



Gandhian Young Technological Innovation Awards (GYTI) - 2016
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Gandhian Young Technological Innovation Awards (GYTI)



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Gandhian Young Technological Innovation Awards GYTI (2016)

Introduction

Over the past five years, *techpedia.sristi.org* has pooled over 190,000 titles and summaries/abstracts of engineering projects pursued by over 550,000 students from more than 550 institutions. For over six decades, we did not track this precious resource of knowledge, ideas and innovations by young technical minds. If million-strong tech student community takes up unmet social needs of 650,000 villages, urban slums, small enterprises, public services, local bodies etc., as the subject of their course or final-year projects, the quality of life of the common people can be improved in no time. Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI), institutional backbone of the Honey Bee Network, has been trying to create a knowledge network and inclusive innovation ecosystem to spawn collaborative creativity and innovation. The objectives of this platform are:

To promote originality, the essence of this

kind of database which would have been very difficult to ensure

- To encourage students for taking up socially, industrially and ecologically important challenges to meet the unmet social needs of the society
- To encourage collaborative learning among disciplines, institutions and, the formal and informal sectors
- To link academia and industry so that entrepreneurs, particularly from small and micro industries, grassroots enterprises, women's businesses etc., get technological support through final-year projects of engineering
- To help find market for technologies developed by the students and also encourage them to set up start-ups for economic or social markets
- To use open and reciprocal innovation

platform for challenge awards & distributed innovation management for generating extremely affordable products and services

Through a close cooperation with the Gujarat Technological University (GTU), a unique ecosystem for innovation was developed so that students get credit for identifying the problems in summer and get further academic credit for trying to solve these problems in the final year. The Punjab Technical University (PTU) made it obligatory for students to upload the final-year projects before they can get degrees.

The PTU has also offered 50 fellowships of Rs 25,000 per month to each of the students who set up enterprises after their graduation. During the past three years, more than 30,000 students worked on the problems of more than thousands of medium and small-scale enterprise units in Gujarat.

SRISTI has propagated the idea of National Innovation Club, promoted by the office of the President of India. The Hon'ble President of India has advised that such clubs be set up in central universities, NITs and other institutions. Through this platform, colleges in states will encourage students to search, spread and celebrate innovations, and sense today's unmet social needs. The 'wicked' problems or persistently unsolved social challenges demands special and focused strategies. SRISTI started organising summer school every year to develop solutions to reduce the drudgery of weaker sections of the society.

Initially, it was organised in 2013, with the support of International Labour Organisation (ILO), to develop prototypes to eliminate child labour and/or increase the income of parents and reduce the risk in work. Later, SRISTI

also received support from UNICEF. Five to six prototypes were developed in three weeks each year, besides generating the solutions for Santi (a three-wheeled tiller), to be adopted in the hilly terrain of Kenya, Africa. SRISTI is transferring three grassroots technologies to Kenya, under the "Feed for the Future" initiative of USAID for agricultural purposes by marginal farmers. SRISTI has also linked children creativity camps with summer schools so that wherever feasible, the ideas of children could be worked upon by the college students. Most global indices on innovation neither take into account the grassroots innovations in the informal sector nor look at the ideas of school and college students. Indian leadership in this area is getting widely recognised.

The Gandhian Young Technological Innovation (GYTI) Awards were set up to encourage:

- a) Technologies on the edge
- b) Those having greater social impact

c) MLM (More from Less for Many) i.e frugal solutions

Thanks to hundreds of faculty members in India and abroad, and executives from leading tech companies, we reviewed 2,363 nominations from 276 institutions & universities, belonging to 26 states & two Union Territories in India and selected 19 innovations for award and another 24 for appreciation. We hope all 43 student teams winning the award and appreciation will resolve to work together and make India more innovative and inclusive. Since 2015, under the initiative of BIRAC-SRISTI, 15 GYTI awardees in medical & biotech innovations category are getting a grant of Rs 15 lakhs, to further develop their prototypes/proof of concepts and another 100 students/others, for grassroots innovations. Surat-based Hari Om Ashram has also endowed, in collaboration with NIF, a fund to provide Rs 50,000 each to eight innovators; three named as Dr C T Patel Challenge Award

and five as Dr Amulya K N Reddy GYTI Award.

SRISTI's effort for early-stage incubation facilitation has fostered a start-up ecosystem and has created a sanctuary of innovations

Dr R A Mashelkar, chairperson, NIF and the Chair of the Advisory Committee of AASTIIC and SRISTI, gave away the awards. He inspired the students to make a transition from 'more from less for money' to 'more from less for many'.

