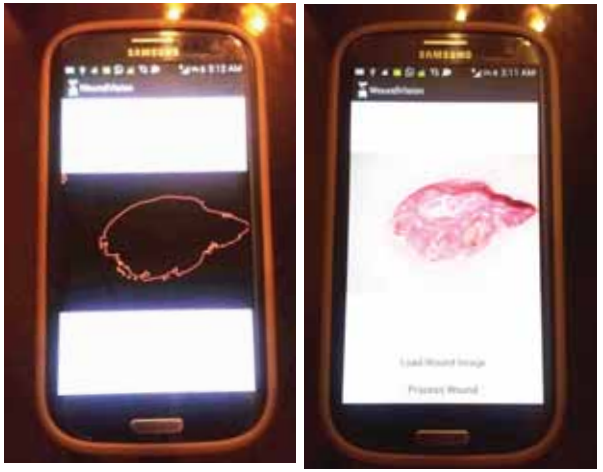
Real Time Wound Management System Wound Segmentation & Analysis Using Image Processing On Mobile Platform (Android)

A cost-effective, non-invasive technique to analyse and manage wounds using a mobile-phone based platform is indeed a possibility now. Innovator, Abhiraj Gupta, had developed the first known image analysis tool that can complement the services rendered by wound clinics. The tool is essentially a smart phone application (Android) that tracks/identifies the wound size, and the wound management process by capturing images on the smart-phone. It uses the concept of image processing, and is based on a simple algorithm/framework for the identification and analysis of the wound. In the future, Abhiraj plans to extend his research to include further optimization of the system based on the preliminary results and wound tissue analysis. He also wants to include the technique of locating nearby specialized doctors, and displaying therapeutic treatment based on wound conditions in his application.

Abhiraj has attempted to diffuse technology into the wound care sector to make treatments more cost-effective. He believes that in the era of smart-phones with a plethora of healthcare mobile applications being used by medical professionals, his innovation will find meaning in creating more value for less cost.


Wound Location: Legs
Patient Name: X
Age: 29 M
Additional Data:
Wound Location:
Wound Area &
Details
Mr. X
Day 1
Wound contour


MODULE – 2
(GIVEN BELOW)
Plot Healing curve
& Analysing
Tracking Daily
Data




Jamdade Nikhil Kailas, Dr. Pankaj kumar K. Chhatrala, Devanshi Saksena
Stanford India Biodesign (SIB), New Delhi

Guide
Dr. Balram Bhargava

Flexicast- A breathable, washable, and customized cast for immobilization of fractured limb

Nikhil Jamade and his team's innovation, Flexicast, aims to overcome the problems of existing orthopedic casts that are used for immobilizing and supporting fractured body parts. Several problems have been observed in the traditional casts (that are usually made of plaster of paris, or fiberglass) - such as the casts being too heavy and uncomfortable, and putting unnecessary stress on the joints; casts restricting the air movement of the skin resulting in poor skin hygiene, infections etc. On the other hand, Flexicast is designed in a fashion that makes it breathable, washable and lightweight. It can also be customisable, and is easy to apply and remove. Further, it provides a casting system that eliminates the use of padding and does not require water for hardening, or curing process.

Flexicast is made of flexible material such as silicon rubber, and comes in 4-5 different sizes that are based on anthropometric data (same as different size of gloves). Its shape varies according to site and purpose of application. Therefore, there are different casts for forehand, full arm, legs etc. On choosing appropriate size, the cast takes the shape according to contours of patient's limb. Being priced at the same rate as the fiberglass cast, it provides a lot more technical advantages in comparison to the other casts in the market.

Flexicast has already been patented, and so far, Nikhil and his team have succeeded in developing various kinds of limb based designs. They have already conducted the need identification, and have tested the problem solving capacity of their product. They have registered for an IP protection with the help of Biotech Consortium India Limited BCIL-Dept. of Biotechnology India. In the future, they are looking to expand their innovation by designing a variety of casts, and testing their functionality by following clinical trials at the Department of Orthopedics, All India Institute of Medican Sciences, New Delhi.


FlexiCast
The Flexicast is flexible like a glove
STANFORD INDIA
biodesign

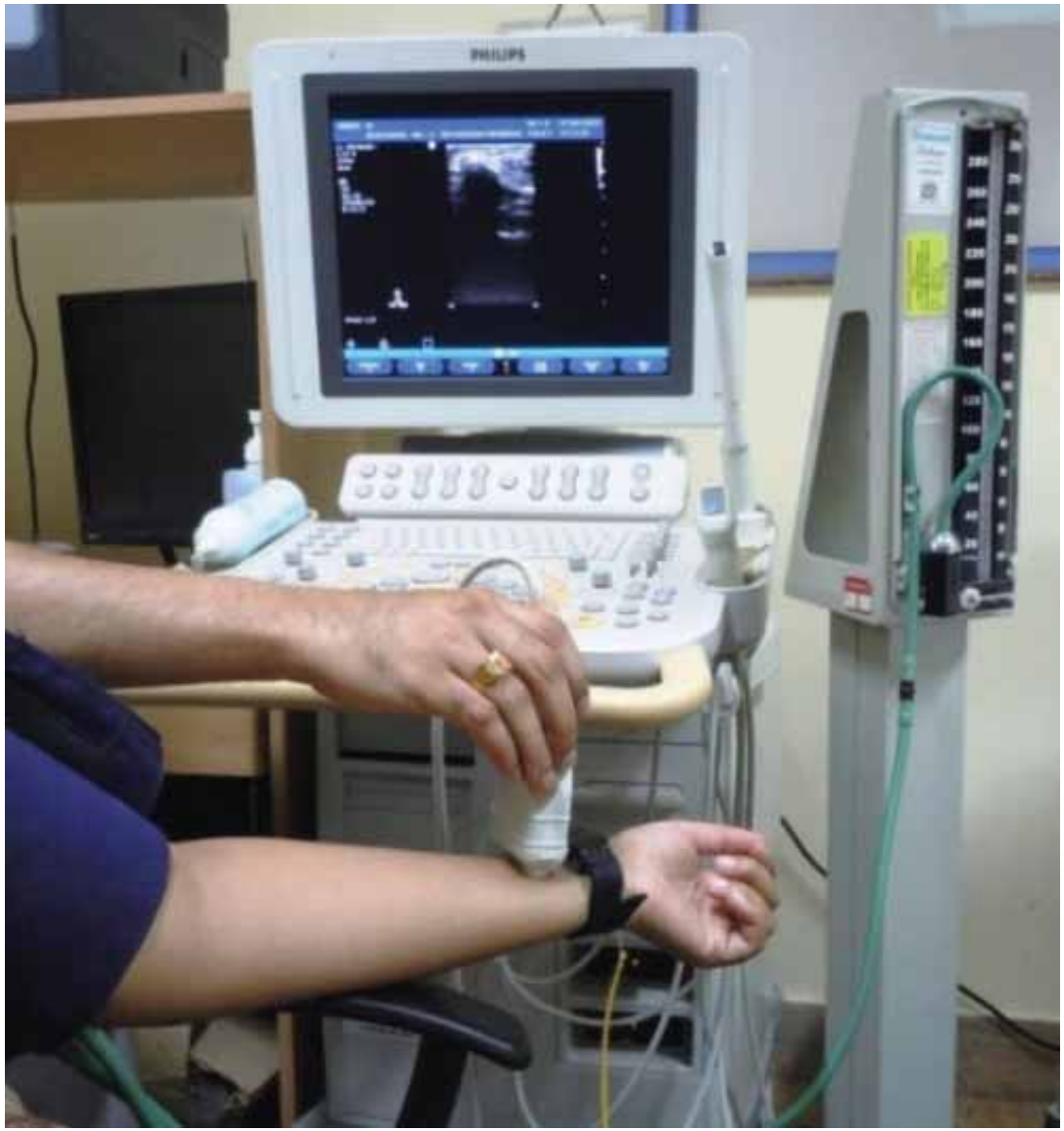
Sharath Umesh
IISc, Bangalore

Guide
Prof. Sundarrajan Asokan

Radial Arterial Pulse Pressure Waveform Acquisition using Fiber Bragg Grating Pulse Recorder

Sharath Umesh's latest innovation has simplified the procedure of intra-arterial measurement of blood pressure, that can be a boon for patients suffering from hypertension. Even though the direct intra-arterial is the standard norm for measuring blood pressure, its application is very limited due to its invasive nature. Addressing this problem, Sharath has innovated a method through which the radial arterial pulse waveform is measured in real-time using a Fiber Bragg Grating Pulse Recorder (FBGPR). This helps in recording the variations in arterial pulse waveform that indicate both systolic and diastolic blood pressure when the patient is subjected to the sphygmomanometric blood pressure examination. Further, they have also invented a novel, in vivo, noninvasive technique to determine radial arterial compliance using the radial arterial pressure pulse waveform (RAPPW). RAPPW is acquired by fiber Bragg grating pulse recorder (FBGPR). Unlike the conventional methods of blood pressure measurement, the current innovation eliminates the use of two sensors (volumetric/ diametric sensor, and pressure sensor). Both the inventions have been trialed, and the results are found to be in agreement with each other.

Sharath has already filed patents for both the innovations, and hopes to work towards expanding the research to observe arterial pulse waveforms in hypertensive subjects, to observe arterial compliance of objects with cardiovascular problems etc.


PHILIPS


FBG Sensor


Janhavi Joshi, Nupura Kirloskar
MIT Institute of Design, Pune

Guide
Prof. Sanjay Jain

Sway
- The Rhythm Within

For the deaf community, dancing is an excellent form of expression. However, owing to their physical limitations, they often miss out on the beat, lyrics, and speed of the song. To give the deaf community a new experience, Janhavi Joshi has designed 'Sway- They Rhythm Within'. The product is new technology that helps the deaf dancers in understanding music through haptic feedback. It essentially has two main parts in its system - A). Wearable ring and, B) A smart-phone application. The smart-phone application filters the base track from a song, and converts its beats into vibration patterns. These vibrations patterns are transferred to the rings that are worn by dancers. The wireless communication happens through bluetooth (version 4.0, and above), and it allows a single device to communicate with several others simultaneously. Thus, giving the specially abled artists a sense of the music through their sense of touch. Sway also helps them in understanding the speed, rhythm, and beat pattern of a song without seeking anyone's assistance.

Janhavi and her team have already filed a patent for Sway. In the future, they hope to receive more feedback from users on the functionality of Sway. It will help the team in each stage of product development.


Sway
Music Beyond Sound
IMPORT
Song
CONVERT
App

Krishna Sai
GITAM University

Taparch

Krishna Sai Inkoolu has innovated a pair of shoes, Taparch, that can help people in identifying and isolating objects within a range of 400 cm, on a specified or unspecified track. The innovation holds great significance in the life of visually challenged people who are often stigmatized by the idea of carrying canes to go about their daily lives. The innovation also finds application amongst various other people including mechanical harvesters, people with foot-drop problem etc.

This first of its kind technology caters to people from all economic backgrounds, and is available in markets at a very low cost. Krishna Sai was only an under-graduate when he innovated this one-foot technology, and he has already patented his product.


taparch



Dhyey Mayankkumar Shah, Eepsit Tiwari, Rajesh Patidar
Indian Institute of Technology, Gandhinagar

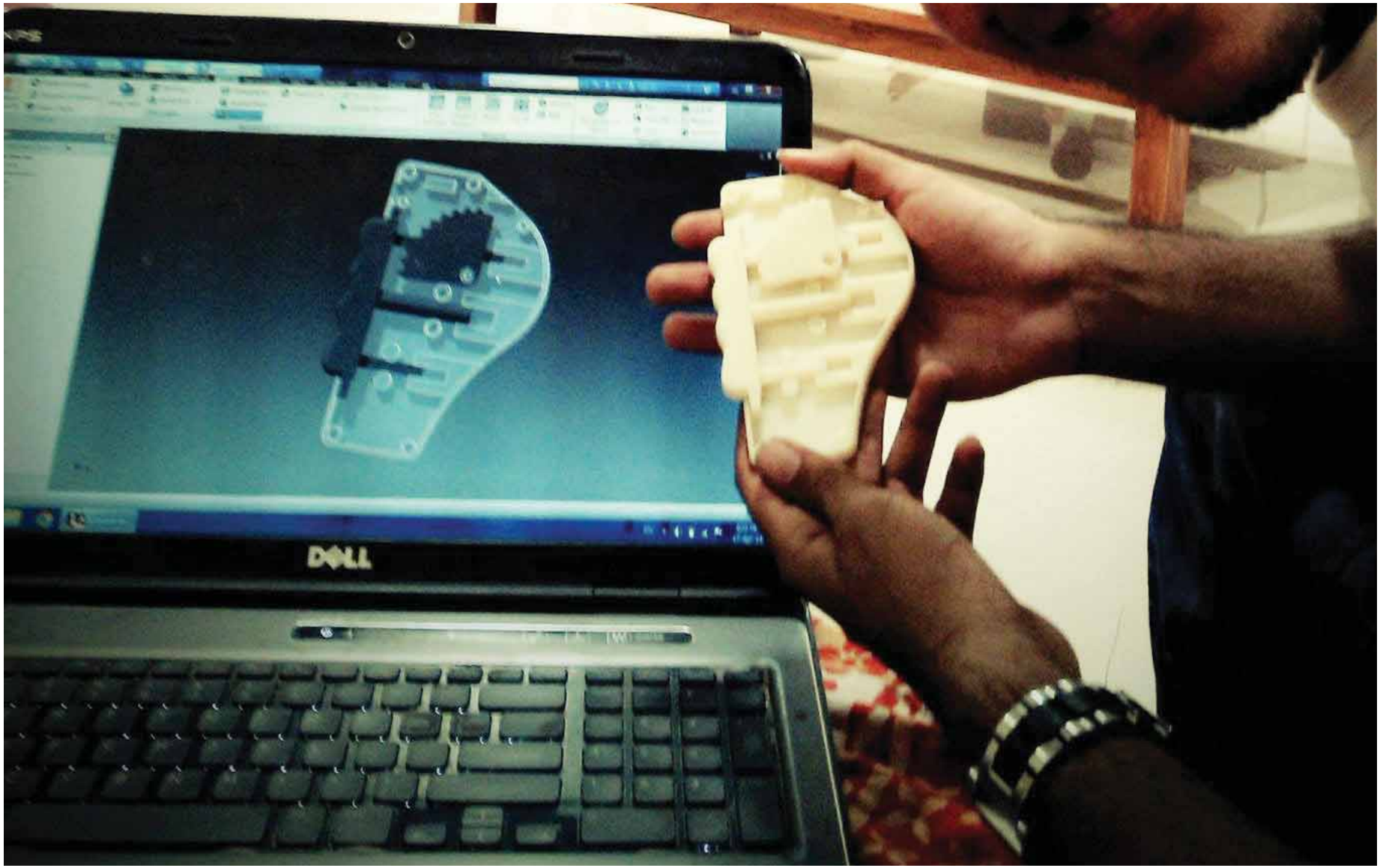
Guide
Prof. Harish P.M.

Redefined Spoon for Parkinson's Patient

Patients suffering from Parkinson's Disease, and other micro-motion disorders may experience tremors in their hands. The distress of the condition often makes them spill their food, which ultimately leads them to reduce their food intake. In an effort to help such patients, Dhyey Mayankkumar Shah and his team, have designed a very affordable spoon that enables the patients to eat independently with comfort, and sans assistance.

Through research, they found that the biggest problem with patients suffering from Parkinson's disease was that they could not exert a pointed force due to the inability of performing and controlling micro motions of their fingers. Therefore, the spoon is designed in a mechanical way, via a lid-trigger mechanism, that can work with the patient, and he/she can achieve significant displacement by pressing the trigger very slightly. Based on the concept of interaction design, this spoon costs less than 150 Indian National Rupees. In contrast, the other spoons available in the market cost around 18000 INR.

In the future, Dhyey and his team plan to connect with manufacturers to build prototypes of the design. They also plan to seek assistance from neuro-physicians and patients suffering from Parkinson's disease for field testing and product validation. The team hopes that with this innovative spoon, they succeed in facilitating the lives of patients, and improving their self-esteem.


DELL

GYTI 2015
Appreciations

MLM (More from less for Many) appreciation award

Sristi socially relevant technological innovation appreciation award

Strategic innovation and /or technological-edge appreciation award

BIRAC SRISTI GYTI appreciation award





Anwesha Mukherjee, Pavan Kumar R, Goutam Prasanna Kar, Sanjay Rao A, Vaibhav V Rao

IISc, Bangalore

Guide

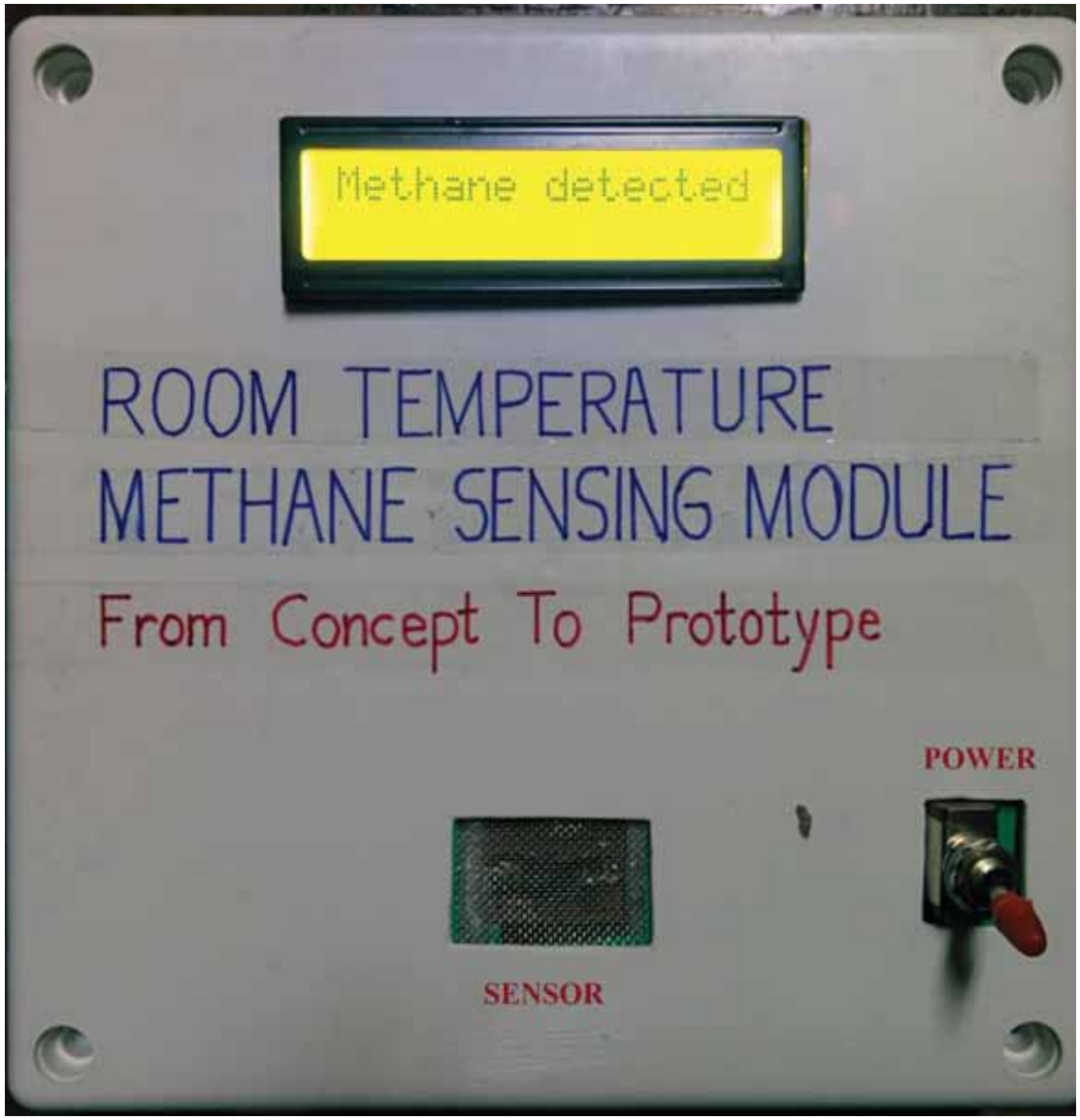
Dr. Abha Misra

Room Temperature Methane Sensing Module: From Concept To Prototype

Anwesha Mukherjee has innovated a low cost carbon nanotube based methane sensing module that can detect methane till 0.1%, and trigger an alarm. The innovation has the potential of reducing the number of deaths that occur due to methane leakage. For instance, a lot of recent industrial tragedies have been a result of natural gas explosion, or leakage of methane. However, since methane is practically inert, it is very difficult to detect it at room temperature, and only a few specialized sensors are capable of doing so. The present technology relates to developing a methane sensor comprising of Palladium decorated multiwalled carbon nanotubes (MWNTs) that can detect 0.1 % methane at room temperature. They usually react with quick response time, and a sensitivity of 0.8% - much higher than the current reported values. The sensor is prepared by drop-casting 2 microlitre solution of Pd-MWNTs dispersed in N,N – Dimethyl formamide on Interdigitated electrodes(IDEs) with a separation between the fingers as 5µm.

The sensor is equipped with alerting features via buzzers, LCD and SMS messages, that greatly reduce chances of any accidents. The estimated cost of the base module consisting of the sensor, microcontroller and the primary alarm system is around 1700 INR whereas inclusion of the GSM module will slightly increase the cost to 2500 INR which makes it quite affordable. Answesha has successfully made a prototype of the room

temperature methane sensing module from the concept. In the future, she hopes to see the product form of the prototype being available in the market.