The frugal engineering, also called Gandhian engineering, has created worldwide awareness about Indian leadership and potential in this regard. He exhorted the students to build upon each other's ideas to come out with extremely affordable solutions for the masses.

There are many challenges that need to be addressed such as: (a) Providing financial support for extremely early-stage technologies so that these can acquire much more robust form, (b)

Protect intellectual property rights (IPRs) even if some of the technologies have to be kept in open source later, (c) Provide a sanctuary of innovations so that innovation, investment and enterprise can be linked seamlessly and without too many constraints or conditions and (d) Help students set up companies to take their ideas forward in both economic and social markets.

A SRISTI Social Innovation Fund (sif.sristi.org) has been set up with contributions from some of us and other well-wishers, to support extremely early-stage innovations even if the risk is too high. We hope more contributors will join this fund. We are very grateful to all the volunteers, faculty colleagues and above all the young students, for making techpedia.sristi.org a portal of first choice in their journey for making life meaningful and purposeful through projects addressing real problems, developing frugal solutions or pushing the frontiers of technological edge.

We are imperfect, inadequate and poorly

endowed but we have a heart, large enough to assimilate the aspirations and generosity of the students. Let the students be a bit more open, bit more inclusive, and bit more amiable and compassionate towards creativity at grassroots.

We hope all the students, including those who could not get awards, will do all within their power to spread the spirit of inclusive innovation ecosystem through collaboration, compassion and co-creation. Honey Bee Network wishes the winners all the strength in their future endeavor.



Anil K Gupta

Acknowledgement

We are grateful to the Department of Science and Technology, government of India for partially supporting the techpedia.sristi.org initiative at SRISTI. The process of scouting and pooling of ideas, screening and final selection involved a very large number of volunteers within and outside the country. The Honey Bee Network is grateful for their help. Hiranmay Mahanta and team Techpedia (Adish, Dhruvang, Sagar, Arihant, Saugat, Hiral, Janki, Devanshi, Srinivas, Brinda, Krunal Aarti, Siddarth, Chetan, Mansi, Nirali, Sanket and Manoj) ensured that the announcement of GYTI Awards 2016 reached almost all corners of the country. Various student volunteers helped in different regions. An enormous effort was put to get as many entries as possible.

We received 2,363 entries in 50 technology domains from 276 universities & institutes belonging to 26 states & two Union Territories. This year, more emphasis was given on offline review

than online. Hence, a complete PDF file, with all the attachments of respective IDs, was made. With the help of team members and volunteers, entries were sent to the subject matter experts. Team members involved were Hiranmay, Dr Nirmal Sahay, Srinivas, Sagar, Hiral, Janki, Brinda, Keyur, Divisha and Gauri. A centralised evaluation of subject-wise entries was made by SRISTI, NIF and IIM Ahmedabad students' team (PGPX 2015). The members involved from NIF were Rakesh, Ritul, Balakrishnan, Adish, Gowripati, Priyanka and Chirag; from SRISTI were Dr Nirmal Sahay, Hiranmay Mahanta, Dr Amol and Srinivas; and from IIM Ahmedabad were Ruchi Jain, Manish Jain, Prajyot Gandhi, Rohit Nargunde, Richa Aggarwal, Suma Antony, Sumedh Ranadive, Kavya Madireddi, Kaustubh, Agashe and Sanchit Srivastava.

Four rounds of evaluation of the shortlisted entries were undertaken by the experts at Delhi and Ahmedabad. The

experts who participated in the evaluation were Dr S N Naik (IIT Delhi),

Dr Anup Anvikar (National Institute of Malaria Research), Dr Dhanajay Tiwari (DBT), Prof Sushil Jha (JNU), Atul Bhargava (ST Microelectronics), Dr Rajmohan Varambally (ST Microelectronics), Prof P V M Rao (IIT Delhi), Dr Anil Wali (incubator, IIT Delhi), Prof Haris Hirani (IIT Delhi), Prof Dinesh Korjan (IIT Gandhinagar), Prof M N Bhatt (Dean, GTU), Prof S B Soni (Nirma University), Prof Prateek Trivedi (Ahmedabad University), Prof Chetan B Bhatt, (Principal, Government Engineering College, Gandhinagar), Dr C J Shishoo (Ex-Director, PERD Ahmedabad), Prof Kiran Kalia (director, NIPER-G), Dr Kalpen Patel (GCS Medical College, Ahmedabad), Dr Anirban Roy Chodhary, (scientist, IMTech, Chandigarh), Aseem Banerji (DAIICT Gandhinagar), Dr M T Chhabria (principal, LMCP, Ahmedabad),

Dr Prabhat Arora (IIT Delhi), Dr Ravikrishnan E (IIT Delhi), Dr Jonathan Pillai (IIT Delhi), Dr P K S Sarma (BIRAC), Dr Satya Prakash Das (BIRAC), Ankur Gupta (BIRAC), Ramendra S Baoni (ECCO), Prof M R Ravi (IIT Delhi) and Prof Ghanshyam Patel (SKN Agricultural University, Dantiwada).