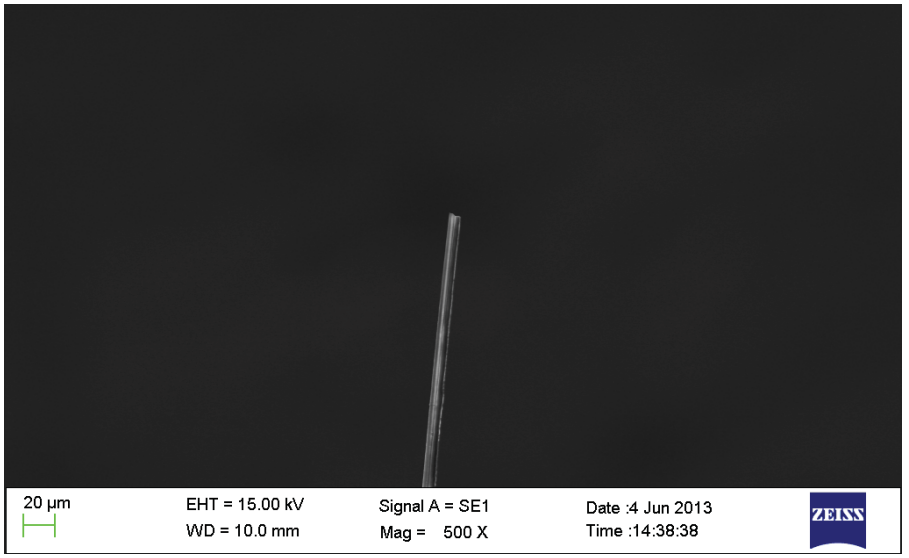
Fazle Kibira
University of Calcutta

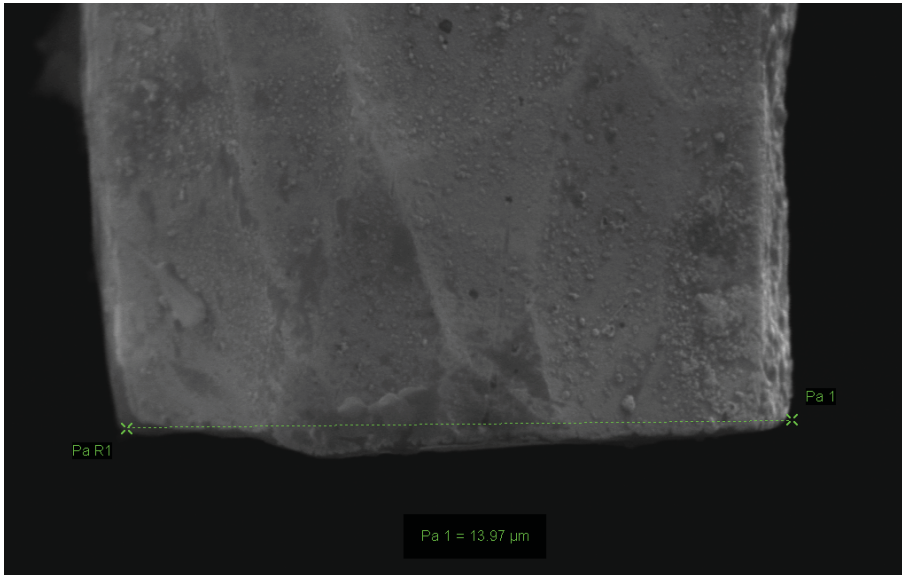
Guide
Prof. Rajib Chakraborty

Fabrication Of Nano Object Imaging Probe Using Simple & Fast Hydro -Mechanical Etching Technique

Innovator Fazle Kibira's present innovation relates to making cost-effective Atomic Force Microscope tips that are not manufactured, but get imported to India. The innovation finds special application in skin cell imaging specially for skin cancer, and fluorescence imaging. In this experiment, Fazle proposes the Hydro mechanical etching method to create desirable tips. The procedure to be followed includes dipping the tips into acetone to remove the jacket. The next step involves, etching the tips in HydroFloric (HF) solution through a mechanical arrangement to create the nanoprobe. Based on the etching mechanism, the tip can be repeatedly dipped into HF solution, if a nanoprobe is not realized in the etching. When the nanoprobe is obtained, it is coated with aluminum by vapor deposition technique. Finally, the data is collected using the nanoprobe sensitively, and has the potential of benefiting the fluorescent spectral detection of micro and nano-sample. The applicability of Optical fiber probe as a real-time, in-situ probe, is increasing rapidly with the enhancement of medical imaging techniques like Optical Coherence Tomography(OCT). Using the above mentioned process, Fazle seeks to make Atomic Force Microscope tips that are presently being imported from abroad.

Optical probe finds various applications in the field of Atomic Force Microscope, Medical Imaging, Optical Coherence, Fluorescence Imaging etc. It is an extremely important tool, and can benefit India economically if it is manufactured within the country.


20 µm
EHT = 15.00 kV
WD = 10.0 mm
Signal A = SE1
Mag = 500 X
Date :4 Jun 2013
Time :14:38:38
ZEISS


Pa 1
Pa R1
Pa 1 = 13.97 µm

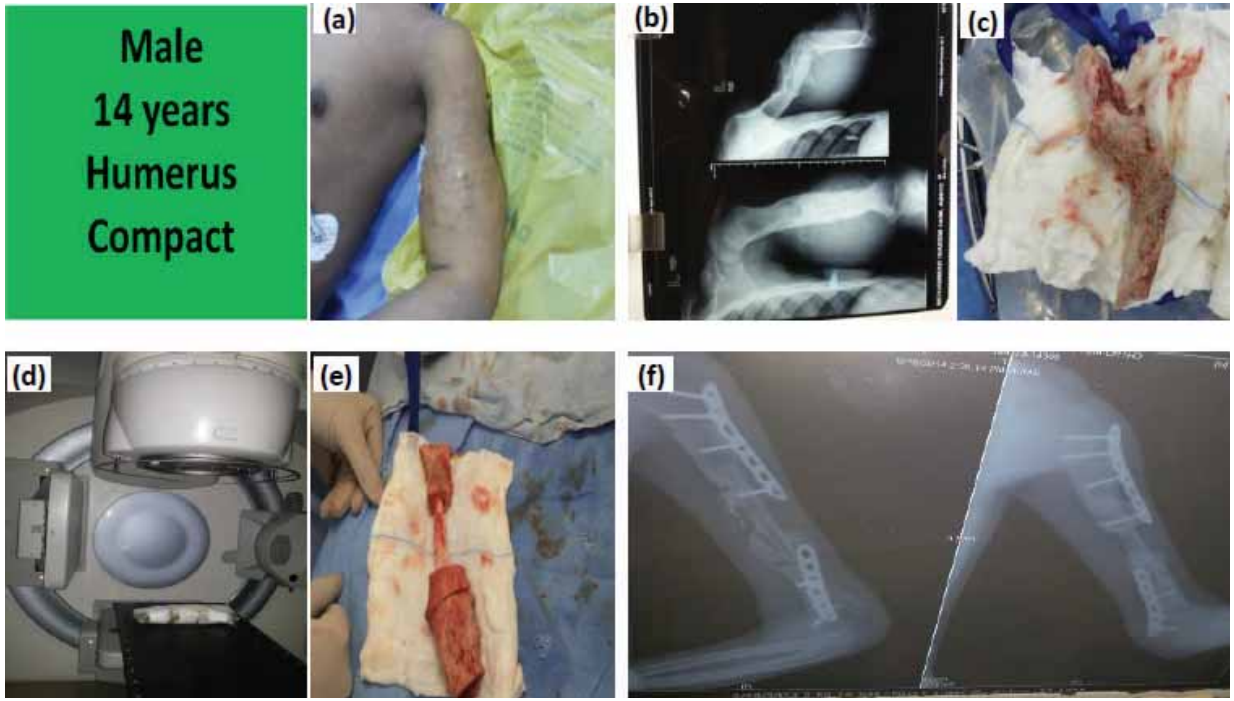
Sakshi Chauhan, K. Manoj
Indian Institute of Technology, Delhi

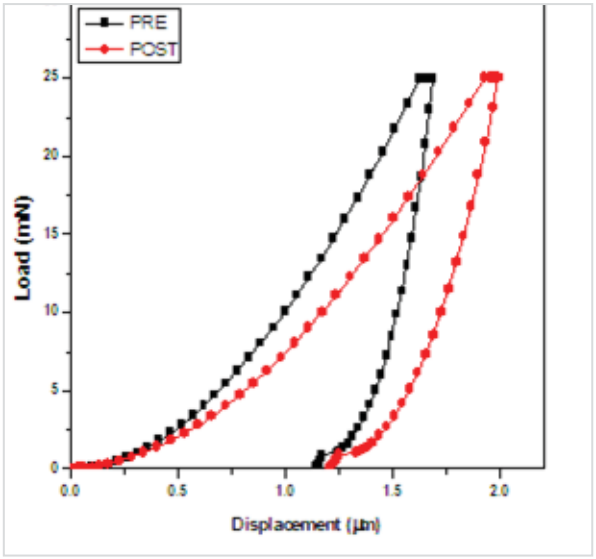
Guide
Dr. Anamika Prasad , Dr. Shah Allam Khan

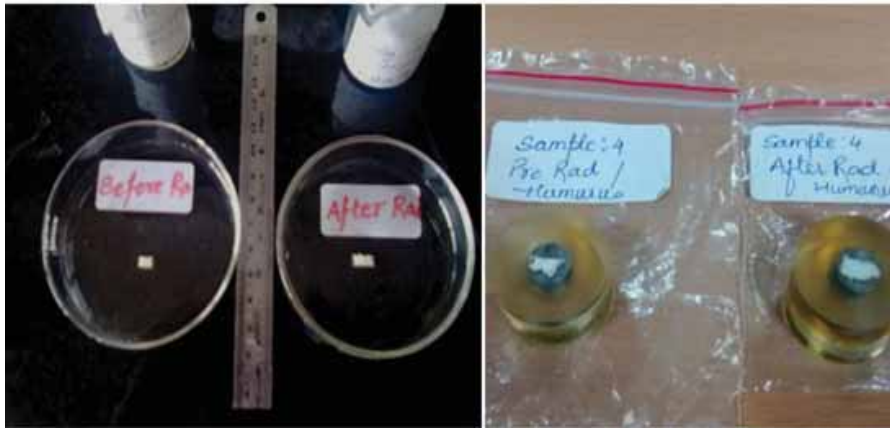
Biomechanical Investigation of Extracorporeal Irradiation and Reimplantation Therapy in Malignant Bone Tumours

Around 1% of people suffer from bone and joint sarcomas out of which 30% are below the age of 20. The most general norm to treat bone tumour is amputation, however, the method is marred by issues including the cost of surgery, low chances of success, the potential of patient getting infected etc. To overcome these drawbacks of the existing method, Sakshi Chauhan, is researching towards the development of extracorporeal irradiation and reimplantation. Her present work aims to consolidate the irradiation effect on bone tumour. While the biological effects related to the study are being researched at All Indian Institute of Medical Sciences (AIIMS), the change in biomechanics is observed at Indian Institute of Technology (IIT Delhi). Thus, her work is a pivoted attempt to quantify the structural and mechanical properties of long bones in pre and post irradiated samples.

Since in contrast to the extensive knowledge of clinical validation, no investigation has been done in the field of biomechanical so far, Sakshi believes that it lends her project greater significance. She hopes that her work succeeds in treating bone cancer with low-resources.







Left : (a)14 years male humerus section suffering from Ewing sarcoma; (b) Patient CT scan; (c) Resected Bone pre-radiation; (d)bone undergoing50 GY radiation in isolated chamber; (e) cleaned and treated bone post radiation; (f) post operative X-rays.
Top : Comparison of Nanoindentation curves of Pre irradiation and Post irradiation sample
Above : Upper disk

Mayank Agarwal
IIT BHU, Varanasi

Guide
Dr. Manoj Kumar Meshram

Linearly polarised planar inverted F-antenna for Global Positioning System and Worldwide Interoperability for Microwave Access applications

A innovative new antenna design by Mayank Agarwal's has the potential to providing an integrated communication and positioning system, especially in mobile settings. Traditionally, the global positioning system (or the GPS) that is widely used for location finding services and the communication system, based on various wireless communication technologies such as GSM, LTE, Bluetooth, Wifi and Wimax, have required a completely different design for their transmission and reception infrastructure. This is because of a large range of frequencies that the antenna needs to respond to with appropriate gains presenting a big challenge in providing an integrated framework.

The new design by innovator Mayank Agarwal tackles this issue by actually coming up with a design that manages to achieve a dual band antenna with linear polarization to achieve less distortion and high gains for the both the GPS and communication signals. Moreover, it solves the problem of providing a return link for the GPS signal. Using right hand or left hand polarization instead of linear polarization as in Mayank's design mitigates the amplitude and phase distortion effects of obstacles present in real world situations such as buildings, trees and humans.

Currently in the prototype stage, the new antenna needs to be integrated with GPS transceivers to obtain a fully integrated dual band communication device.

Left : Antenna with network analyser
Top : Antenna protype

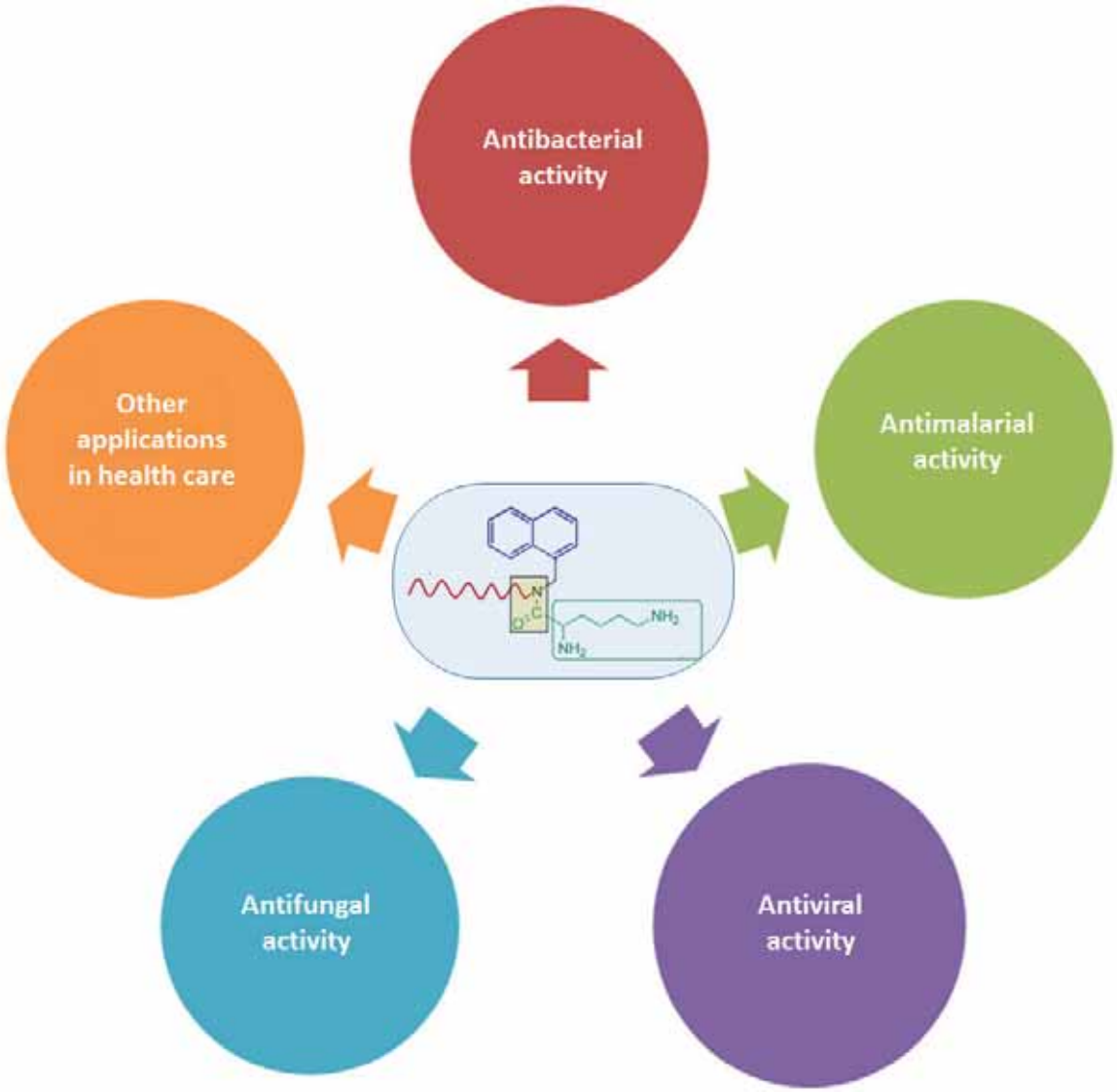
Chandradhish Ghosh
JNCASR

Guide
Dr. Jayanta Haldar

One drug to cure them all

Is it possible to have a cost-effective drug that acts against active bacteria, viruses, fungi and parasites? With Chandradhish Ghosh's innovation, that may be a reality soon. His innovation aims to find one or two similar drugs that are active against maximum pathogenic diseases. Moreover, with his research, he also wants to address the impending danger of antimicrobial resistance. To do so, in three simple steps, he has prepared Synthetic Mimics of Anti-Microbial Peptides (SWAMPS), that have a therapeutic role- He designed molecules that had an aromatic core, a variable hydrophobic alkyl chain and an L-Lysine moiety. Later, these three components were linked together by a tertiary amide linkage. Since, systematic variation of the aromatic core and the long alkyl chain yielded optimal amphiphilicity, the resulting molecules possessed antibacterial, antimalarial, antifungal and antiviral activity.

Chandradhish believes that for the commercial development of this compound, more in-vivo studies in animals are required. The clinical studies will help in assessing the potential of the compound to be used as marketable drugs. The compound is already undergoing an ebola test to know it's effectiveness against the Ebola virus. Chadradhish, and his team have already filed a patent. They hope that with the cost-effectiveness of their drug, they succeed in making it affordable for all the sections in the society.


Antibacterial activity
Antimalarial activity
Antiviral activity
Antifungal activity
Other applications in health care

Dilip Singh, Dr.Preeti Mehta,
Mr. Ravi P.Gupta
DBT-IOC Centre for Advance Bioenergy Research

Guide
Dr. Anshu S.Mathur and Dr. Deepak K. Tuli

A novel process to commoditize carbon dioxide gas into fuels and high value nutraceuticals commercially viable scale

Dilip Singh has invented a breakthrough new procedure that aims to solve the greenhouse effects of carbon dioxide pollution. At the same time, it also provides a more efficient process for manufacturing widely used nutraceuticals like omega-3 fatty acids and lipid based biofuelds. The innovative new two stage method is a closed loop process, in that it produces no waste and converts carbon dioxide into nutrients such as DHA (docosahexaenoic acid) and carotenoids and biofuels. Traditionally, most of the omega-3 fatty acids are used in nutritional supplements through commercially produced fish oils. The new method can thus lead to a drastic reduction in fishing directed at manufacturing such nutrients.

Breaking down of carbon dioxide does happen in nature through phototrophic algae derived fixation, but it is an exceptionally slow procedure when compared to this new discovery. The two stage fermentation procedure used in this new technology first operates using anaerobic microbes that use carbon dioxide to produce acetates, and then couples it with a second stage where in-house protists convert the acetates into biomass that in part contains DHA, and the other part useful in manufacturing biofuels. The new technology has the potential to disrupt both industrial waste management procedures while revolutionizing the production of biodiesel and can hopefully make it a commercially viable fuel. It also leads to a protein rich de-oiled mass that can serve as good animal feed. At present, efforts to build a working plant that implements the technology is underway. Currently validated at the scale of a 10L bioreactor, a pilot plant will go a long way in infusing confidence in the merit of this new method.


New Brunswick
New Brunswick
1501

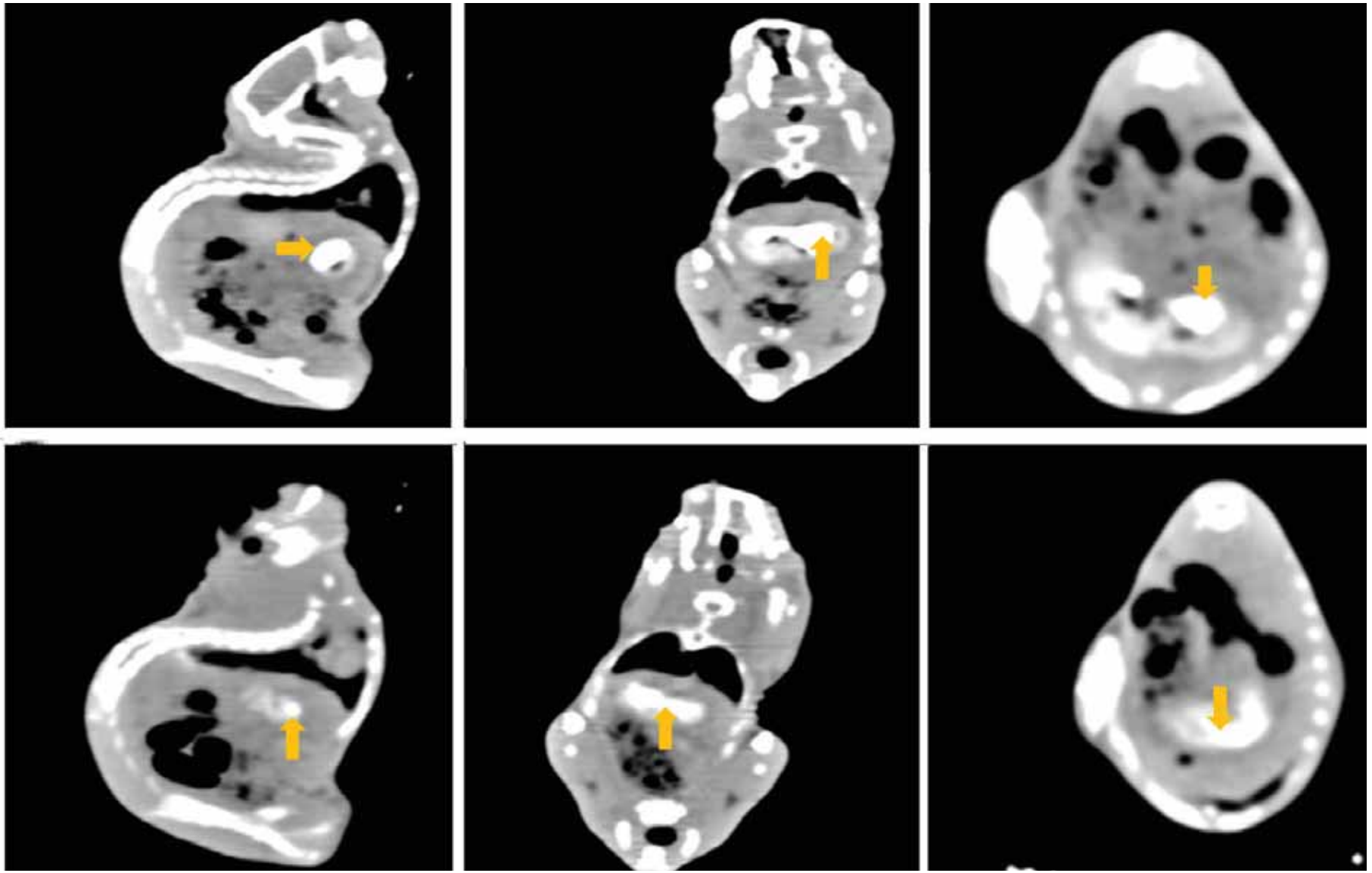

Paulomi Ghosh, Arun Prabhu Rameshbabu
Indian Institute of Technology, Kharagpur

Guide
Dr. Santanu Dhara

Development of X-ray Visible Polymers via In Situ Iodination-Crosslinking for Non-Invasive Real Time Imaging

Paulomi Ghosh has developed a new biodegradable radiopaque polymeric material that has the potential to revolutionize biomedical product industry in India and beyond. While the importance of high quality post-operative assessments can hardly be underestimated for improvement in patient outcomes, the standard high end methods such as stress echocardiography and single-photon computed tomography are out of the reach of the lower economic class. Conventional medical polymers are radiolucent, in that, they let most of the X rays pass through them and thus cannot be used in the cheaply available X ray imaging techniques for diagnosis. The new radiopaque material developed by the inventors blocks X rays directed at them, and thus serves as a medical polymer suitable for inexpensive imaging studies for diagnosis and post-operative assessment. The polymer can be fabricated into fibers, beads, foams, gel, powder for a variety of biomedical applications and can be used to make sutures, surgical swabs. Also it can be used to make X-ray blocking aprons, gloves, or collars to protect special organs like thyroids and gonads for the safety of health care workers, in addition to biomedical implants that can be assessed using X rays.

The existing radiopaque materials are based on compounds like Barium Sulphate and MMA both of which introduce various side effects on the users when made into polymers. The key idea in Paulomi's work is the use of Iodine coupled with cross-linking reactions to modulate the required properties of the fiber to address these problems.



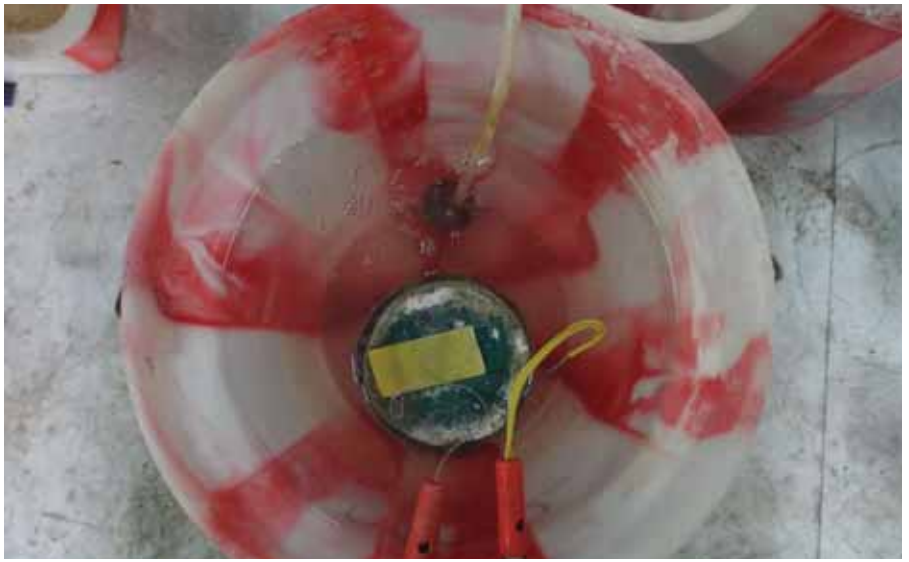
Rajesh P P

Guide
Prof. M.M.Ghangrekar

Utilization of Marine Algae as substrate and methanogen inhibitor in microbial fuel cell

Bioelectrical systems such as Microbial Fuel Cell (MFC) offers a sustainable means to extract electrons from organic matter in the form of electricity. Innovator Rajesh PP has presented a proof of concept that proposes using algae biomass as a substrate, as well as methanogen inhibitor, to enhance the power production from microbial fuel cell. The use of algae biomass as a substrate in MFCs can provide a cost effective means of electricity generation due to its low energy requirement of cultivation. Biocatalysts present in the MFC oxidize the substrate, and in that process, the electrons are donated to the solid anode. These electrons move through an external circuit towards the cathode and combine with an electron acceptor to generate electricity. Rajesh believes that further research on the study is necessary to scale up the microbial fuel cell system using algal biomass. Also, there is a need to focus on making MFC system more economical with capacity for higher power generation.


MFC 1
291



M.S. RaghuPrasad, Abhijit Biswas
Indian Institute of Technology, Madras

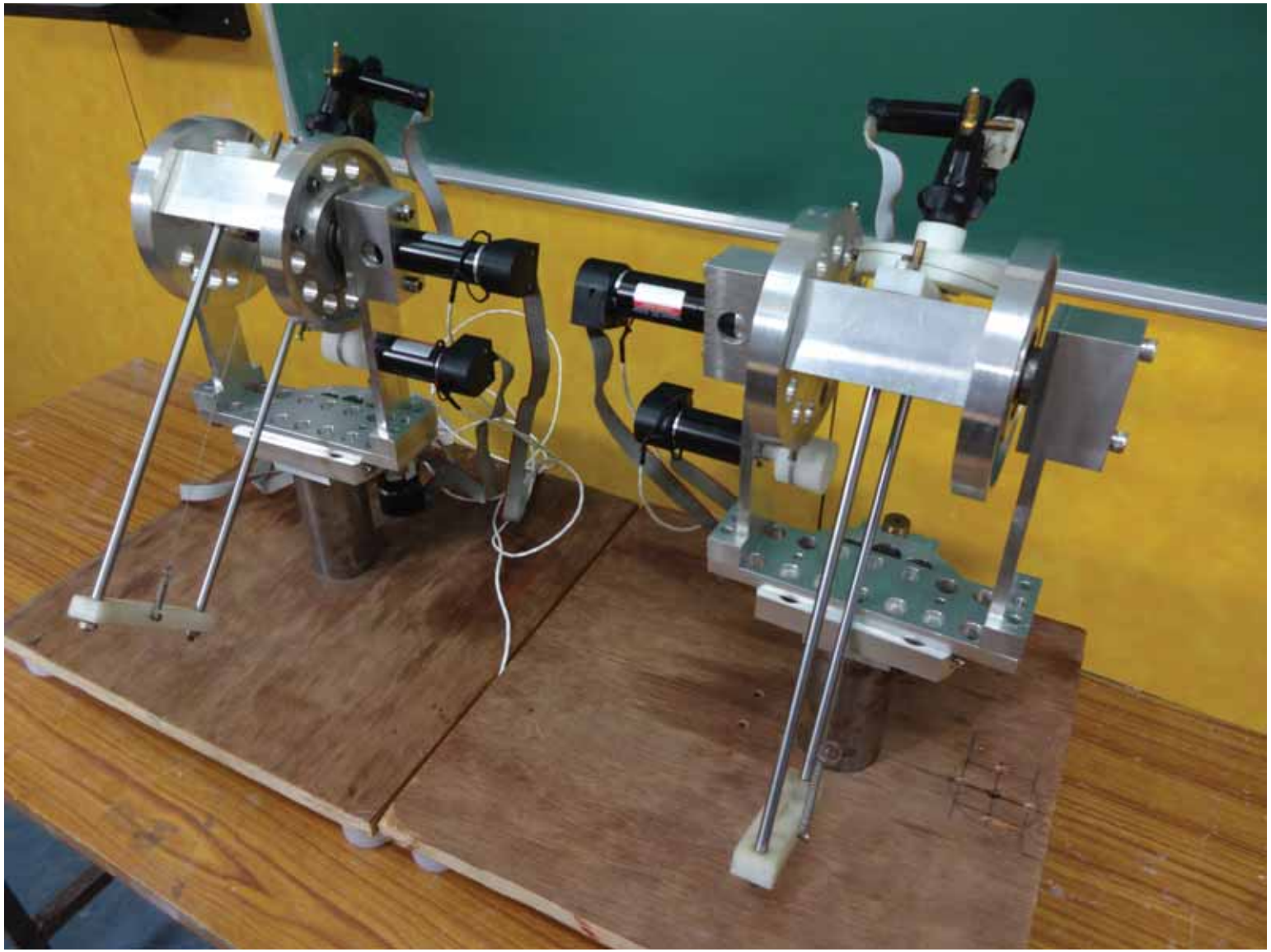
Guide
Prof.Dr.M.Manivannan

Virtual Reality Based Minimally Invasive Surgical Simulator with Haptics Feedback

With the widespread adoption of minimal invasive surgery (MIS) in Indian hospitals, the importance of proper training of novice doctors in using the technique cannot be underestimated. Training under the supervision of skilled professional is time consuming and demands greater reliance on virtual simulators that can help young doctors gain expertise. However, because of lack of external feedback, doctors generally face trouble in managing the amount of force used often leading to tissue trauma. Good MIS simulators are expensive and generally hard for hospitals to acquire.

M.S. Raghunath along with his doctoral adviser N. Mannivannam has a novel solution to address this important problem with a new cost effective design of a virtual reality MIS simulator that especially focuses on training in haptics or force-skills. With an extensive design that can simulate 5 degrees of freedom, coupled with a high precision motors and a capstan drive, the simulator effectively models the size, precision, friction and force feedback in real life situations.

The device promises a cost effective training equipment for doctors to gain expertise in core MIS skills. It is currently in prototype stage looking for funding to move into a full-fledged product.



Meenakshi Sarkar
CSIR - Central Mechanical Engineering Research Institute, Durgapur

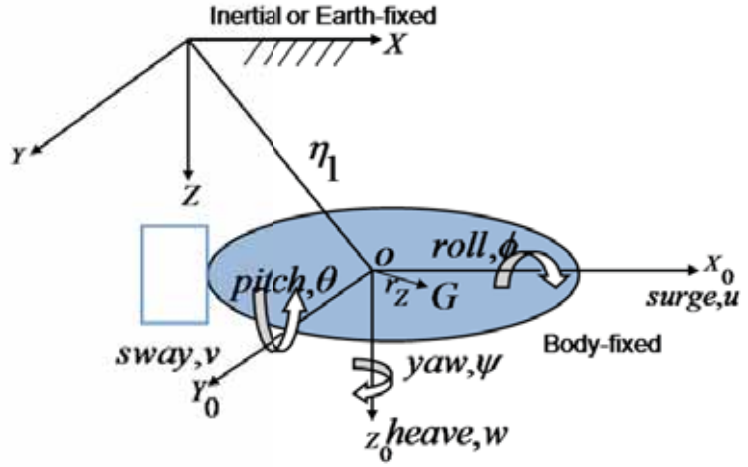
Guide
Prof. Dr. Sambunath Nandy

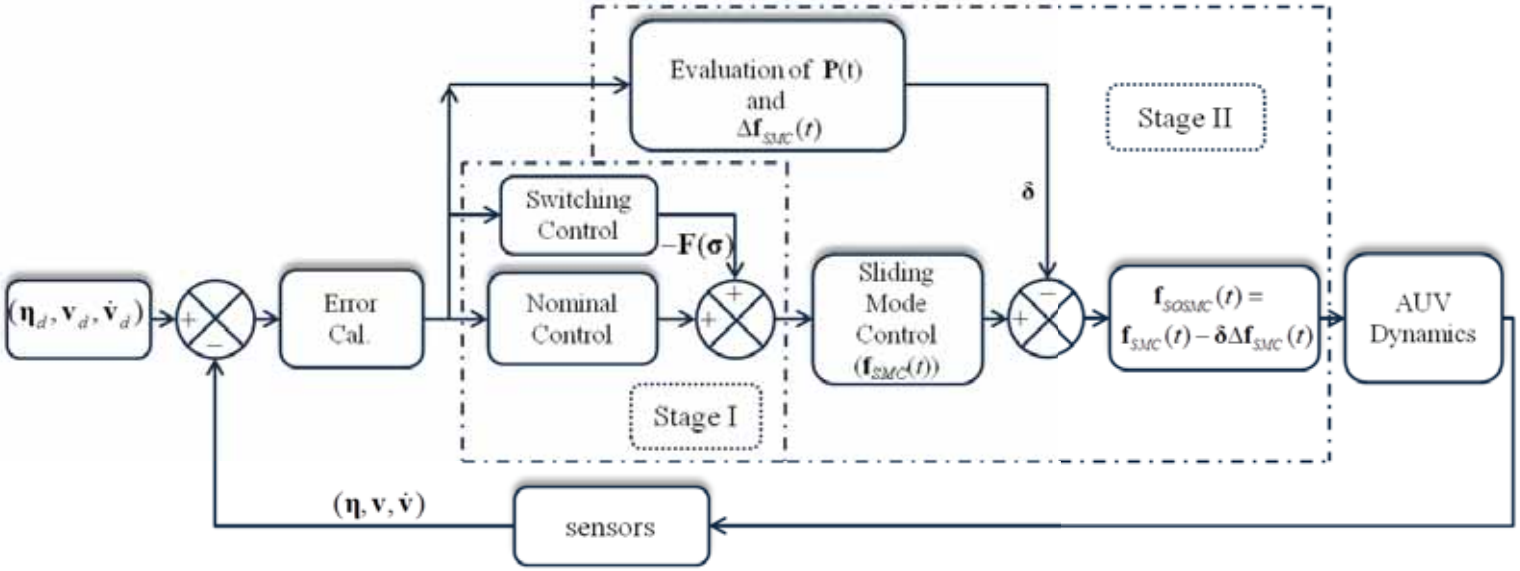
Energy Efficient Robust Controller for Autonomous Underwater Vehicle

Autonomous underwater vehicles (AUV) can perform various tasks ranging from sea floor surveying, inspection and maintenance, rescue and surveillance. It demands strict positioning and appropriate control force by the AUV controller for efficient and prolonged operation. In the given light, the present innovation by Meenakshi Sarkar relates to designing a robust controller for the AUV. She has presented a two stage energy efficient robust control methodology that pertains to the sliding mode control. It also relates to the solution of Euler-Lagrange equation for energy optimization, in relevance to the trajectory tracking of autonomous underwater robots within acceptable range of tracking error. The robust controller compensates the uncertainties and disturbances present in the system within some bounds, and provides the best possible initial guess for the solution of the optimal controller. The hybrid controller that has been named as Sub-Optimal Sliding Mode Controller (SOSMC) is designed to simultaneously be robust and energy efficient in the system.

The innovation has been tested to be more energy efficient. The efficiency will help the controller in increasing the life of the on-board battery, and thus, make the system more cost effective. Further, the improved battery life will make extended and continuous underwater survey operations in possible hazardous situations.

Meenakshi believes that the present controller can be customized to be used for application areas application pertaining to surface robots working through an uneven terrain for planetary explorations as well as all terrain robots for surveillance etc.


Inertial or Earth-fixed
X
Y
Z
η_1
o
roll,ϕ
pitch,θ
G
X_0
surge,u
sway,v
Y_0
yaw,ψ
Body-fixed
Z_0 heave,w


Evaluation of P(t) and $\Delta \mathbf{f}_{SMC}(t)$
Stage II
Switching Control
$-\mathbf{F}(\boldsymbol{\sigma})$
$\boldsymbol{\delta}$
$(\boldsymbol{\eta}_d, \mathbf{v}_d, \dot{\mathbf{v}}_d)$
Error Cal.
Nominal Control
Sliding Mode Control $(\mathbf{f}_{SMC}(t))$
$\mathbf{f}_{SOSMC}(t) = \mathbf{f}_{SMC}(t) - \boldsymbol{\delta}\Delta\mathbf{f}_{SMC}(t)$
AUV Dynamics
Stage I
$(\boldsymbol{\eta}, \mathbf{v}, \dot{\mathbf{v}})$
sensors





Siddhartha Moulik, Dr. Sundergopal Sridhar, Y.V.L. Ravikumar, M. Madhumala, Dasari Manjunath
CSIR-IICT

Guide
Dr. Sundergopal Sridhar

Development Of Membrane Technology For Industrial Progress, Societal Benefit And Environmental Safety

Siddhartha Moulik's innovation is an attempt to ensure the availability of safe and clean drinking water at places relying on ground-water. At various places, ground-water is polluted by contaminants like fluoride, arsenic, nitrate, iron, excess salinity etc., that can be hazardous to the health of people consuming it. In this regard, Siddhartha's present inventions uses the concept of membrane technology for industrial progress, societal benefit and environmental safety. In his research, the synthesis of the cost effective membranes is one of the primary objectives. He uses a novel, indigenous, inexpensive spinning process for hollow fiber membrane casting that can bring down the cost of surface water treatment. The reduction in costs can prove to be beneficial for rural welfare, and also for industrial application due its high surface area/unit volume.

Siddharatha's innovation has a dual role- it works towards rural welfare, and also industrial development. The membrane separation process is capable of providing purified drinking water at lower cost, and is also capable of treating municipal/industrial solvent to fulfill the requirement of zero discharge. The technology is under the process of getting patented. He is currently working on the production of novel, efficient, low-cost inoculums for membrane bio-reactor, and solar based membrane processes.

Indigenous Hollow fiber spinning machine

S. Arun
Indian Institute of Technology, Guwahati

Guide
Dr. S Kanagaraj

Injection Mouldable Polymeric Composite Based Passive Polycentric Knee Joint

The increasing prevalence of amputees in our society has led Arun to design a light-weight prosthetic limb for above knee amputations. At present, the prostheses that are available in the market for amputees are expensive, bulky and unsuitable for children. The mechanics of his design includes a top and bottom part, a link, a link pivoted multi body system, and two extension springs to achieve knee joint movements. The passive prosthetic knee joint is lighter and more stable during the walking cycle. Using injection molding technique during manufacturing the prosthesis, the cost has also been brought down considerably.

Arun hopes that his design will make this environmental friendly prosthetic limb easily affordable for all patients undergoing above knee amputation, and thus, quicken their rehabilitation process.

Testing of knee joint

Abhishek Gandhi
Indian Institute of Technology, Delhi

Guide
Naresh Bhatnagar

Recyclable porous sheets for low cost water-filter

Porous materials that are currently used as water-filters are manufactured using thermoset polymers that cannot be recycled, thus, posing a threat to the environment and well-being of individuals. Addressing the need of an environment-friendly, thermoplastic porous water-filters, Abhishek Gandhi has innovated a method that uses nitrogen gas to manufacture porous thermoplastic foamed sheets. These thermoplastic foamed sheets are recyclable, and can be utilized to develop low-cost water filters. Abhishek believes that using these water-filters will help in reducing the incidences of water-borne diseases in India. Also, due to its low cost, it can also find application in the industrial sector. Another advantage of the technology is that to utilize it commercially, the foaming industries will not have to change their existing set-up, and thus, there will be hardly any cost of installation.

In the future, Abhishek aims to continue working on his research, and look into issues such as pore-size and pore-density, optimization of process parameters using various design of experiment techniques etc. He has already filed a patent for the technology, and his application is under process.

D. Sugasini
CSIR-CFTRI

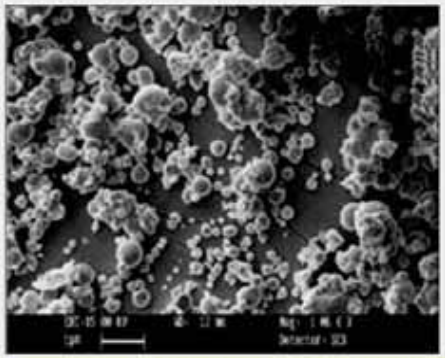
Guide
Dr.B.R.Lokesh

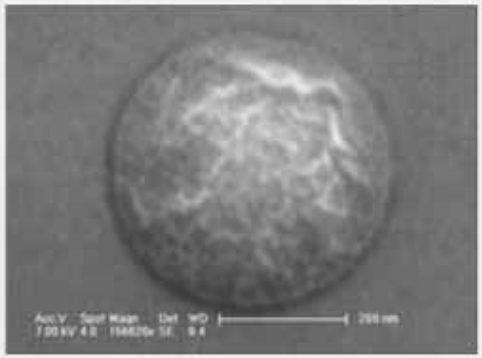
Nanoemulsions as a vehicle for delivery of omega-3 fatty acids for serum and tissue lipids

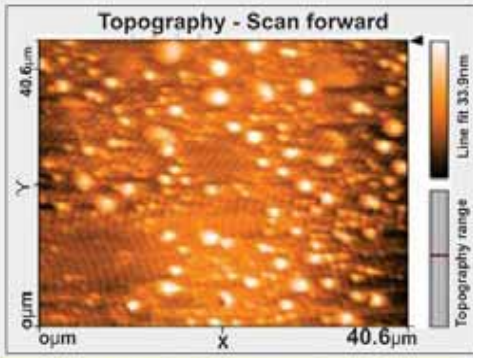
The lack of Omega Fatty-3 Acids in the Indian diet has led innovator Sugasini to innovate an approach that can boost the levels of Omega 3 -Polyunsaturated Fatty Acid in the heart and brain. Since, Alpha linolenic acid (ALA) is the sole source of omega-3 PUFA for vegetarians, it needs to be converted to Docosahexaenoic Acid (DHA). The conversion of ALA to DHA in vivo, is minimal. Further, the recent developments in the field of nanoemulsions have been exploited by many investigators for the delivery of biologically important molecules. Thus, for the current, she aimed to investigate the increase in the bioavailability of alpha linolenic acid (ALA). She also attempted to possibly enhance the ALA conversion to long chain omega-3 PUFA in given nanoemulsions of linseed oil by experimenting on rats.

In the future, Sugasini hopes to commercialize her research by making oils such as linseed oil and sunflower oil etc. The current project was a part of her doctoral thesis that she's pursuing from University of Mysore.

NANOEMULSION OF OMEGA-3







SEM and AFM of nanoemulsions of omega-3 fatty acid

Delivery of nanoemulsions to rats

HIGHLIGHTS

- Docosahexaenoic acid (DHA) is an omega-3 polyunsaturated fatty acid is vital for cardiovascular health, cognitive and retinal function.
- DHA is essential from starting from birth to death.
- Alpha linolenic acid (ALA) is an source of omega-3 PUFA in Vegetarian sections of Indian population. The conversion of ALA to DHA is minimal. There is a need to increase omega-3. Hence, we used innovative approach of LSO nanoemulsions to increase bioavailability of omega-3.
- LSO nanoemulsion was fed to rats and observed its absorption in lymph. Further, it is converted to DHA in serum and liver lipids. This enrichment of DHA lead toenhance neurotransmitter levels in brain.

- Therefore, LSO in nanoemulsion form increases DHA levels in vital organs and beneficially modulate cardiovascular health and brain function.

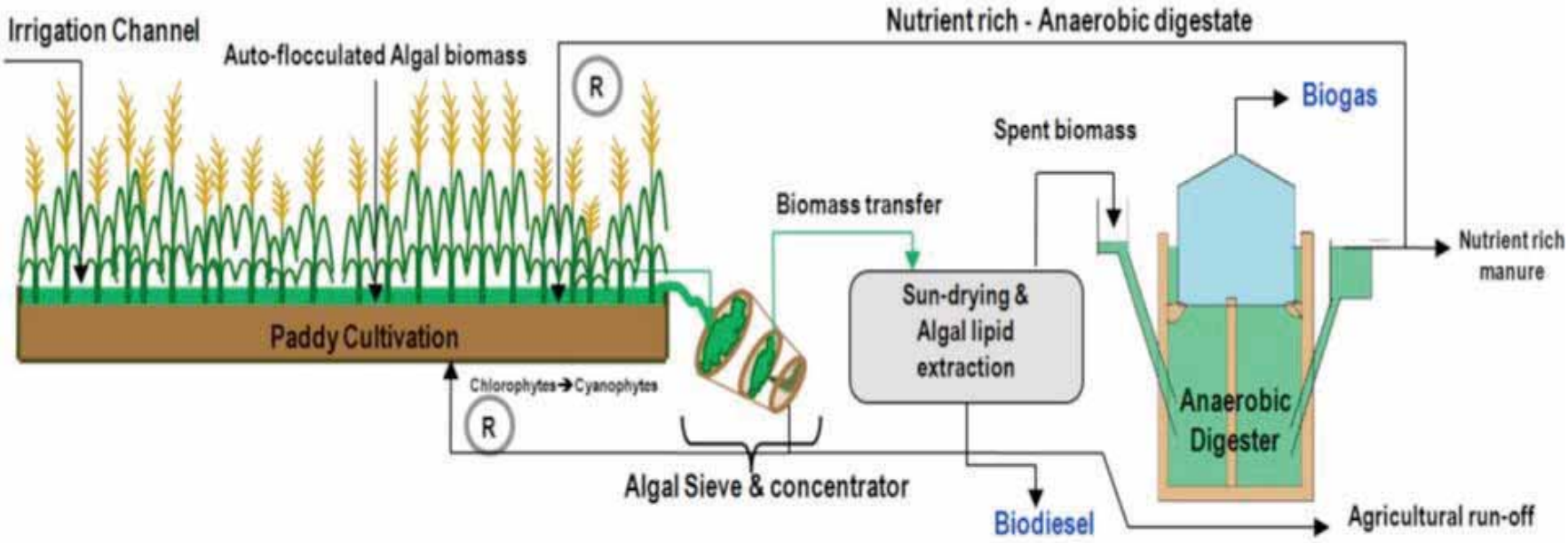
Abitha R
IISc, Bangalore

Guide
Dr. H. N. Chanakya

Algiculture

Innovator, Abitha R, has researched a technique called Algiculture. Algiculture aims to sustainably cultivate oil producing algae as a multi-tier crop for bio-fuel, along with the agricultural crop paddy, in the paddy fields itself. Addressing the problem of unsustainable and very expensive techniques for large-scale algae cultivation, it grows algae along with paddy in a way that these two crops together produce three times more biomass than before. The process not only helps in the production of bio-fuel, but also removes the efficiencies of the paddy crop. By extension, it helps the farmers in having an additional source of income.

Abitha believes that the innovation is capable of changing the face of the agricultural industry in India. Since India is the second largest producer of paddy in the world, cultivating it along with algae will give the additional benefit of releasing bio-fuel, that can help India become energy self-sufficient. Further, it will also generate additional income for the farmers. In the future, she plans to employ experts to train farmers in becoming partial algologists, and integrate the cultivation of algae in farming. She hopes to continue her research to create sustainable agriculture in India.


Irrigation Channel
Auto-flocculated Algal biomass
Nutrient rich - Anaerobic digestate
R
Biogas
Spent biomass
Biomass transfer
Nutrient rich manure
Sun-drying & Algal lipid extraction
Paddy Cultivation
Chlorophytes → Cyanophytes
R
Anaerobic Digester
Algal Sieve & concentrator
Biodiesel
Agricultural run-off

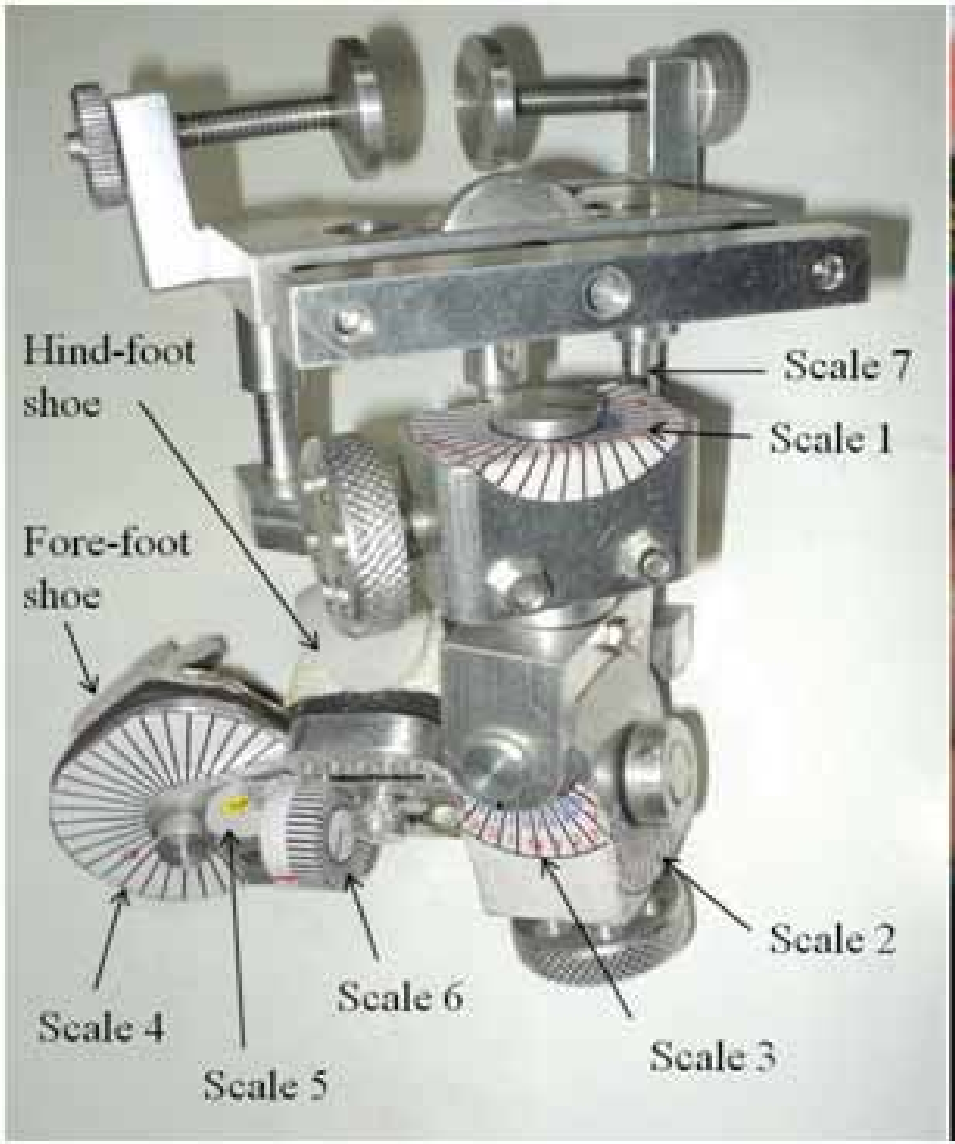
Kanwaljit Singh Khas
Indian Institute of Technology, Delhi

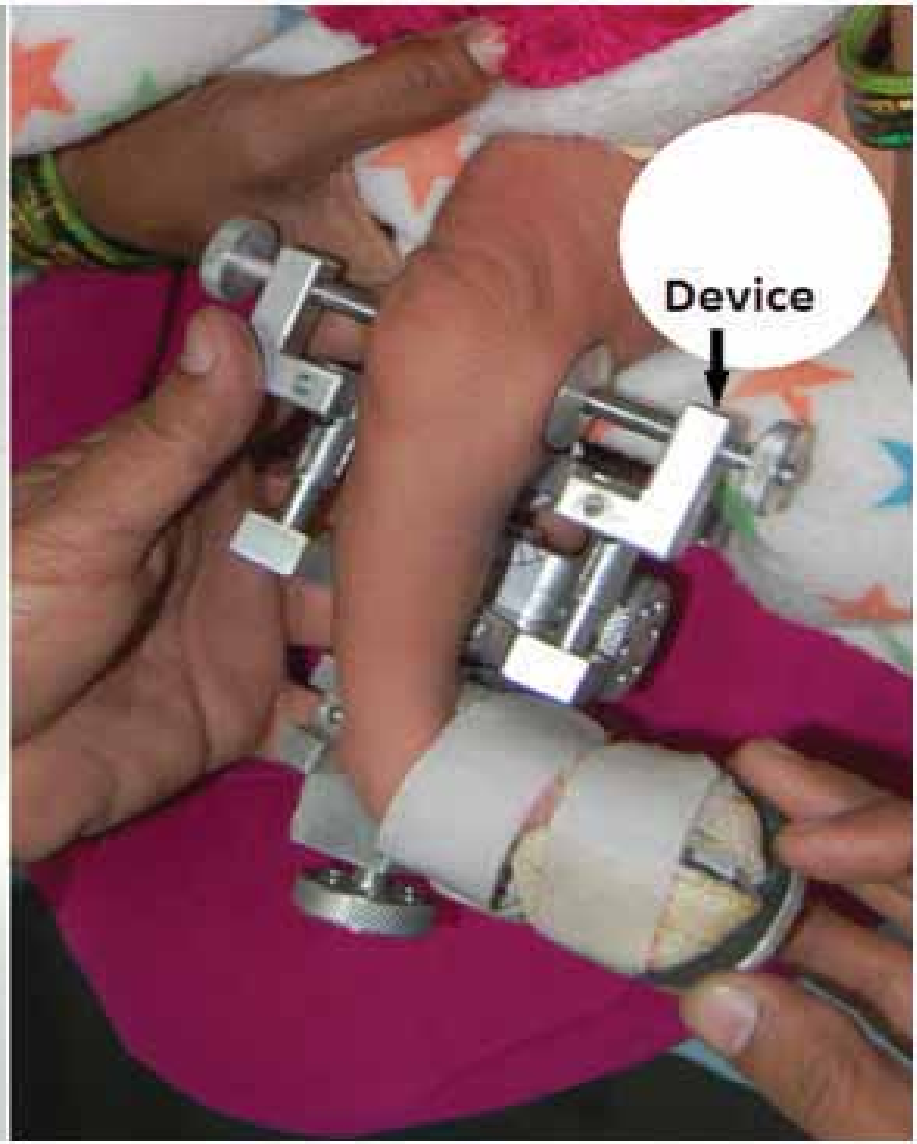
Guide
Dr. P.M. Pandey

Clubfoot deformity measuring device

As the name suggests, the present innovation that is conceptualized by Kanwaljit Singh Khas, evaluates the level of deformity of clubfoot. Each year, more than 200,000 babies are born with clubfeet. However, the cost of scanning to measure the level of deformity is extremely high, making it unaffordable for a significant section of the society (each scan costs between 3500-5000 INR). Moreover, the radiations from the scanning devices have a deteriorating effect on the skin of the new-born baby. As an alternate and more effective solution to the above mentioned problems, an economical device has been developed to evaluate the deformities of the clubfoot. It has various advantages over regular scanning devices, including, no harmful effect on the skin of the baby, no requirement of an external source of power, free evaluation for patients etc.

In the future, Kanwaljit wishes to collaborate with companies supplying products for pediatric health care. He has already filed a patent for the device, and is currently working to digitalise the output of the device.


Hind-foot shoe
Fore-foot shoe
Scale 7
Scale 1
Scale 2
Scale 3
Scale 4
Scale 5
Scale 6


Device

Lad Virangkumar Nanubhai
SVNIT, Surat

Guide
Prof. Z. V. P. Murthy

Use of High Nutrient, Low Cost Natural Materials for Preparation of Well-Engineered Emulsions for Variety of Applications

The present innovation, by V.N. Lad, offers motivation for extended research in the direction of interfacial interactions and molecular attraction forces between the constituents of additives (like coconuts, coriander, turmeric, aloe vera etc.), and oil-in-water emulsions. Through literature review and experimentation, the study provides justification for the effective use of naturally and easily available low cost materials for the preparation of well-engineered emulsions. For instance, using coconuts and aloe vera which is abundant in many parts of the world in all the seasons. Even the microparticles of Bengal gram and Turmeric may be produced by appropriate milling operation. The study concludes that the proper usage of certain naturally available materials can effectively eliminate the synthetic/ man-made surfactants, emulsifiers, stabilizers, thickeners and other rheology modifiers, resulting in true herbal emulsion products.

The technique finds application in devising drug delivery systems, tissue engineering, and health care products that require controlled rheology of the colloidal materials including emulsions and gels. In the future, V.N. Lad aims to probe the interactions of various bio-derived additives on a molecular level with the dispersed and continuous phases of various emulsions, gels, and other soft matters.

Photographs of the samples prepared, under communication for publication.

Subhramanya Shridhar Shetty
NMAMIT

Guide
Prof. Pradeep Kanchan

Food vending Machine for Schools

Subhramanya Shridhar Shetty has innovated a vending machine that can provide meals and milk to school students in extremely simple ways. His invention is particularly targeted towards government schools that provide mid-day meals to students. In an effort to address the problems of mismanagement that arise in schools where the Mid-day Meal scheme is implemented, this food vending machine reduces human effort, and can be manufactured at very low rates. The machine is designed to have screen that will give all the relevant details to the students, and later dispense the food and milk.

In the future, Subhramanya plans to include a test for food toxicity by using color sensor technology. Under this procedure, sample of some food (that is to be served) will be put in the machine along with a chemical that detects food toxicity. In case the quality of food in not up to the mark, the machine will send messages to the person incharge using GSM module.


FOOD VENDING MACHINE
FOR SCHOOLS
NITTE
DESIGNED FOR
MID DAY MEAL SCHEME
N.M.A.M. Institute of Technology



Sri Priya Kalidoss, Karthikeyan SD, Vivek sarda
Indian Institute of Technology, Madras

Guide
Dr. Sujatha Srinivasan

Affordable power assist for wheelchair

Sri Priya Kalidoss and her team have innovated an affordable wheelchair that attempts to address the limitations of both power assisted and manual wheelchairs. The manually driven wheelchairs require considerable amount of upper limb strength to be propelled, thus, proving to be a major disadvantage for users who move on an uneven terrain. On the other hand, the motorized wheelchairs are exorbitantly priced, extremely heavy, and limited on modularity. Therefore,the team has attempted to design a wheelchair that uses a single motor to power itself, thereby reducing its weight. It has a manual steering used which is used for directions. Its other features include a power unit and battery unit, both of which are easily detachable. The design uses a BLDC motor which offers low resistance when engaged to drive it in both powered and manual modes.

In the future, Sri Priya and her team aim to develop a product of the proof of concept, and extensively test its efficiency on wheelchair users. They believe that their power assisted wheelchair has great scope in the market, and can also have a significant social impact.

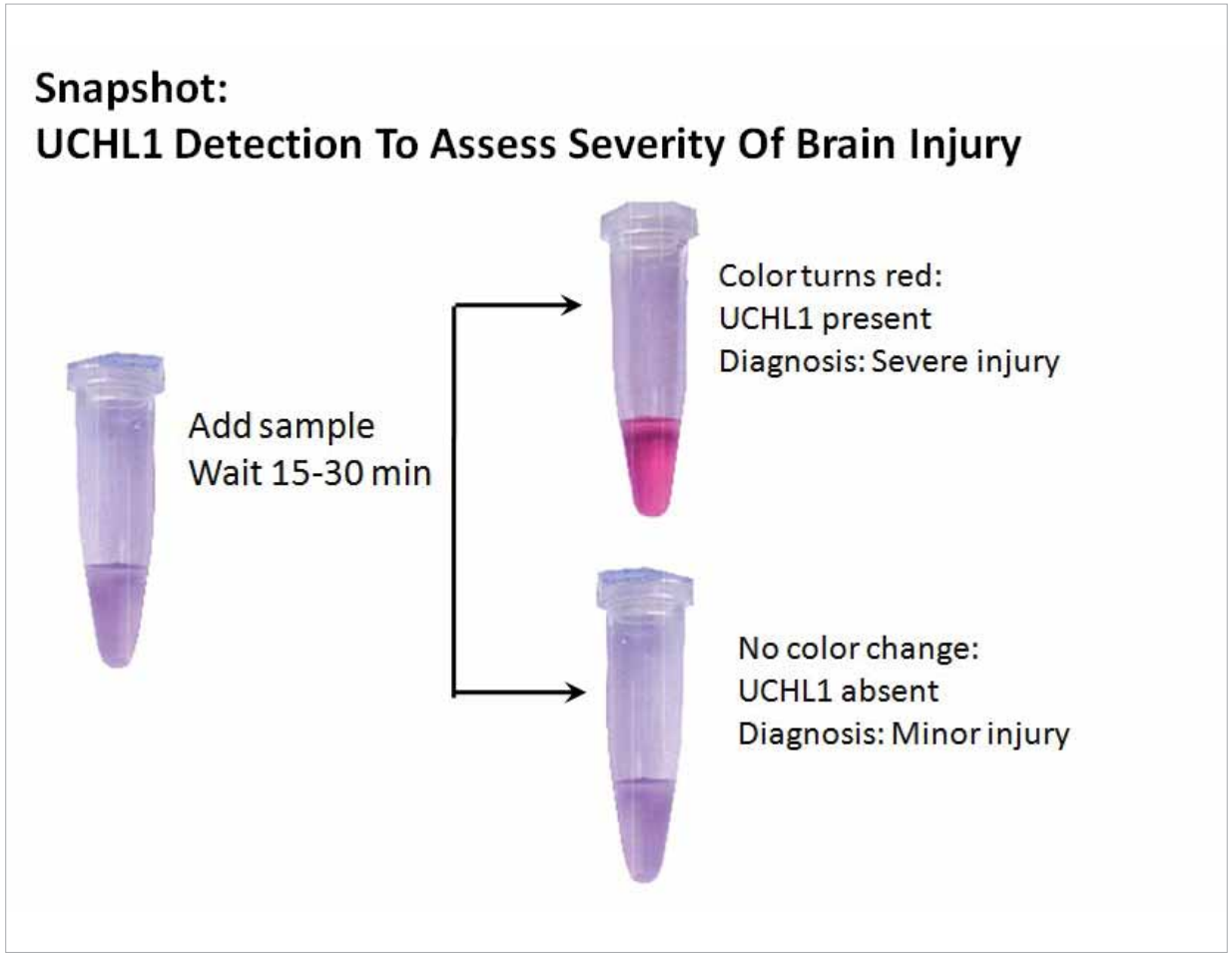
Srishti Aggarwal
Indian Institute of Technology, Hyderabad

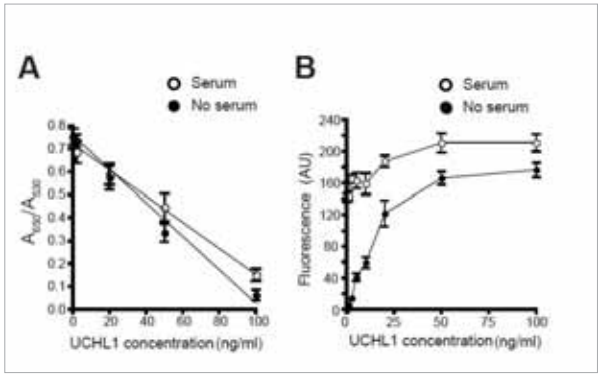
Guide
Dr. Anindya Roy

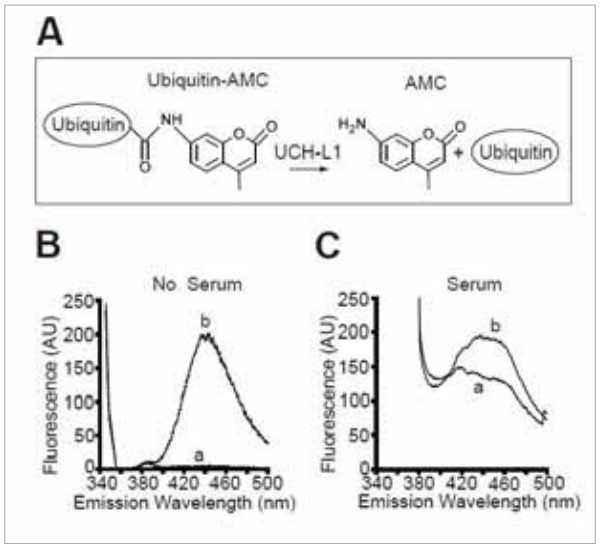
Rapid diagnosis of brain injury- a novel approach using citrate-capped gold nanoparticles

India has the unenviable distinction of having the highest rate of head-injury in the world. In fact, 95% of the trauma victims end up not receiving optimal care in hospitals. To address this gap in healthcare, Srishti Aggarwal, has innovated an approach that can determine the severity of brain damage in patients, monitor the progress of treatment, and ultimately predict the rate of survival. She has developed an assay based on gold nano-particles to determine UCH-L1 (Ubiquitin C-terminal Hydrolase-1) in clinical samples. UCH-L1 has recently been discovered in cerebrospinal fluid after head injuries, and clinical studies have established a strong relationship between the concentration of UCH-L1 and the outcome of a given treatment. Therefore, by using a simple colormetric analysis, a qualitative detection of the concentration of UCH-L1 can be performed. The detection can be used to analyse the extent of brain damage.

The current neurological examination is dependent on neuroimaging such as CT Scan, MRI etc., that are often very complicated and expensive. Sristi belives that using the nano-particle based will be more efficient and cost-effective. Further, in the recent times, UCH-L1 levels have also been found in various malignancies including acute lymphoblastic leukemia, breast cancer, leukemia, medullary thyroid carcinoma, non-small cell lung cancer, neuroblastoma, and in prostate, esophageal, colo-rectal and pancreatic cancer etc. Therefore, she also plans to work on developing a functional assay that can be used to quantifying clinical samples, and thus, help in cancer staging and treatment.







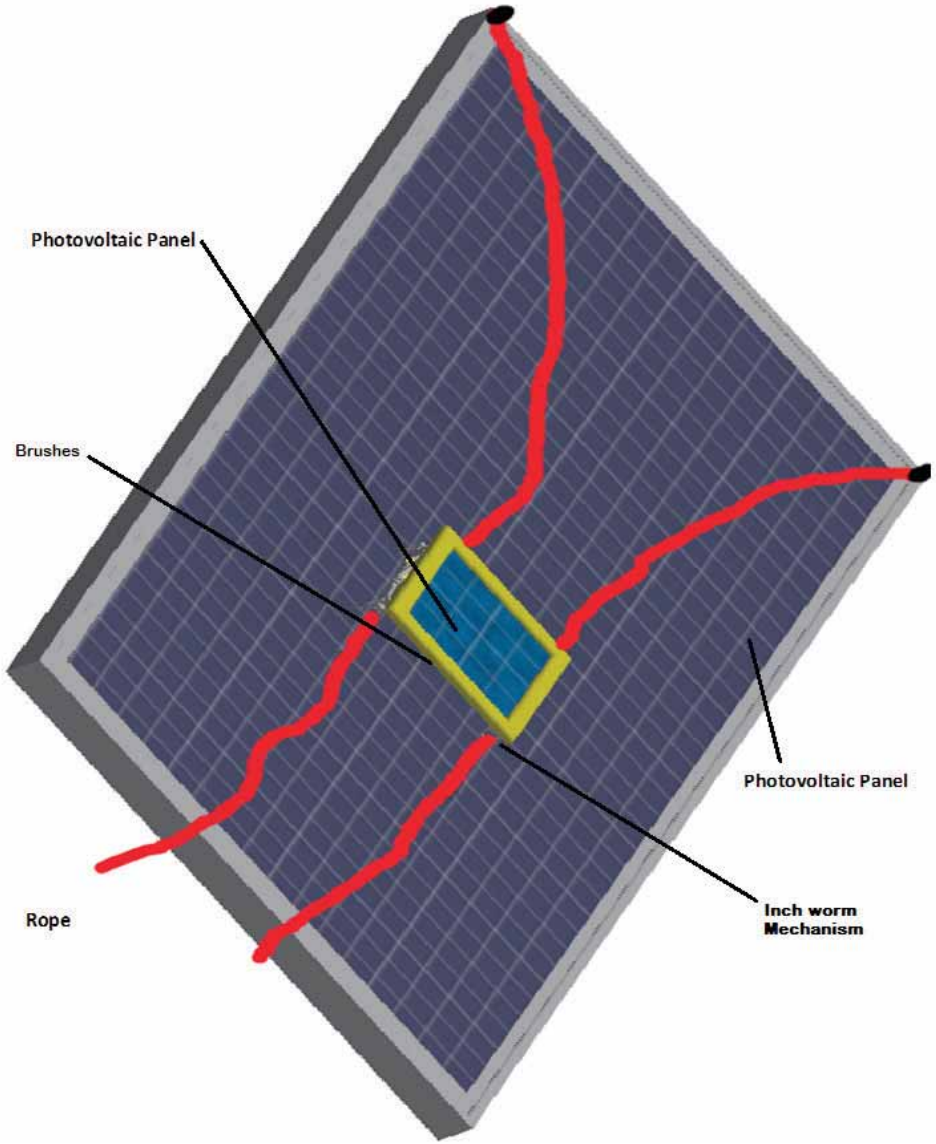
Above : UCHL1 detection to assess severity of Brain injury
Top right : (A) Schematic representation of the method for assaying UCH-L1 using Ubiquitin-AMC.
(B) Emission spectra showing the increase in fluorescence with cleavage of the peptide bond by UCH-L1. Graph (a) represents the background fluorescence in the absence of UCH-L1. (C) Emission spectra showing the increase in fluorescence on cleavage of the peptide bond by UCH-L1 in the presence of serum (b)
Bottom right : Calibration graph for the determination of UCH-L1 concentration.

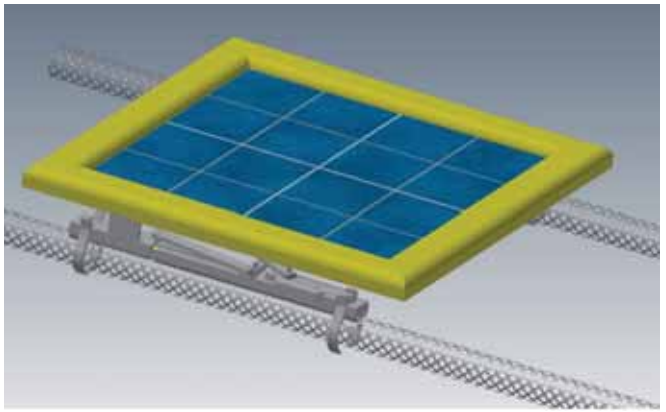
Bhivraj Suthar
Indian Institute of Technology, Delhi

Guide
Prof. S. Mukherjee

Inch worm mechanism for solar panel cleaning robot

The present innovation, conceptualized by Bhivraj Suthar, represents a mechanical design for the robot of solar panel cleaning process. The cleaning process requires the robot to be able to travel on the solar panel module in extremely specific areas. For this, the robot uses the inch worm mechanism with two ropes to move around. Bhivrajs's proposed design suggests the use of two robot bodies with grippers on their each end. In such a scenario, the inchworm's mode of locomotion will be attached at the rear end of the robot's body by a rope (via the gripper). Further, the rest of the body will be extended forward, and attached on the same rope. This mechanism will help in bringing the rear part of its body to meet the forward part. This design has two servos - The first servo is responsible for the closing and opening of first gripper as well as linear motion on the rope, while the second servo is responsible for the closing and opening of the second gripper. Both grippers are capable of latching and unlatching the robot on the rope - this ensures that the inchworm always has at least one portion of its body firmly latched on the rope. Interestingly, the robot has its own solar module that converts solar energy to electrical energy, and feeds on it. Bhivraj feels that the proposed idea will hold tremendous significance in the field of cleaning robotics.


Photovoltaic Panel
Brushes
Photovoltaic Panel
Rope
Inch worm
Mechanism



Toshib Bagde, Jamdade Nikhil Kailas
Indian Institute of Technology, Kanpur

Guide
Dr. J. Ramkumar

Prashamana
- A Smart Hospital Bed

Prashamana, an innovation by Toshib Bagde, is a smart hospital bed that ensures the privacy, and helps in the overall physiological monitoring of a patient. Conventional hospital beds that offer patient monitoring tools are often very complex, and are priced exorbitantly - making them beyond the reach of most patients and hospitals. Further, since most traditional beds are placed in a busy surrounding, the patients often have to compromise on their privacy which may affect them psychologically. As a solution to these two major problems, Prashamana promises a better experience for both patients and doctors.

Prashamana consists of an overhang roof with sliding curtain which renders the choice of privacy to a patient. It is also provided with a night-light and a sliding chair that can be used by caretakers or doctors. Further, each bed comes with an LCD that displays the patient's personal information like (name, bed number, condition of patient, blood group, weight, temperature etc.). This information can be monitored from the monitoring room, or the nurse's chamber. The bed is also capable of monitoring blood pressure and vibration using sensors that are meant to ensure better care of patient. Additionally, it can detect the vibrations during heart attacks, and its in-built system alarm notifies the monitors in nurse/doctor's hospital space. Its other features include sleep pattern analysis, weight measurement, tracking of patient's movements etc.

Toshib and his team have already conducted documented research on the efficacy of Prashamana. They have also taken reviews of medical professionals on the productivity of their innovation. Their patent is currently under progress, and in the future, they plan to conduct clinical trials in Kanpur area. Their team hopes that they succeed in creating a new standard of care in hospitals that is efficient and cost-effective.


PRASHAMANA
1
OVERHANG ROOF
Down lights
Curtain Frame
2
CURTAINS
To ensure privacy
3
LCD DISPLAY
Personal Information
Weight
Important details
4
SLIDING CHAIR
For check ups
For meetings
Public
Private
Safety
Social
Healing Blue
FocusingYellow
Calming Green


PRASHAMANA



Pratik Raj, Deepak Nagar, Kewal Chand Swami
IIITDM, Jabalpur

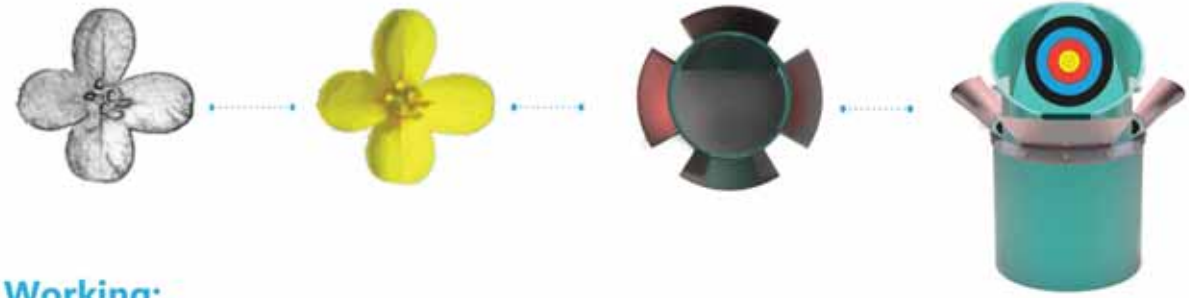
Guide
Prof. Awadhesh Kumar Singh

Suchi-Ahvana

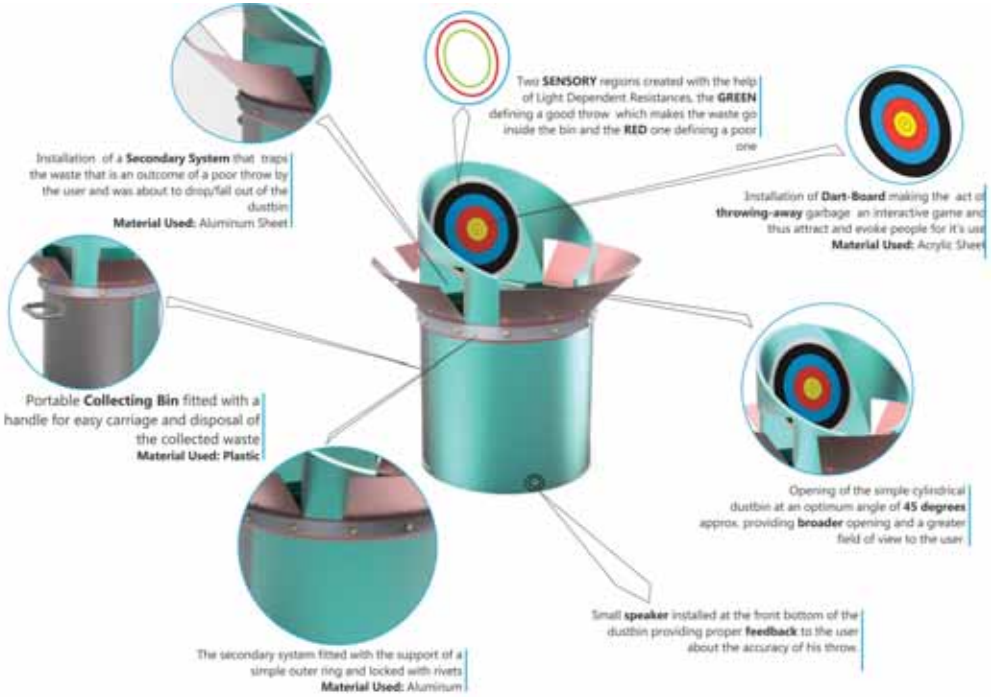
Ever heard of an interactive dustbin that assesses your garbage disposal skills? Pratik Raj's innovation, Suchi-Ahvanna (Sanskirt for 'evoking cleanliness'), does exactly that! Believing in the importance of cleanliness in our society, Pratik and his team conducted various surveys analysing why people did not dispose garbage efficiently. His findings revealed that various reasons including unclean dustbins, unhygienic surroundings around the dustbin, lack of time and patience amongst people etc. contributed to the inefficient use of dustbins. To curb this habit amongst people and with the aim of inculcating effective cleanliness, he designed Suchi-Ahvanna. It is based on the concept of a dart game, where the user has to aim for the centre of the dustbin. It has an in-built processor that interacts with the user, and assesses how good or bad the was his/her throw.

The team believes that the element of gaming attracts more people and conditions them to dispose waste in a correct manner. In the future, his team would like to continue working on Suchi Ahvanna to make the design more compact, and capable of more varied and detailed intercations with the user.

Inspiration and Ideation of the Secondary System



Working:



Ankita Gulati, Neil Shah
Indian Institute of Technology, Delhi

Guide
Prof.M.Balakrishnan

Tedkit- An Audio Tactile Storybook For Visually Impaired Children

Tedkit, an innovation by Anikta Gulati, is an auto tactile storybook for visually impaired children. It is observed that visually since impaired children are unable to visualize their surroundings, they fail to develop a strong understanding of their environment. However, with Tedkit, Ankita hopes to give these children an opportunity to not only learn things on their own, but also develop their internal literary skills. Using 3D embossed images, Tedkit provides an imaginary view of the original character, and scenes from the story.

The kit comes with a Ted storybook, a Ted stand, and a Ted android mobile application. The android application scans the QR code attached on each page of the story book & plays the corresponding audio file. Storybook also has interactive braille questions with toggle switches at the end to make the storybook more interesting for the visually impaired child. Ted Stand is a wooden/plastic stand with clips to position the storybook appropriately and groves on the top to hold the android mobile device (camera sensor) in proper position. It has an enclosed Bluetooth integrated electronic circuit which is used to control the toggle buttons at the end of the storybook, through which a child can experience an interactive way of answering all the questions related to the story through an android application.

Ankita is currently working on a user-centric approach by surveying the experiences and needs of the visually impaired children. She hopes that Tedkit succeeds in enhancing their lives.

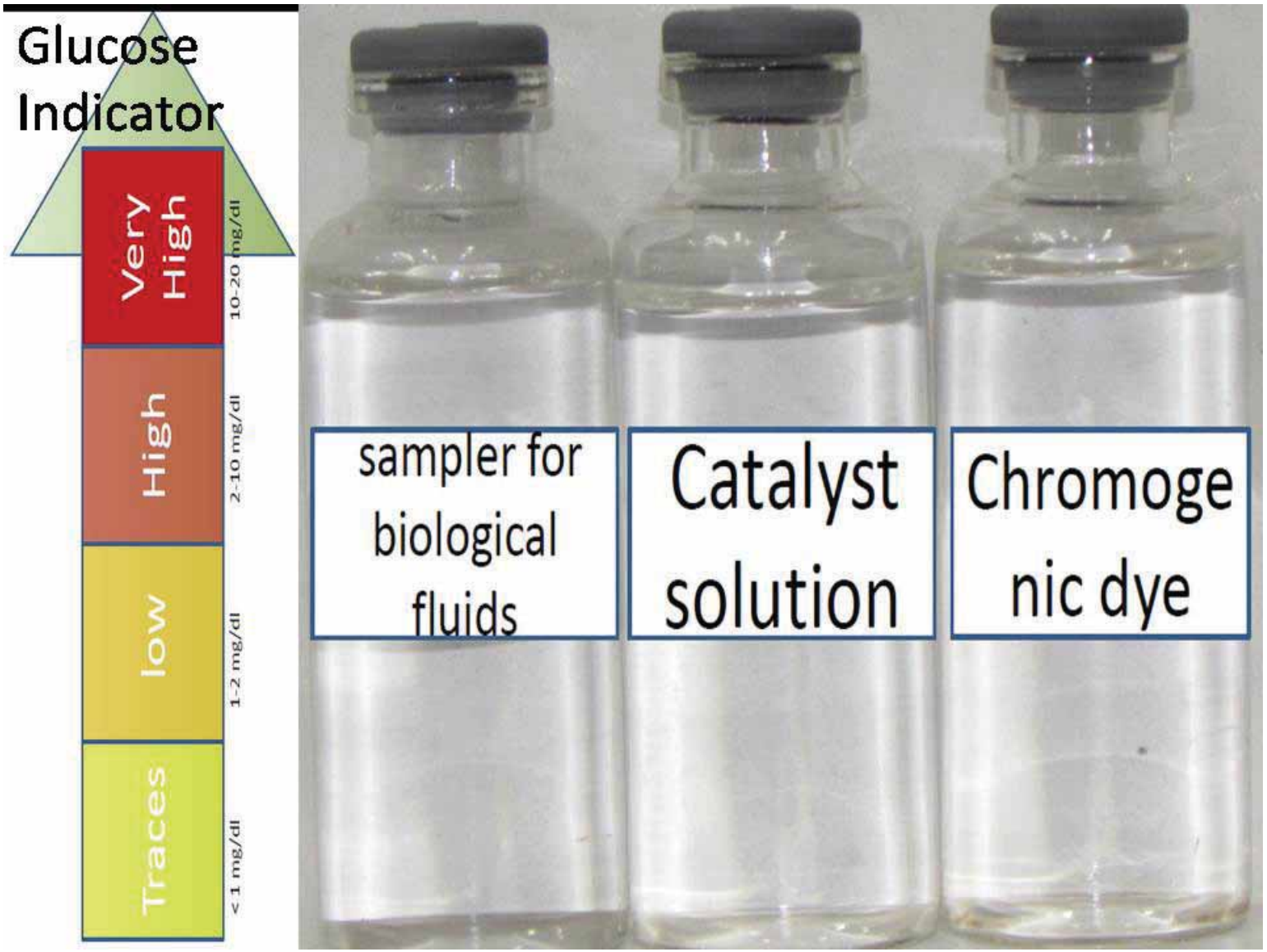
Yadav Vijay Dukhran
Institute of Chemical Technology

Guide
Dr. Prajakta Dandekar-Jain

Rapid-Non-invasive Diagnostic Kits for diabetic patients to check glucose level thrice a day

To make healthcare more affordable and effective, Yadav Vijay Dukharan, has developed a non-invasive glucose detection kit that helps diabetic patients check their glucose levels up to three times a day. The kit consist of a fluid sampler, two solution bottles (that is expected to cost between 10-20 INR/ 100ml), and a glucose indicator. It is capable of detecting both biological (blood, saliva, urine) and chemical samples. It follows a very simple procedure that yields accurate results - one has to simply place the sample being tested in the sampler, add one drop of the given solution, and later, compare the color change with the given indicator strips.

The invention is based upon the colormetric detection method which is an efficient, cost effective, and flexible method for glucose analysis. Also, since the glucose content of the sample can be detected visually, the kit is expected to find applied uses in the fields of diagnostic, food production, and biochemical research. Dukharan hopes to continue his research by using technology to replace the glucose strips by paper strip or non-enzymatic electrochemical strips (micro fluidics), and dye-sticks that are more cost effective.


Glucose Indicator
Very High
10-20 mg/dl
High
2-10 mg/dl
low
1-2 mg/dl
Traces
< 1 mg/dl
sampler for biological fluids
Catalyst solution
Chromoge nic dye



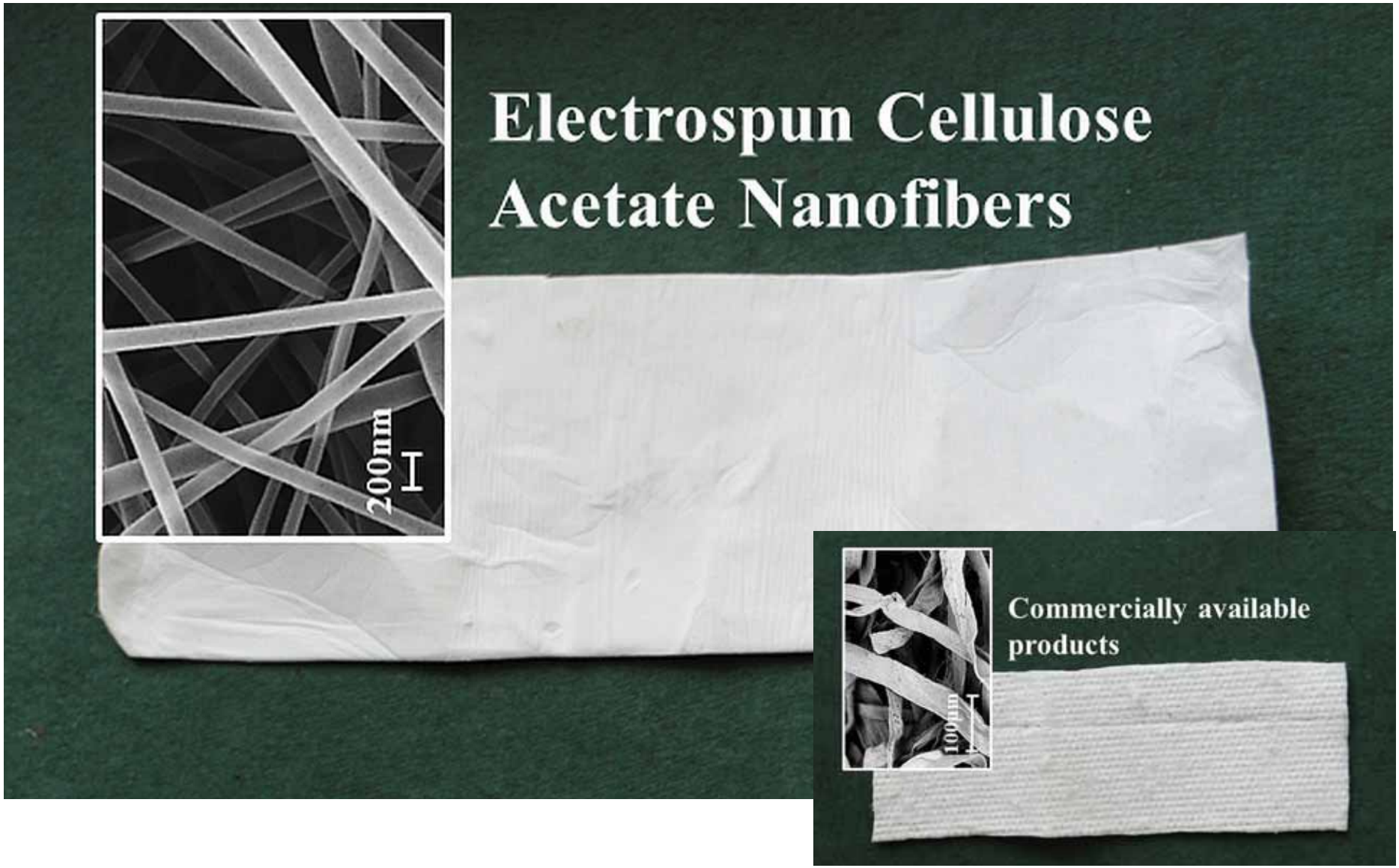
Shital Yadav, Illa Mani Pujitha,
Tulika Rastogi
Indian Institute of Technology, Hyderabad

Guide
Prof Chandra Shekhar Sharma

Electrospun Cellulose Acetate **Nanofibers for Female Hygiene** Applications

In her innovation, Shital Yadav has attempted to overcome the limitations that the existing female hygiene products (sanitary napkins) possess. Her aim is to develop a product that eliminates harmful super-abosrbent polymer, leaves zero residue, and has a higher absorbency with enhanced mechanical strength. The current sanitary napkins available in the market are mostly made up of wood pulp fibers, rayon fibers, dyes for giving color, chemicals for giving fragrance, and are bleached with chlorinated compounds to make them appear white. Further, in order to increase the absorbency of the sanitary pad, manufacturers add superabsorbent materials to them. Evidently, the infusion of such chemicals pose a threat to the health of women, and cause diseases like cervical cancer, skin allergies, Toxic Shock Syndrome (TSS) etc. Shital has attempted to decrease the super absorbent polymer content in the existing napkins, without compromising on the absorbency. It has been done by replacing the microfiber matrix with the nanofiber based matrix due to different advantages of nanofibers. The process of electrospinning is used to produce the nanofiber matrix because of advantages like flexible morphology and tunable porosity.

Even though Shital has a proof of concept, to make the product commercially available, an industrial scale electrospinning set-up is required. The proof has a provisional patent, and she is currently in the process of filing a full patent application.


Electrospun Cellulose
Acetate Nanofibers
200nm
Commercially available
products
100nm

Appendix

Dr. R A Mashelkar

Speech at 2012 GYTI Awards Ceremony : Gandhian Innovation

First of all I want to acknowledge the great effort by SRISTI Techpedia in making us aware of the enormous innovation that goes on in the classrooms of this country which was previously completely unrecognised. With the power of imagination and the hard work of leaders like Hiranmay, they created a depository of all that knowledge for all of us to savour, to learn from, to be inspired and then this wonderful idea to create these awards and name them after Gandhi, theGandhianYoung Technological Innovation Awards.

Let me tell you a bit about the way the word Gandhian Engineering was coined and the word Gandhian Innovation came into circulation to start with. I remember about four years ago I was honoured by the Australian Academy as a Foreign Fellow and I found thatin forty years I was the only Indian they had honoured; so I said there must be something wrong because there are hundreds of people who are better than me whom they should have honoured; that means they don't know enough about India. So when they invited me to speak on Innovation in Canberra at the ATAC annual meeting where this honour was going to be bestowed I chose deliberately a topic whose title was Indian Innovation from Gandhi to Gandhian Engineering. That was the first time this term was used.

What is Gandhian Engineering?Engineering is always about getting more from less, isn't it ? Engineers help you in speeding up things, engineers help you in miniaturising things,engineers help you in reducing cosst. All the time engineers are working towards getting more from less, right? Now mainframe computers used to occupy the size of these rooms and today you carry something in your hand which is hundreds of thousands of times more powerful than a mainframe computer; in terms of the kind of power it carries, you are getting more from less. But is it available to everyone? It is not. It is so expensive and therefore I say the principle behind Gandhian Engineering is getting more from less for more and more people; not just for more and more profit.

More and more people; there are 4 billion people in the world whose income levels are less than $2 a day. How do you give access of these things to them? That phrase more from less for more got very popular, they started calling it MLM and in fact the word went around to such an extent that the World Economic Forum had actually half a day's session on MLM. CII in Ahmedabad had a full day session on MLM. And that was the way this Gandhian

Engineering, Gandhian Innovation started spreading.

Why is it so important for the world, not only for the developing world but also for the developed world? It is simple. What you find is that as economic growth is taking place, if you look at the top 10% and the bottom 10% percent, the gap between them is increasing. For example in India the top 10% their share of the national economy is around 1/3rd and the bottom is around 3 %. So there is a gulf of a factor of 10 and this is increasing. The gulf is increasing. Now what it means is that we have income inequality but despite that income inequality can we create access equality? Access to education, access to health, access to communication, access to housing, transport, access to financial services? Now that looks ridiculous.

If your income levels are so different, how can you have equality of access? But that is happening and that is why last time I mentioned an example of how when I was driving from Bombay to Pune I stopped at a traffic light and I saw something interesting. There were two people who were waiting for the signal to turn green and cross the road. One was a girl from a slum with tattered clothes and the other one was very smartly dressed rich woman. Both of them were standing next to each other, nothing common between them excepting one that both of them had mobiles and they were talking to someone on that mobile.

So here is a case their income inequality being maybe factor of 10000 but with access equality because both of them at least as far as voice communication was concerned, have an equal access. How did that happen? That was innovation. It is called Business Process Innovation and for those of you who are interested you can look at the paper that was written by the late C.K. Prahalad and me, that turned out to be his last paper in Harvard Business Review where we said how Indian telecom companies adopt business process innovation to bring down those costs very substantially.

We created that access equality but let me ask a question. She has that access to voice communication, but does she have access to a toilet? Does she have access to education? Does she have access, that little girl,to clean drinking water? Perhaps not. And this is not on in today's India and therefore the mantra has to be despite all the inequalities there will be innovations that will enable access for all. That is the new India we need to make. Access for all, access for every single citizen of the basic necessities of life.

We cannot tolerate these jokes that India has more mobile phones than it

has toilets. No. I do not like these jokes. Why? Why should that be the case? This deep concern about society, I think is extraordinarily important and it is this that is embedded in these Gandhian Innovations. Gandhiji used to say "Vaishnav Jan tohteneKahiye, peed parayijaane re." The one who understands the pain of the others. If you see today's innovations that have won the awards, you see that they are based on understanding the pain of other people. People who cannot see, people who cannot hear, people who are handicapped, people who are using wheelchairs, how do you make life comfortable for them, that is why they call it the fight for Gandhian Innovation,Peed ParayiJaane Re.

There are three things that we must all imbibe. First is of course is innovation, which comes from your mind and comes from your brain. Second, passion, without passion things don't happen. You don't build an institution, you don't build a nation without passion. The third is compassion, compassion in the heart. There are a lot of nations, a lot of individuals who have innovation and passion but no compassion. They don't make complete human beings and you make complete human beings because you have that compassion, without that you won't be complete.

The other issue about Gandhian innovation is the following, Gandhiji always used to say that there is enough for everyone's need but not for everyone's greed. So, we need to reinterpret getting more from less for more. It is not just getting more from less for more and more people, 4 billion people whose income levels are less than 2 dollars a day, the people who are living currently, but also the people who live in the future. Your great grandchildren, their great grandchildren. Because we come on this earth, we stay here for 60-70-80-90 years depending upon his wish and then we go away. And we are given something by our predecessors and we have to hand over something for our future generations, what do we do? And that is where this issue of sustainable consumption comes in, that is where this issue of the planet comes up and therefore the 3 key words for you to take home are people, planet and if you are in business; profit for people and planet.

How do you help the largest number of people meet their basic needs, how do you preserve the planet so that people of the future will have a planet to live on otherwise you'll destroy it? And while you're doing it, previously people used to talk about doing well and doing good, right? What we are now saying is that doing well by doing good, how do you actually marry the two? I think that's the issue, that's the future generation that one would like to see.

Not only Samvedna but alsoSajanshilta going together that is where innovation, compassion and passion come up. I am very happy to see, among the innovations we saw for example, the low-cost stick making machine, again it has come out of compassion because those who make those agarbattis, the poorest of the poor, what are their income levels and he is trying to see how could you reduce their tragedy of making them as well as how to enhance their income. When you look at something like engine-exhaust heat being used for specific uses, again what we are saying is that let there be no waste, how can you extract value out of it? That's the game, the Gandhian sort of principles that are going to be sustainable, not just required for India, it is going to be required by the whole world.

The whole world is watching us and I am seeing that this Gandhian innovation is appearing in different forms, the vocabulary of innovation is changing. You will find 'frugal innovation' is the word that is floating around. If you just see the last issue of The Economist, you'll find there is special feature on frugal innovation, how ideas are flowing from east to west, how there is going to be a dramatic change. There is this word, inclusive innovation, which is floating around. Two American authors, husband and wife, they wrote a book called Nanovation, it has just come out, based on the inspiration they had from the car Tata Nano.

You can have so many indices and powers and so forth. My index is simple, are you changing the language, like today when we go to the internet and we search, what do we say, "areygooglekaro". Google has become part of our vocabulary, googling has become a verb, that means it has changed the world, and in the same way you find that what India is doing in this inclusive innovation, in this Gandhian innovation, is actually having a great impact, a great influence on the rest of the world.

I personally believe also, that we have a very special trait in India, of course we are very imaginative, we are very creative but there is something special about us because what has happened is that on the one hand, we had to suffer from lack of resources and on the other hand, we had aspiration, and the combination of that has given eyes to really inspired innovation.

I was in Ahmedabad around 10 to12 years ago, somebody met me the morning when I had to spoken to the chamber of commerce and I told him you are not innovative. And in the evening, at dinner someone came and said what do you mean by we are not doing innovation? We are doing innovation, I am doing innovation, I said what are you doing? He said

I am concerned about oral health, I want people to brush their teeth properly so I am creating a one rupee toothbrush, I said impossible. I said impossible because I know, I am a polymer engineer, I understand plastic and I know the amount of plastic that goes in the handle of toothbrush, I said in one rupee you cannot do that. He said who told you that I have to use a plastic brush, I am using this, the finger. Arey, but where is the brush? No problem, velcro, I use velcro and use a paste there, and he said I also have a flexible tooth brush.

So what I did that evening when I went back to my hotel, I just went to www.usp2.org and typed the word "flexible toothbrush" because I knew that there would have been some innovation that must have been in the US or somewhere, where they must have looked at the flexible toothbrush with the same functional demand. And so there were patents in flexible toothbrushes, accepting that what they have done was, if the toothbrush let's say was costedat 1 dollar, the innovation that they had done was such that it made it a 50 dollar item, and here in India you can see what is the cost of a toothbrush. That is what I mean by Indians having a special trait where we beat any price-performance envelope that you can basically talk about.

So you have to let your imagination run wild. The only message I have for you is the following: There is no limit to human imagination, there is no limit to human endurance, there is no limit to human achievement, excepting the limits that you are going to put on yourself. There is a limitless ladder of excellence as people talk about, you have to keep on climbing it, and I am seeing that spirit already because I saw two innovations one after the other, solving the same problem but one beating the other, year after year. You are already following what the Sony chairman had said, "You must displace your own product. We believe in displacing in our own products ourselves otherwise our competitors will do it for us". That was all in evidence today.

This is an event, an award event, normally what happens is we take pictures, we clap, we celebrate, and following day we forget. No, I am quite sure this event is going on to be a movement on Gandhian innovation and this movement will be carried around across the country. We are very lucky that while creating that history and running that first mile in that thousand mile journey, we are all there at the start. I think we must now have that viral effect, the clustering effect, move from ten to a hundred, hundred to a thousand, thousand to a hundred thousand, hundred thousand to a million and the entire country of 1.2 billion.

We are not 1.2 billion mouths but

we are 1.2 billion minds. So that is the India we are going to build. My last point is the following: I felt very proud when we were singing Jana GanaMana, and I always dreamt, that one day at a given time 1.2 billion Indians will get up and sing Jana GanaMana together, wherever they are, what a spectacular scene it would be. What a spectacular scene it would be and that is why last time we mentioned about all of us getting up in the morning and wherever we get up, our saying, "My India", 5 times and then before we go to bed, our saying "My India" 5 times and what a difference it will make if 1.2 billion Indians do it every day. "My India, My India." Thank you very much.

Speech at 2013 GYTI Awards Ceremony : More-from-Less-for-More Innovations

Let me start from the end, we celebrated the grassroots innovators on the 7th: What a grand function it was! Within a couple of days, the ex-President, Pratibha Patil, invited the award winners to her home; she personally came and visited the whole exhibition. The commitment at the level of the Head of State, not only the current and the past, but Dr. APJ Abdul Kalam was equally involved. As you know he started this particular practice of giving away the awards. And this is all based on a very fundamental principle, which I keep on repeating, that 120 crore Indians do not mean 120 crore mouths, they mean 120 crore minds and that's the power of grassroots innovation. Everybody can think, everybody can innovate, and everybody can make a difference. Techpedia is getting all of India galvanized, really. Particularly bringing to the front the young students, young people, and the way they innovate. Not just the national laboratories and universities and so on and so forth, but everyone, all these young minds, I think it's incredible.

A number of things I loved today, first is Team India - IIT Madras, IIT Bombay, DAIICT,* all of them coming together. I always said, that if you always think of Team India, One India and India First we will make it. And I saw that spirit today. I think that's the first thing. The second is you know we always talk in terms of universities going for excellence. But we must look at relevance, and excellence and relevance must go together. Mere excellence without relevance, will it do? You can get some good ranking, get counted among the top 500 universities, so what? At the end, what you do in terms of science technology if it's not going to make a difference

to the billions, it's not going to work and therefore I saw this fantastic combination of excellence and relevance, making high technology work. I saw the use of fluids being used very imaginatively; I saw the use of first principles of viscoelasticity being used. You know, by profession I have been a chemical engineer, but I specialized in polymer science and particularly polymer viscoelasticity, and I was amazed the way it was basically used. Nanotechnology, cutting edge nanotechnology, to solve the problems! So who says excellence is separate and relevance is separate?

The third thing that impressed me most was this. You know there are problems: 120 crore Indian people say have 120 crore problems, no issue. As long as we are not part of the problem, we become part of the solution. For 120 crore problems, we can find 120 crore solutions, all right! And for that dil mein jalan (dard?) honi chahiye, hain na, compassion hona chahiye ke bhai yeh thik nahi hai isko thik karvana hai. And yeh compassion maine dekha aaj, jaise ke. The team from Kerala learnt that somebody got electrocuted, a young student, and they said no, this is not proper. And therefore they have developed a comprehensive system which will prevent such accidents. Why? Because they could not see somebody young dying like that and they wanted a solution. We have all read about Nirbhaya, 120 crore hearts bled knowing whatever happened to that little innocent girl in Delhi. And here is a team, Manisha and her colleagues, they said no, this is not done and they went ahead to see what technology can do. They created something, where somebody with ill-intentions, if he touches a woman, he can get electrocuted.

That's what makes me very optimistic about India. People are looking at the blind and they say how can I help, people are looking at the deaf and they're saying how can I help them. These are the kind of innovations that we saw. They do not want to be a part of the problem, they want to be a part of the solution. I think that's a tremendous message all across. What we see today at this exhibition is an exemplar as far as all of India is concerned, on how India can raise itself to a completely different level.

These awards are very special; some of them are called MLM awards, More-from-Less-for-More. Let me explain to you the logic behind it. People always say as technology advances, you create more and more divide between the haves and the have-nots. And why the divide comes? Because the western world has always talked in terms of more from more, right? You get iPhone 5, iPhone 6, iPads, IPods and so on and so forth. You'll have

more and more extensive products, more and more functionalities, more and more features, but more and more money and more profit. And when it came to the poor, we said less for less, right? Arey woh toh gareeb hai, woh kya le sakta hai? What we are trying to do -- that's what I saw in the exhibition -- you are not more from more, you are not less from less, the exhibition is more from less. And if you do more from less, then many people can use it. That is what MLM is -- More from Less for More. That is the genesis of this award, that's Gandhian innovation by the way. Gandhiji wanted the fruits of science to reach the entire society.

Ladies and gentlemen, I want to assure you that MLM is not a message which is just pertinent for India. It's becoming pertinent all over the world. Can you believe it? You know on the 3rd where I'm going to be? Brussels. Why, because the European Union has invited me to speak on MLM, to address the cabinet of the European Commissioner. And on 5th of April, I am addressing 3000 people of a company that is interested in understanding MLM, a leading European company. Why would they be interested? I mean why, we are a poor country. Well it is becoming very clear that the age of affluence is going away and the age of austerity is something they are beginning to understand. And that is why I admire what GE and GE Healthcare is doing. As you heard the GE R&D centre has come up in Bangalore. The journey began when in a national capital laboratory we started partnering with GE. And Jack Welch* was so impressed with what we were able to do. He said if they are so good, why are we not there? That is how that centre actually came up. I was there during the sort of inaugural session. What he said was, in the press conference, that we have the highest intellectual capital per dollar here in India! That is how that laboratory was started. So you represent the highest intellectual capital per dollar. And it is not because you are low cost, no! The kind of value that you create is so high. Don't forget that the latest Intel chip is being designed in Bangalore, not in the US; the latest aero-engine of GE was designed in Bangalore, not in the US. You get the point, so each one of you are capable of that.

If you ask me, for India what is most important is what I saw today. There are three things that I saw. The first was a war on waste. I could see that, everywhere, it could be waste of material, it could be waste of time, it could be waste of this and that, etc, and you are saying "No". The second is extreme efficiency, how can we do things faster and better, and so on and so forth. And third was value maximization,

creating value. And creating value means what: it's not just creating profit. Creating value means creating value for the people. That is something very special about Indian society and Indian innovators. And practically, all the sort of innovations that one saw actually belonged to that category. I want to emphasize something. See innovation as the final key to competitiveness; innovation is the key if we want to create a society which is equitable; finally, innovation can bring both competitiveness as well as equity. And when will it bring equity? It is through MLM, more-from-less-for-more-people, many people not just more-from-less-for-more-profit. In fact, the keyword has to be the environment, and not just profit prosperity, and prosperity for whom? For all.

How do you include more and more people? Let's look at healthcare, the kind of healthcare for all. GE has cared, for example. What are they doing? They have looked at an ECG machine, an Electrocardiogram machine, which costs $10,000, and they have done it for what -- $600. I was in China, and I saw an ultrasound machine, which costs $20,000, and GE have done it for $1500. And so you can very clearly see, at that price point, in villages, everywhere, we can start moving on quality healthcare for all.

And that is why, Jeff Immelt, the current GE chief, talks about reverse innovation. The US, Europe did the innovations, and then they looked back at us, and said what can they afford, and then they started knocking down the functionalities. They said, all right, this knocked down product will be for you. Turn that around is what Jeff Immelt is saying. He said, "Now it is the Indias of this world, the Chinas of this world, who are going to be the centres of innovation. This is GE's experience in India, and then the rest of the world is going to say, Can we have it please? With some additional value and additional functionalities. So the whole world is changing.

I like to end by just narrating something that is very close to my heart because I have seen commonalities between all that is happening. I think, you know, as I have often said, innovation is very important, we're celebrating that. You also have to have passion in the belly without which you cannot innovate. What was most impressive as I was going around, I could see the passion in their belly, as people were explaining. But also, there was compassion in that. Innovation, passion and compassion -- and I think that is going to be the hallmark.

We have what is called the Anjani Mashelkar Inclusive Innovation Award that is in my mother's name. We created that. Prof. Anilkumar Gupta chairs that commit-

tee and Miss Elaben Bhatt is a member of that committee. It's a national committee: we select the awards. Why did I create that award? My mother used to say, "If you are poor, there is a challenge; if you are old, there is a challenge; if you're poor and old, there is a huge challenge. If you are poor, old and a woman, only God can save you." So, do something. And, therefore we say, can we look at awards for these people, I mean those who create innovations. You know, this year, the person who got that award was a young boy called Myshkin, you know why he got that? Very interesting. He asked a simple question, he said `I can understand people dying of cancer; I can't understand why they die of anaemia. Because the haemoglobin level, when it goes low, you can't detect it, okay? And by the time it's detected, it's too late. If you detect it in a village, the person has to go to a city, a nearby city to get it detected and then the report comes in three days. So he said, `Why that?' `Needles are invasive,' he said, `why not something non-invasive, put something around the finger and you do it.' Now, nobody has done non-invasive detection of haemoglobin before that. Nobody in the world! It requires extremely sophisticated technology, and he developed that. nd then he said, `why should it cost 200-300-400 rupees. Why not 10 rupees?' Looked impossible, didn't it? He did it. Now that's what got the award. And why did he get the award, because of the compassion he had, because he thought that those people should not die. Today we also saw a similar effort to the non-invasive the blood glucose test, the tests for B-12 and so on and so forth. There has been a commonality between what all these young people are trying to achieve. Isn't that wonderful? . Woh sui lagaane ki zaroorat nahi hai. Kitna phark padta hai.

Last year's award was won by one Shyam Vasudeva, you know what he did? Needless blindness. You have problems of glaucoma, diabetic retina, hain na, cataract and all that. Five tests he does at 1/10th of the cost. But what less from less, more from less, it's as sophisticated as anything in the world. But 1/10th, 10 per cent. But that's not why he got the award. You know why he got the award? Very interesting. He went to the slums, and found that nobody from the slum would come for testing. You know why? Because when you go there, you know you put that eye drop, and then what happens? For 3 to 4 hours, you are fuzzy. Now you can't work on that day and if you can't work your daily wage is gone, your children might go hungry. So he said, `Why do I have to put that drop at all." And he created something using infrared, and a very sophisticated sensor which by the way costs just 1/10th. This was ex-

hibited in Delhi, and at that time, Vilasrao Deshmukh, the minister of Science and Technology, was alive. And I have a photograph where Vilasrao Deshmukh is showing that to Hillary Clinton, and you know what Hillary Clinton said? "You have this, you have developed this, you're way ahead of us. We don't have it. Can we have this Indian product in America." Hillary Clinton said this!

And then he (the innovator) said, `Of course, but it would need to be approved.' And then she said, "I will work with you." Actually, they're working now in order to move it. What is the point I'm trying to make. You have this wrong impression, that everything is going to be designed and developed there, okay? And then it is going to come here. Sorry, no. Look at what you have developed today. Many of the products you have today have the potential of becoming global products, provided, of course, the `innovation ecosystem' actually gets established. Because but for the power of innovation, ideas will remain ideas, until they move finally as marketable products. And that's a tough journey, and we'll help you in moving forward. In fact that's what exactly we have been discussing. We're not just interested in applauding you, taking your photographs, having publications the following day in the media that we have done it, and then forget about it till the next year. No, that is not the issue.

The issue is that we'll walk with you, okay. To make sure, that you become leaders in innovation. As one gets older, you know, there is a cliché, they say, you must not just add years to your life, you must add life to your years. As a 70-year-old man I can say I've added life to my years today. Thank you very much.

Speech at 2014 GYTI Awards Ceremony : Affordable Excellence

I want to warmly congratulate all the winners today but also the winners of the last year and the year before last. When I was going around (GYTI exhibition) today, I was feeling amazed at the quality of mind that our young children and students have. What touched me most was that these innovations were not just about making the next supercar or next superbike or super-plane: They were about making the life of every Indian, not some, a bit better. That means you're thinking not just from your head but from your heart. That's something very special. I travel quite a bit -- I was in Europe three times in the last 20 days. And the image outside India, unfortunately, is that of a 'jugaad India'. And I simply do not like this. Why?Jugaad is getting less from less for lesser people, getting it somehow,

reducing the cost, and with no consideration for safety. That's not My India. My India is what I saw outside (exhibition). My India is one that is a leader in affordable excellence. Now, some might say, that is a contradiction, because what is affordable cannot be excellent and what's excellent can't be affordable. I'm sorry, they have got it wrong. India has shown that it can make this seemingly impossible, possible, again and again.

By using the latest cutting-edge technology, you're not doing jugaad, putting something together somehow.You're creating world-class excellence. Let me go through some of the examples. Compliance is a big problem in the treatment of TB. One of the solutions on display was just about solving that problem. Diagnostics is another area, where India faces huge challenges. Electronics based diagnostics sometimes can be a big problem. When something goes wrong, someone has to repair it, and there's often no one to repair it. So why not paper based diagnostics, no electronics? Take the case of the fuel cell -- the whole world is talking about alternative designs -- and so a paper-based fuel cell. You look at, for example, a very low-cost solution to detect whether you have pneumonia, and what does it cost? You look at breast cancer through a new design of diagnostics based on photonics. Visually impaired -- you are concerned about those who cannot see and you created an Email system for them. You're concerned about safety and security, whether it is helmet based design, or stampede-based image analysis; whether it is -- I particularly loved this point -- giving all the gadgets to women to make sure we don't have another unfortunate Nirbhaya, who was a victim of an unimaginable brutality in New Delhi last year. So what you are trying to do is, think from the point of view of those who are have-nots, those disabled, those for whom something needs to be done under great adversity, and you are creating products for them. To me, this was the highlight of what I saw. And I, therefore, feel a very happy man today.

You know, we always read in newspapers all the bad news: 'India is gone, this and that is happening.' Somebody will take the World Innovation Index and say, 'last year, we were 62 and now we are 64.' Those people, who take the index seriously, should come here and see what is being done. I say this, and we always said this: How Prof. Anil Gupta could conceive this idea of Honey Bee? And you're right, Anil, if Honey Bee Network was not there, National innovation Foundation would not be there. If HBN was not there, an evening like this would not be there. That's why I say, India does not have 1.2 billion mouths

but 1.2 billion minds. And, it is incredible, when you see their manifestation. You suddenly find them doing innovations of an incredible nature!

Look at Yerwada Jail in Pune, which has about 3600 inmates. They have to make around 10000 chapathis or rotis for lunch and the same number for dinner. They apparently had a dough-making machine. A convicted inmate was very innovative, saw the process in practice then and he was not happy: the machine wasn't working well, it was not mixing dough well and the quality of rotis was not good. With his innovation, the quality and speed improved. You know, I used to talk so much about the importance of Indians patenting their inventions, that people used to refer to me as 'patentkar', rather than as 'Mashelkar'. This had been known to these inmates also. So they went to the Superintendent and said some Mashelkar talks about patenting, whenever we have a new idea. So we want to patent this. Can we take a patent on this?' I am told that a Pune patent attorney Mr Ponkshe, who is no more, helped them! A jail inmate innovating, can one imagine!

We must understand that innovation is about thinking differently, doing things differently for making a difference. The first part you have done, you have demonstrated what you can do. But the story is not complete. Has it made a difference? And that difference, we have to help them make together.Finally, at the end of the day, what you have designed for the TB and pneumonia patients etc., has to finally reach them. And that is where we require a robust, a conducive national innovation ecosystem. An idea is like a seed. But you don't eat seeds. You eat the fruit. How does one go from seed to fruit?The seed has to be put in fertile soil so it can germinate, you have to give inputs like water, and fertilizer. Finally, it has to grow into a tree. It's a long journey -- the mind to marketplace. And, therefore, what we did today is the first step. And for making a difference, finally, we all will have to help you. And we promise that every possible help will be given in every possible way by us with the kind of organization connections and network we have.

Let me come back to the image we have of India. In the past, a meeting was organized abroad on a new report called 'Reimagining India'. I have written this book Reinventing India. So I said the challenge is not 'reimagining' but 'reimaging India'. Why, because the kind of image we have outside is that of a 'jugaad nation, a corrupt nation', among others. Is this kind of image fair? When one sees the ground reality, as I saw today, one finds plenty of an innovative India, who is a leader in cre-

ating inventions that belong to the unique class of affordable excellence.

Recently I was in Brussels, where they had asked me to give a talk on 'Innovation under Adversity.' And what I am particularly proud of, is that they began the session with the video of one of our award winners, Remya, who had developed that pedal-driven washing machine, which Discovery Channel had made video on. And when I finished my talk, they ended it with the 'Bicycle on Water' by Saidullah yet another of our award winners. Can you imagine 1200 people in the audience from all over the world in that Innovation Forum 2014 looking at these two films as inspiration for them on how to 'Innovate under Adversity?' What can be a greater tribute to Indian ingenuity?

One of the questions asked at the end of my talk was: how could our experience help EU member nations. I referred to our eternal belief in 'VasudhaivaKutumbakam'. We yearn for improvement in quality of life not just for some of us who are sitting here but for all Indians, not for some Indians but all Indians and not just for all Indians but the whole world. Therefore, the innovations that I saw today are directed towards making India do well, not some Indians do well. I think that is extraordinarily important.

I would like to end by reiterating three core issues: affordability, sustainability and quality. Every innovation that we do must meet these benchmarks, because we don't want anything that's substandard, not sustainable, or destroys the environment and ecological balance. And 'affordability' because it has to be good for all, not good for some. Take this message home and ensure that everything you do in life should be directed to this.

My last point, I am often referred to as 'a dangerous optimist'. Now I am 71, and I am getting little worried. I can see India progressing. I can see India is going to make it. I can see 30 years from now what India will be, and I feel sorry I would not be there. So I was saying I would like to negotiate with the God that he can take away whatever days I have been left with, but give me one day after 30 years, when I can come back for just one day and see My India. But, by the way, this deal with the God is now off because you have added so much life and so many years to my life today, that I don't have to do that now!

God Bless You.

Honey Bee Network

Honey Bee Network, a new social movement pioneered open innovation culture much before the term became popular. For the last twenty five years, it has been at vanguard of protecting the knowledge, and resources rights of knowledge rich-economically poor people. It aims at i) cross-pollination of ideas, promoting lateral learning among creative individuals and communities, ii) overcoming anonymity of the grassroots innovators and other knowledge holders, ensuring that whatever is done with their knowledge is shared with them in local language and iv) if any profit or income is generated using their knowledge, a fair and just share should go back to the people. It has been promoting creativity and green grassroots genius in over 75 countries. It has facilitated documentation of over two lakh ideas, innovations and traditional practices besides student projects through volunteers. Honey bee Network has incubated a series of institutions to support green grassroots innovators and others. It has given birth to SRISTI in 1993, GIAN in 1997, NIF in 2000 and inspired many national and international innovation policies. It is a global platform where like-minded individuals, innovators, farmers, academicians, policy makers, entrepreneurs and non-governmental organizations (NGOs) come together to respect, recognise and reward grassroots innovations. Various volunteers associated with the network help in scouting innovators, supporting them, mentoring them and provide help in disseminating the innovations as well.

The key areas of engagement are...

1. Scouting, spawning, and supporting innovations and outstanding traditional knowledge at grassroots. It links formal and informal science, tries to validate and add value in sustainable innovative technologies, promotes creativity among children, and also pursues learning from grandparents particularly centenarians about viable and green traditional knowledge.

2. Promoting innovations and creativity among grassroots farm and non-farm workers, communities and women's groups engaged with culture, folk art, school and college technical education, institutions (particularly common properties or community managed) for conservation of biodiversity and natural resources.

3. Mentoring individual innovators in various sectors and linking them with each other and informal sector innovators.

4. Lobbying for policy and institutional changes in support of grassroots creativity and innovations at regional, national and international level.

5. Supporting knowledge and intellectual property rights of economically poor people, young inventors and encouraging them to share their knowledge with other self-employed people as a part of Technology Commons. The transfer of people's knowledge to Firms is facilitated on fair and just licensing terms with benefit sharing.

6. Linking innovators with formal R & D institutions, market & communication institutions and networks, media etc., so that more and more people are inspired to find solutions to problems with which our society has been living with, for long, unfortunately.

7. Supporting National Innovation Foundation (www.nifindia.org) which is part of Department of science and technology now and helps take HBN goals to much larger level but focuses only on technological innovations at grassroots and among school children. The SRISTI www.sristi.org and GIAN www.gian.org provide institutional support to the Network along with other volunteers.

8. HBN is mainly a voluntary movement supported by large number of volunteers. It has a very strong network in China (CHIN -TUFE President and SRISTI have signed an agreement).

9. Linking technology students with small industry entrepreneurs and informal sector through Techpeida.in and facilitating Gandhian young tech innovation awards by SRISTI .

10. Creating world's largest open access pool of sustainable solutions developed by people without outside help, accessible to communities worldwide.

11. Bringing out Honey Bee Newsletter, unique voice of creative and innovative people at grassroots in different languages.

12. Motivating commercial organizations and public systems to become more empathetic in providing extremely affordable service and products to common people

SRISTI

Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI), which means creation, was born in 1993, essentially to support the activities of the Honey Bee Network to recognize, respect and reward creativity at the grassroots. The objectives were: systematic documentation, dissemination of, and value addition in grassroots green innovations, providing them intellectual property rights protection and risk capital support besides helping in the in situ and ex situ conservation of local biodiversity and associated knowledge system. SRISTI is devoted to empowering the knowledge rich but economically poor people by adding value in their contemporary creativity as well as traditional knowledge. Linking formal and informal science was one of the major objectives. It has helped to establish GIAN, NIF, MVIF and AASTIIK in support of innovators and their innovations. SRISTI created the Honey Bee database of innovations, and supports the publication of the Network's newsletter in nine languages. These are in: English (Honeybee), Gujarati (Loksarvani), Hindi (Sujh-Bujh, Aas Paas Ki), Tamil (Nam Vazhi Velanmai), Kannada (Hittalagida), Telugu (Palle Srujana), Malayalam (Ini Karshakan Samsarikkatte), Oriya (Aama Akha Pakha) and Marathi (Mrudgandh).

SRISTI is now focusing in more concerted ways on hitherto neglected domains like women's knowledge systems, value addition through a Sadbhav SRISTI Sanshodhan Natural Product Laboratory (SSSNPL) and innovations in Education, Culture and Institutions. However, ethical fulcrum of its activities can be captured by eight E's (Ethics, empathy, equity, efficiency, excellence, environment, education and enterprise) – the values that are central to the existence of Honey Bee Network. SRISTI organises Shodh Yatra (Journey of Exploration) twice a year, Traditional food festival, Recipe competition, Biodiversity competition and maintains the database of Innovations and Traditional Knowledge. SRISTI has been advocating since more than two decades for protecting knowledge right of creative communities and individuals. SRISTI had organised several consultative sessions with the private sector, scientists, activists and development workers for discussing various issues related to the access to bio-diversity and associated knowledge rights. It has also organised worldwide contest for scouting and rewarding innovations at Grassroots with IFAD, Rome. Techpedia.in, another initiative of SRISTI, aims at putting the problems of micro, small and medium enterprises, informal sector, grassroots innovators and other social sectors on the agenda of the young technology students

across the country. SRISTI is providing a platform for the industry and academic institutions to collaborate co-create and foster distributed innovations and promote horizontal learning and sharing. To promote a culture of innovation among the young minds of the country, SRISTI has established three categories of national awards for innovative student/ faculty projects in engineering, pharmacy, biotechnology, basic science and other applied technologies in the form of Gandhian Young Technological Innovation Award (GYTI) since 2012. SRISTI Samman is given periodically to outstanding social change agents.SRISTI has created Social Innovation Fund (SIF) to support young innovators at early stage. SRISTI is trying to build an online Sanctuary of social, technological and institutional Innovations through blend of open innovation, collaborative design, crowd-funding, incubation, e-commerce and challenge awards. Volunteers and collaborators are invited.

National Innovation Foundation-India

Towards a creative, compassionate and collaborative India

The National Innovation Foundation – India (NIF) set up in 2000 by the Department of Science and Technology, building upon the Honey Bee philosophy, has taken major initiatives to serve the knowledge rich, economically poor people of the country. It is committed to making India innovative by documenting, adding value, protecting the intellectual property rights of the contemporary unaided technological innovations, as well as of outstanding traditional knowledge holders on a commercial as well as non-commercial basis.

With major contribution from the Honey Bee Network, NIF has been able to build up a database of more than 1, 85,000 technological ideas, innovations and traditional knowledge practices (not all unique, not all distinct) from over 555 districts of the country. NIF has till date recognised more than 600 grassroots innovators and school students at the national level in its various award functions. Through the collaborations with various R&D and academic institutions, Agricultural and Veterinary Universities and others, NIF has helped in getting thousands of grassroots technologies validated and value added. It has also set up a Fabrication Laboratory (Fab Lab) with the help of MIT, Boston, for product development apart from strengthening in-house research and development facilities for the initial validation of herbal technologies. Pro bono arrangement with patent firms has helped NIF to file over 650 patents (including eight filed in USA and twenty seven PCT applications) on behalf of the innovators and outstanding traditional knowledge holders of which thirty six patents have been granted in India and five in the USA. It has also filed applications for twenty one farmer's developed plant varieties at the PPV&FR Authority. Micro Venture Innovation Fund (MVIF) at NIF with the support of SIDBI has provided risk capital of over Rs 3.2 crores to 187 projects, which are at different stages of incubation. NIF has received over six hundred product inquiries from around fifty five countries for various technologies, NIF has succeeded in commercialising products across countries, in six continents apart from being successful in materialising seventy cases of technology licensing to eighty licensees with the help of partner agencies. NIF has proved that Indian innovators can match anyone in the world when it comes to solving problems creatively, where they perform better than rest is in generating greater sustainable alternatives by using local resources frugally. The Grassroots to Global (G2G) model that NIF is propagating is all set to change the way the world looks at the creativity and innovations at grassroots.

1 The Honeybee collects pollen from the

flowers and in the process links one flower to another enabling cross-pollination. Similarly, the Honey Bee Network strengthens people-to-people contacts, learning and networking by pooling the solutions developed by individuals across the world in different sectors and sharing in local language. The network acknowledges the innovators, knowledge producers and communicators so that they do not remain anonymous. It also tries to ensure that a fair share of benefits arising from commercial exploitation of local knowledge and innovations reaches the innovators and knowledge providers.

Techpedia.in

Techpedia.in, an initiative of SRISTI aims at putting the problems of micro, small and medium enterprises (MSMEs), informal sector, grassroots innovators and other social sectors on the agenda of the young technology students across the country. For over last sixty years, India has not utilized much the technological outputs of millions of students. But this apathy will continue no more. Can a knowledge society really afford to ignore the huge talent distributed in thousands of polytechnics, diploma and degree colleges of engineering, pharmacy, medical science, agriculture etc.? SRISTI is providing a platform for the industry and academic institutions to collaborate co-create and foster distributed and horizontal frugal innovations.

Goals of Techpedia

• Promotion of originality among technology students by making it impossible for them to do what has been done before. This will be possible only when they can find out what has been done before. Techpedia.in already has 1.8 lac technology projects done by about six lac students from more than 600 colleges in India.

• Connecting the technical students with the problems of informal unorganized sector and grassroots innovators. Putting the technical problems of MSMEs on the agenda of students so that affordable solutions can be generated in a real time.

• To harness collaborative potential of students across disciplines and colleges to solve persistent problems of our country in formal and informal sector.

• Explore kho-kho model (relay) of product development. Idea here is that if one student group has brought the solution of a particular problem to a specific stage, then next group within that department or somewhere else should be able to build upon it to take it forward.

• To pose challenges to students to address unsolved problems of our society. Gandhiji had announced an award of 7700 pounds, (approx Rs one lac) to redesign charkha-spinning wheel. Today the value of this prize will be more than Rs 10 crores. Industry association, government and others can offer attractive prizes for solving those problems which have remained unsolved so long.

• Developing high tech capabilities through network platforms so that India becomes a hub for high tech outsourcing for the world

in future and does not serve only the low tech needs.

• Promoting both IPR protected and open source technologies and eventually develop techpedia.in into an online virtual sanctuary of innovations and not just an incubator.

• Creating real-time online NMN (National Mentoring Network) to harness skills, insights and experience of senior tech experts for mentoring young students. Also promote reverse mentoring by young start-ups and students.

• Encourage some of the innovations through SRISTI Social Innovation Fund set up recently to promote frugal and extremely affordable socially useful ideas.

• Leverage policy and institutional changes to make innovation eco-system more responsive to societal needs and aspirations of young talent.

• Organise summer schools on address specific social challenges so that young students can try to overcome institutional inertia by coming out with new prototypes for removing child labour, enhance women safety, or supporting autonomy of physically challenged people etc.

• Build global linkages so that collaborative open innovation model pioneered by Honey Bee Network is further diffused among student communities worldwide

• Promote Innovation based entrepreneurship based on technology innovation by young university students.

Impact of GYTI

Since 2009, student innovations in UG, PG and PhD level are being pooled and shared in Techpedia for promoting originality and develop a relay (kho-kho) model of innovation. While more than 50,000 student projects are being pooled and shared at Techpedia web platform there was a need to benchmark the best of them in every year and appreciate them. GYTI 2012 was the 1st attempt to appreciate young innovators at national level and since then 97 teams have been awarded in past 3 years which were held at IIM-Ahmedabad. During GYTI 15 another set of 43 teams are being awarded during Festival of Innovation at Rastrapati Bhavan.

GYTI has not only been a stage to award and exhibit innovations but also the innovators get a thorough handholding at various stages after the coveted national award. We have found that 38% GYTI winners of previous years have got more than one national award after GYTI. Similarly 15% GYTI winners got more than 2 national innovation award, 10% GYTI winners got more than 3 national innovation award and 9% of them received more than 5 national innovation award covering both private and public organisations award. This ensures that GYTI has been an unique platform to scout, recognise and handhold early stage innovations of university students.

It was noticed that 10% of the GYTI winners have attempted start-up based on their innovations by now. During both the editions of Power of Shunya , the innovations shown by ET, more than 60% final teams was of GYTI participants and the winner of the 1st edition of this television program was a GYTI winner of 2013. GYTI winners have bagged award from GE Edison award, 3M CII inclusive innovation award, IMC inclusive innovation award and many more accolades. By now more than 4500 nominations have been received during GYTI applications from more than 200 universities across the nation. GYTI award has fetched the faith of many large scale research and industrial units to leverage the open innovation model for solving challenges and create value.

The award re-emphasize on the fact that a huge portion of creativity and innovations by young students is yet to be tapped and they are critical part of the national innovation system. Realising the need of the hour and looking at the innovation potential of awardees BIRAC has decided to give BIRAC-SRISTI GYTI award 2015 to selected 5 innovations worth of Rs 15 lac each to take them to next stage. While reviewing the nominations, the involvement of best minds from world class universities and MNCs not only boosted the motivation of participants but the entire

ecosystem has been rejuvenated.

We hope many more collaborations and policy interventions will create a fostering environment for young innovators in day's to come. The early trigger by GYTI award towards this cause will be inspiring.

Social Innovation Fund (SIF)

Social open innovations are needed to fill the gaps by enabling disadvantaged communities to trigger samvedana and youth to experiment, innovate and find entrepreneurial solutions. While micro-finance has been well known and established as a tool for bringing about a change in grassroots entrepreneurial environment, Micro venture finance is yet to be recognised as a viable and effective tool for promoting innovation-based enterprises. Micro-finance is for products for which markets exist, but micro venture finance is for goods and services for which market is yet to be created. When we have to create social markets and not just economic markets, we may have to go beyond MVIF (Micro Venture Innovation Fund) and move into Finance for Open Inclusive Social Innovations Program (FOISIP).Young innovators face crucial challenge while taking their innovation forward in the pre prototype stage. No funding mechanism in the nation really caters the needs of this scale and need at this point of time. Social Innovation Fund (SIF) is an effort towards helping socially relevant innovations to take their idea to next stage. The main objective of the program would be to provide mentoring, financial support, fabrication, validation, and value addition facilities in labs, fields, and R and D Institutions, part of HBN, for nurturing creativity in culture, education, technology and governance.

SRISTI will be hosting the program through support of volunteers from IIM-Ahmedabad, NIF, GIAN and other like-minded institutions. It will be run by young people who would also create new criteria of transparency, critical but empathetic evaluation and accountability. Program Advisory Body would include experts from academia, successful entrepreneurs and investors. The partnering institutions can also play an active role in implementation as per their expertise and core capabilities. They can contribute in terms of funding, mentoring support, human resources and other support as required to fulfil the main objective of the program.

The program would be implemented in three stages for most of its grantees unless there is an exemption, a decision for which would be taken by Program Advisory Body.

- The first stage would involve providing seed fund to the grantee. This would be aimed at creating a pool of innovation products, services and art forms.

- The second stage would involve converting these products, services and art forms into enterprises either by supporting the founder members or by inviting outside entrepreneurs to take forward the business.

• In the third and final stage of this program, the enterprises established would be pitched to a group of angel investors or growth funds.

Though the core strategy would be to provide monetary support, the program would also involve mentoring support to all its grantees. This support would be critical especially in the first stage of the program, where lot of hand holding support would be required for the grantees.

The project aims to attract Rs. 5 crore to be utilised for the objectives outlined. Currently, around Rs. 20 – 25 lakhs have already being raised in form of commitments to be honoured when project launches. The first phase of the project is estimated to last for three years. The estimated size and project time frame is indicative and are subject to revision by the Program Advisory Body in consultation with Secretary, SRISTI. The mandate of the project is maximizing social impact through supporting as many creative minds in the field of culture, education, technology and governance as possible.

The program would nurture real unmet needs of our society where young people would have opportunities to test out their ideas and also to fail and test them again.

National Innovation Club

During the current decade of innovation, Hon'ble President, Shri. Pranabh Mukherjee has exhorted the academia to set up National Innovation Clubs in every university and college. These clubs will promote inclusive innovations by linking the creativity in formal and informal sector. Primarily, the clubs will aim at four functions: [a] search, [b] spread, [c] sense and [d] celebrate.

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http://presidentofindia.nic.in/sp070313-1.html

Hon'ble President of India asked central university Vice-chancellors to set up National Innovation Club at their respective universities.

http://presidentofindia.nic.in/pr070213.html

Search

Unless young students go out into the field, villages, urban workshops, slums and other MSME clusters to find out innovations by common people as well as others, they would not know the creative potential that already exists in our country. They can mobilise ideas from school children, college students, roadside mechanics, farmers, artisans, homemakers and others for solving various problems or improving the quality of life through incremental innovations. Every time a hidden innovation is brought to surface, many more people feel encouraged and may start trying to solve problems through their own genius. If every college and university starts mapping creativity in its hinterland, the whole society will bristle with positive energy and unleash tremendous dynamism in the economy.

The innovations in different fields such as technology, education, institutions, public services, private enterprises, cultural creativity, governance at different levels, etc., will be documented first in a synoptic way and then detailed documentation will be taken up of the more significant ideas. In different courses, these ideas and their documentation can be incorporated as a part of curriculum. The social, cultural, ecological, industrial and institutional connect are extremely important for overcoming possible alienation of people in certain areas.

Spread

Diffusion of existing innovations whether sourced from Honey Bee Network and National Innovation Foundation [NIF] or other depositories have to be shared with the local communities in a systematic manner through various creative pedagogies and performances. In fact, searching innovations without sharing may neither appear very credible nor even ethical. In the process of sharing, the students and faculty will themselves become aware of how creative our country is and how limited is the support extended to these people/communities by the formal sector including academia. Such a realization will do more to trigger introspection and generate empathetic culture for blending ideas from formal and informal sector. The students can organize exhibitions, have street theatre performances or follow other means of creating awareness about innovations in the nearby villages, schools, communities, clusters of industry, government departments, etc.

Sense

There are a lot of problems in our society which have remained unsolved for long. Unless we benchmark the persistent problems and try to address them within the means available, we may develop an attitude of living with them indefinitely. Such an attitude will never let our society progress in the long term. Idea here is that students from different discipline should benchmark unsolved problems or challenges in different sectors, at various scales affecting numerous social groups. In technology institutions, third year students can go to both MSME clusters and units and informal rural and urban sector and benchmark the problems to be addressed. They can be given credit for identifying the problem and writing a synopsis on it. In the final year, they can take up projects to address these problems in one or two terms. Accordingly, they canget credit for that too. Practical examples of such a process are

given at www.techpedia.in. The innovative solutions can be given prizes at university level and also at national level through competitions like Gandhian Young Technological Awards [techpedia.in/award]. In social sciences, one can identify gender and other cultural problems and address them likewise through action research approach. Language related students can help improve the linguistic skills of school children and develop innovative pedagogies. If every student develops one lesson for any one topic and for any class, a huge repository of open source local language lessons for school children can be developed to overcome the asymmetry in access to basic education. Different challenges can be sensed and responded.

Celebrate

During the interactions with different social and institutional segments, a lot of outstanding achievers will be identified in the hinterland. There may be an outstanding doctor who may have contributed in a big way for making the communities almost disease free or a teacher who has created a very rich learning environment in a school or an innovator who has solved a problem or a public or private functionary who has created public goods for larger social development. There may also be outstanding artists, writers or other change agents who need to be invited in the universities to inspire students and create an insatiable desire to excel and serve society.

National Innovation Clubs can be coordinated by the students under the oversight of empathetic faculty members. Students should have as much flexibility and freedom as possible. They should organize interactions with the innovators in different fields and try to add value where possible, help in diffusion, create markets, provide linkages with other innovators and stakeholders and forge a knowledge network around innovations. They should not remain restricted only with local innovations. They should also mobilise ideas from outside for local development and vice versa. If a few sessions can be organized in different courses to rigorously analyse the heuristics, triggers, motivations, outcomes and ecosystem characteristics, more and more students may feel encouraged to take risk and try new ideas.

NIF will support the value chain development in the case of innovations from informal sector and by school children. The mandate of NIF is restricted to support ideas, innovations and outstanding traditional knowledge practices from

the unorganized sector by individuals or communities who have not received any professional training or support. The educational, cultural, institutional and other governance related innovations will be pooled by Society for Research and Initiatives for Technologies and Institutions [sristi.org] and linked to various other programmes. In due course, support may be mobilised to give traction to these ideas. At present, the major contribution will be to give voice and visibility to the innovative ideas in various sectors.

Volunteers from among faculty, staff and students will hopefully join hands with the innovators at different levels and in different sectors to ensure widest application for creative and compassionate ideas. Collaborative culture is likely to emerge when learning across formal and informal boundaries get reinforced.

During the visit of the Hon'ble President, such clubs can be inaugurated and the team of volunteers can be blessed by the President so as to motivate them to excel in search, spread, sense and celebrate the creativity and innovation in our country.

List of GYTI Awardees 2012-2014

GYTI Awardees 2014

Project title	Student Team Leader	Institute Name
'Paper-and-pencil' microfluidic device for point-of-care diagnostics	Ranabirdey	Indian Institute Of Technology Kharagpur
Cost effective vegetable chiller for rural small farmers	Vishnu Padmanaban	Amrita School Of Engineering - Coimbatore
Parichaya - a low-cost medical device to increase adherence among tuberculosis patients in rural assam	Himanshu Seth	Indian Institute Of Technology (Iit) – Guwahati
Adsorptive removal of phenolic compounds using mixed matrix membrane of cellulose acetate pthalate and alumina nanoparticle	Raka Mukherjee	Indian Institute Of Technology, Kharagpur
Touchpad for malignant tumour (epithelial) detection and imaging	Sritamparashar Rout	Indian Institute Of Technology, Bhu

A low cost cardiovascular diagnostic instrument for rural healthcare	Pradipgatkine	Indian Institute Of Technology, Bombay
Open source e-mailing system for the visually impaired	Aakash Anuj	Indian Institute Of Technology, Kharagpur
A transceiver for satellite based communication during emergency using tv white spaces	Rajan Kapoor	Indian Institute Of Technology Patna
Concept of β breaker dipeptides and its application in alzheimer's amyloid disruption	Nadimpally Krishna Chaitanya	Indian Institute Of Technology Guwahati
Synthesis and design of indigenous polycentric knee for transfemoral prosthesis	Anand Ts	Indian Institute Of Technology Madras
Microwave coplanar sensor system for detecting contamination in food products	Makkattaryshaji	Indian Institute Of Technology Kanpur
Fabrication of organic thin film transistor using single drops of organic or hybrid insulator, conductor and semiconductor materials.	Gundamanideep	Indian Institute Of Technology,Kanpur

Low-cost diagnosis of pneumonia	Abhishekkhanolkar	Indian Institute Of Technology Madras
Inhalable multiparticulate carrier systems for sustained and targeted delivery of isoniazid	Dr. Sanjay Tiwari	Department Of Pharmaceutics, Indian Institute Of Technology, Banaras Hindu University, Varanasi; India (221005)
Voice activated safety app	Mithila Harish	Vellore Institute Of Technology, Vellore
Android application for women safety	Akhil Aggarwal	Indian Institute Of Technology Delhi
Novel algal bioreactor for wastewater treatment and biofuel (lipid) production	Durgamadhabmahapatra	Indian Institute Of Science, Bangalore
Microfluidic immunosensor	Ramchander Chepyala	Indian Institute Of Technology Kanpur
Caremother-mobile pregnancy care	Shantanu Pathak	Science For Society
A simple and cost effective retrofitting to improve the thermal and combustion performance of traditional cookstoves	Vijay Hanmanthonkalaskar	Centre For Technology Alternatives For Rural Areas, Indian Institute Of Technology Bombay

Jaivik prakash (biophotonics): a simple tool for detection of hazardous materials and sanitary condition at rural level	Rajeev Ranjan	Csir-Central Food Technological Research Institute
Injectable silk fibroin hydrogel for tissue engineering and drug delivery	Surojeet Das	Indian Institute Of Technology Guwahati (iitg)
Development and pilot testing of nano-sized tio2 based photocatalytic oxidation technology for controlling vocs	Indramanidhada	Indian Institute Of Technology Kanpur
Laser technology detects hidden materials: applications to security and medicine	Sanchitasil	Indian Institute Of Science
Highly stable metallic nanoparticle-semiconductor heterostructures via click chemistry for photoelectro/photocatalytic applications	Arun Prakash Upadhyay	Indian Institute Of Technology Kanpur
Ultra-high actuation in a carbon nanotube actuator	Prarthanagowda	Iisc
Wireless communication and security system embedded saftey helmet	Sivagurunathapandian.M	Easwari Engineering College

Amsler grid test android app	Nagarjunpola	Indian Institute Of Technology Guwahati, R V College Of Engineering Bangalore, National Institute Of Design Bangalore
3d Model Generation From 2d X-Ray Images	Vikasdhruwdaskarade	Indian Institute Of Technology – Bombay
Fabrication of stable liquid crystal based biosensor	Arun Prakash Upadhyay	Indian Institute Of Technology Kanpur
Biomimicked polymer surfaces exhibiting superhydrophobic and anti-reflective properties	Srinadh Mattaparthi	Indian Institute Of Technology Hyderabad
Development of microbial fuel cells with improved performance	Jayeshmanoharsonawane	Indian Institute Of Technology Bomb
Integrated circuit (ic)-based flexible electronic devices and displays (icfedd)	Prakash Kodali	Indian Institute Of Science, Bangalore
Macrophage-specific targeting of mannose-functionalized biodegradable polymeric nanoparticles of some anti-leishmanial drugs-development, characterization and efficacy evaluation	Pramilachaubey	Department Of Pharmaceutics, Indian Institute Of Technology (Banaras Hindu University), Varanasi, Uttar Pradesh

Paper-pencil based self pumping and self breathing fuel cell	Ravi Kumar Arun	Csir-Central Mechanical Engineering Research Institute, Durgapur
Development and evaluation of women friendly vaginal in situ hydrogel for sperm immobilisation.	Dr.Vaishalit.Thakkar	Anand Pharmacy College
Laser light based fully computerized automated breast cancer and muscle screening system development	Samir Kumar Biswas	Indian Institute Of Science
Identification of safest path using crime records	Puneet Singh	Indian Institute Of Technology Kanpur
Performance enhancement of microthruster using nano-engineered mems structure for long term space mission	Pijuskundu	Indian Institute Of Technology, Kharagpur
Stampede control using image analysis technology	S.Vidya Sagar	Kongu Engineering College

GYTI Awardees 2013

Project Title	Name	University
Laser Ignited Internal Combustion Engine	Kewaldharamshi	Iit Kanpur
Ultra Low Cost Tunable Nano Scale Patterns	Nandinibhandaru	Iit Kharagpur
Design Of A Smart Automotive Ventilation System For Parked Vehicles	Gaurav Kumar Jaiswal,Mohitgandhi,Sanketphalgaonkar,Harshalupadhyay,Ankit Agrawal	Vit University, Vellore
Graphics Model For Power Systems And Design Of Online Web-Based Virtual Scada System For Visual Power Grid And Future Control Centers	Gelleravikumar	Indian Institute Of Technology, Bombay
Development And In Vivo Evaluation Of Novel Cross Linked Hydrogel Containing Anti Microbial Drug For Severe Burns Wound	Mr Chakavalasoyebrafikbhai,Ms. Vaishali Thakkar	Gujarat Technological University
Dredger	Amit Dinanathmaurya,Digvijaymaheshwari	Iit Bombay

Reactor & Catalyst Development For Oxygen Evolving Step In Sulfur-Iodine Cycle For Hydrogen Production.	Kishorkondamudi	Iit Delhi
Title: Saralparikshan - An Advancement In Cutting Edge Technology For Rural Area To Detect Vitamin B12 For Pernicious Anemia. Subtitle: A Visual Nano-Aptamerbiosensing Molecular Pro	L. Sagayaselvakumar	Mysore University
Re- Arranging Unused Contacts In Mobile Phone For Better Accessibility	Bala Vishnu R,T Kartickkumar,Pgowthamraj,Mmuraliprasnth	Konguvellalar Institute Of Technology Trust
Development Bamboo-Epoxy Nanocomposites For Manufacturing Of Helmets And Other Structural Applications	Vivek Kumar	Iit Delhi
Digital Pen Which Works On Almost Any Surface	Kalpeshwani,Vivekbavisi,Venkat Rao	Vnit, Nagpurvisvesvaraya National Institute Of Technology
Hybrid Classifier For Marine Vessel Based Upon Propulsion Type	Piyush Aggarwal	Jiit Noida

Nanofinishing Of Freeform Surfaces Of Prosthesis Knee Joint Implants	Sidpara Ajay Muljibhai	Iit Kanpur
Target Oriented Niosome Based Delivery Of An Antitubercular Drug, Development And Charecterisation	Gyanendrasingh,A K Srivastava	Banaras Hindu University
Multifunctional Nano-In-Micro Alginate Microspheres For Biosensing, Drug Delivery And Mri	Rashmidilipchoudhari,Abhijeet Joshi	Iit Bombay
Highly Gas Impermeable Elastomeric Rubber-Rubber Blend Nano Composites	Ajesh K Zachariah	Mahatma Gandhi University
A Portable And Efficient Electronic Filter For Sub-Micron Particles From Fluids	Aswathi R Nair	Indian Institute Of Science
Apparatus For Making Silk Fiber Based Lamellar Biomaterials To Solve Problem Of Lower Back Pain	Maumitabhattacharjee	Iit Delhi
Self-Cleaning Functional Molecular Material	M.B.Avinash,T.Govindaraju,Carstenschmuck, Elisabethverheggen	Javaharlal Nehru Center For Advanced Scientific Research

Memory Aid For People With Diability	Devendergoyal,Aditi Srinivasan	Iit Hyderabad
Vision For The Blind Using Ultrasound Sensors	Santosh Kumar Bhandari,Amritapattnaik,Vinodk,Libinvarghese,Pillaisareesh,Shibinjoseph,Adarshs,Chithirajacob,Nithyamerin,Anoop P	Srm
Ambulatory Health Network App	Jayeshvrujlalkhasatiya	Gujarat Technological University
Hydro Operated Square Bottom Paper And Jute Bag Making Machine Also Generate Electricity And Filter Water.	Anirudh Thakur	Punjab Technological University
Sancharak: A Cell-Phone For Blind People	Rohitbharatkumarsingh,Hitarthnarsipatel,Navnathbhimraomane,Tanmayvinayshinde,Rahuldilip Kapoor	Mumbai University
Semi-Automatic Rubber Tapping Machine	G R Malarmannan,S Emmanuel Richards	Anna University

Cowdung Based Microbial Fuel Cells(Cdfc) To Light Up Indian Villages	Vishnu Jayaprakash,Prof. T S Natrajan	University Of California,Berkeley,Usa
Development Of A Geo-Hazard Warning Communication System	Devanjan Bhattacharya	Iit Roorkee
Prognosis Of The Pre-Diabetes And Type 2 Diabetes Based On The Non-Invasive Estimation Of The Blood Glucose Using Infrared Thermography Against The Bio-Marker	Sivanandam S,B Venkatraman,Menkam,Sarath D	Srm University
Saree Cutting Machine For Mat Making Handlooms	Alap K Shirsagar,Abhijitpatil,Vkalpjambhulkar	Iit Bombay
Novel Stand-Alone 1-Phase Ac Generator For Rural Electrification Using Renewable Energy	Sandeep Vuddanti	Iit Delhi
E-Diagnoser: An Advanced Low Cost Patient Monitoring Watch	Libin Varghese	Mahatma Gandhi University
Spectral Eye	Sai Vijay Gole,Saketchoudhary,Yashesh Gaur	Iit Madras
Chetna-Celebrate Your Pregnancy	Keyursorathiya,Amitranjan,Jagriti Kumar	Iit Guwahati

Vajra(Vessel Desk)	Raghunath P Lohar	The Aeronautical Society Of India
She	Manishamohan,Rimpitripathi	Srm University
'Comprehensive Protection From Electrocution'	Ramdas M U,Sonuunnikrishnank,Ashfaqmuhammedt,Shahin T A,Sreelakshmy Suresh And Sruthy	University Of Calicut
The Third Eye	Naveen Kumar Rai	Iit Guwahati
Electronic Support System For Physically Disabled(Deaf & Dumb)	Margie Ashok Joshi,Vishalpatel,Chiragpatel,Jay Patel	Gujarat Technological University
High Performance Cooking Stove (Hpcs)	Mayurrastogi	Iit Kharagpur
Mosquitocidal Endotoxin From Vellore Poultry Farm Wastes	Bishwambharmishra,Abhishek	Vit University, Vellore
Automatic Fish Scaling Machine	M. Rajesh Kanna,C. Mathan,M.V.Krishnamoorthi,Maheshmithilesh	Anna University
Clubfoot Orthosis	Kanwaljit Singh	Iit Delhi

GYTI Awardees 2013

Project Title	Student Team Leader	Institute Name
Incense Stick Maker	Keshav G	Iit Gandhinagar
Automobile Air Conditioning Using Engine Exhaust	Harish Umashankartiwari	Pune University
Domestic Refrigerator Cum Water Heater	Dhruv Patel	Gandhinagar Institute Of Technology
Lpg Refrigerator	Jainil Bhatt	Ldrp, Gandhinagar
Multi Desire Wheelchair	Pratik Gandhi	L. D. College Of Engineering
Jeevandhara- A Handpump Integrated With A Filtration System	Kirtiranjan	Iit Kharagpur
Vardaan	Shanu Sharma	Iit Kanpur

Ultra Sensitive, Low Cost Hand Held Explosive Detector System (E-Nose): Replacement To Sniffer Dog	Neenaavinash Gilda	Iit Bombay
Tiles Measurement And Grade Classifying Equipment	Kothari Dulari	Government Engineering College Rajkot
Design, Synthesis & Evaluation Of Novel Steroidal Aromatase Inhibitors In Breast Cancer	Dr. Prafulla M. Sabale	Parul Institute Of Pharmacy, Vadodara
Innovation In Smart Grids (Improving The Forecasting Capabilities Of The Existing Tools)	V S K Murthy Balijepalli	Iit Bombay
Using Ionospheric Measurements To Design Of Tsunmai Warning System Using Small Satellite Pratham	Jhonnyjha	Iit Bombay
Image And Speech Recognition And Synthesis(Project Hope)	Saurabhsaket	Bcet, Ptu

Gandhian Young Technological Innovation Awards (GYTI) 2016

Techpedia (www.techpedia.in) at SRISTI invites entries for GYTI 2016 in three categories by 31st December 2015. SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions) has established three national awards for innovative student's project in engineering, pharmacy, science and other applied technologies. These awards will be given away by Dr. R. A. Mashelkar, Chairperson, NIF at Rashtrapati Bhavan, New Delhi in March 2016 during Festival of Innovation (FOIN). The awards will be given to young innovators in the following categories:

Gandhian Young Technological Innovation Awards, 2015

- **MLM (More from less for Many) award**
- **Sristi socially relevant technological innovation award**
- **Strategic innovation and /or technological-edge award**

Students project which address an important social, environmental or technological problem faced by masses or disadvantaged people/sectors/spaces or micro and small enterprises, or have the potential to impact a pressing national need are invited. The applications may be made by the past or present students of technical institutions/universities.

On behalf of the students who have already passed out and left the Institute/ University, the faculty member, who supervised the project, can also apply.

A: MLM (More from less for Many) Award: This award will be given to the innovations which use significantly less material/energy to create sustainable solutions. Frugality and creating value for many by using lesser material, energy, and resource could be the key focus while bench-marking such innovations.

B: SRISTI social technological Award: The best student's project which have a demonstrable proof of concept/ prototype having significant amount of novelty and social applications are eligible for this award. Any projects completed in or after

*Techpedia (www.techpedia.in) at **SRISTI** invites entries for these three awards by **31st December 2016***

2013 can be submitted by the students or their faculty supervisors on their behalf.

C: Strategic innovation/technological edge Award: A breakthrough or a significant technological advance in any field of engineering, pharmacy, medical, agricultural, or other disciplines will entitle a student to qualify for this award.

The full project report of the shortlisted projects will be needed for final evaluation. All the shortlisted entries will be displayed by winners at the annual exhibition at Rashtrapati Bhavan in March 2016.The submitted entries will be included in www.Techpedia.in database with due acknowledgement of the name of the team members, supervisor, college, department and any contact information provided. The exhibition will be visited by leading policy makers and practitioners of the country.

The prototype may be retained to be displayed in a permanent exhibition likely to be developed soon at the national level with due acknowledgement of innovators, supervisors and the concerned institution. The nominations have to be submitted at http://gyti.techpedia.in and only abstract of the content submitted along with innovator's detail would be published at the site or shared otherwise, if the student wish to have incubation support, they should clearly indicate the same in their nomination form. Those who are also interested in IPR support, assistance from a network of pro bono attorneys can be mobilised at concessional term.