Further shortlisted entries were sent to specialists, including Prof Ashutosh Bhatia (DAIICT), Prof Anil W Date (IIT Bombay), Prof Biman Mandal (IIT Guwahati), Prof K Sudhakar (IIT Bombay), Prof K V S Hari (IISc Bengaluru), Prof Jhumkee Sengupta Iyengar (IIT Kanpur), Dr Rajamohan Varambally (ST Micro), Prof Santanu Dhara (IIT Kharagpur), Dr Vinod Kuberkar (IIM Ahmedabad), Dr G Uma (NIT Tiruchirapalli), Dr Bairagi Vinayak K (AISSMS-IOIT, Pune), Girish Shastry (GE), Anupam Basu (IIT-K).

In addition to above offline reviewers, some of the online reviewers were Prof S K Shukla (IIT BHU), Prof Chandra Shekhar Sharma (IIT Hyderabad), Prof Ravi Poovaiah (IIT Bombay), Dr Nirmal Sahay

(SRISTI), Prof Venkata Mohan (scientist, CSIR), Prof Sanat Kumar Roy (IIT-K), Prof Manoj K Meshram (IIT BHU), Prof Mukherjee (IIT Kharagpur), Prof Lopamudra Giri (IIT Hyderabad), Prof Soumen Das (IIT Kharagpur), Prof Kartikeyan (IIT Roorkee), Prof Debabrata Sen (IIT Kharagpur), Prof Natarajan (IISc Bengaluru), Prof Partha Roy (IIT-R), Prof Santosh Noronha (IIT Bombay), Prof Govindarajan (IISc Bengaluru), Prof Chakraborty (IIT Kharagpur), Prof Santanu Bandyopadhyay (IIT Bombay), Dr P B Singh Bhadoria (IIT-K), Prof Asit Kumar Chakraborti (NIPER, Ahmedabad), Dr Ipsita Roy (NIPER, Mohali), Dr Pratik N Sheth (BITS, Pilani) and Prof Shyam S Sharma (NIPER, Mohali).

Nilesh and various other information and communication technology (ICT) volunteers ensured that review system for various nominations worked flawlessly to facilitate the smooth process. Experts from industry such as ST Microelectronics, GE and ECCO, joined hands with academics from IITs,

IISc, CSIR, DBT, technical universities. Retired professors and directors helped in reviewing. I must particularly thank Dr P V M Rao and others from IIT Delhi, Mumbai, Guwahati, Kanpur, Hyderabad, Kharagpur, Patna, Madras, etc. The vice chancellors of technical universities, particularly from GTU (Dr Akshai Aggarwal), PTU (Dr Rajneesh Arora) and their teams helped a lot.

Special thanks to Dr Vipin Kumar, director, NIF who helped in reviewing by offering their staff of respective subject area to screen/shortlist the entries. Thanks to IIM Ahmedabad PGPX 2015 batch who sacrificed their consecutive Sundays to review the entries. Colleagues from Wing 13 of IIM Ahmedabad -- Anamika, Pooja, Chintan, Unnibhai and Sushil provided immense support as always. NIF and SRISTI lab have done the Prior Art Search (PAS) of all shortlisted entries to ensure novelty and uniqueness. The members involved were Dr Nirmal, Dr Urja, Dharmendra, Srinivas, Aditya and Abhishek. Thanks to SRISTI team -- Ramesh, Manish, Sumitra, Tejal, Alkaben,

Chetan and Bhoomi who helped at every point during the review process and award ceremony. JSW was one of the sponsors of the award function besides SRISTI. Without their help, the function would not have been possible.

Dr R A Mashelkar, Chairperson, NIF and Chief Patron, SRISTI, Dr K VijayRaghavan, Secretary, DBT and Dr Renu Swarup gave away the awards last year (and will do the honours this year as well). They have inspired and supported the entire techpedia.sristi.org and GYTI movement by the Honey Bee Network.

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Kausik Kapat



Pavan Kumar Srivas

A simple cost-effective titanium foam for skeletal tissue reunion

Kausik Kapat
Indian Institute of Technology, Kharagpur

Guided by:
Prof Santanu Dhara

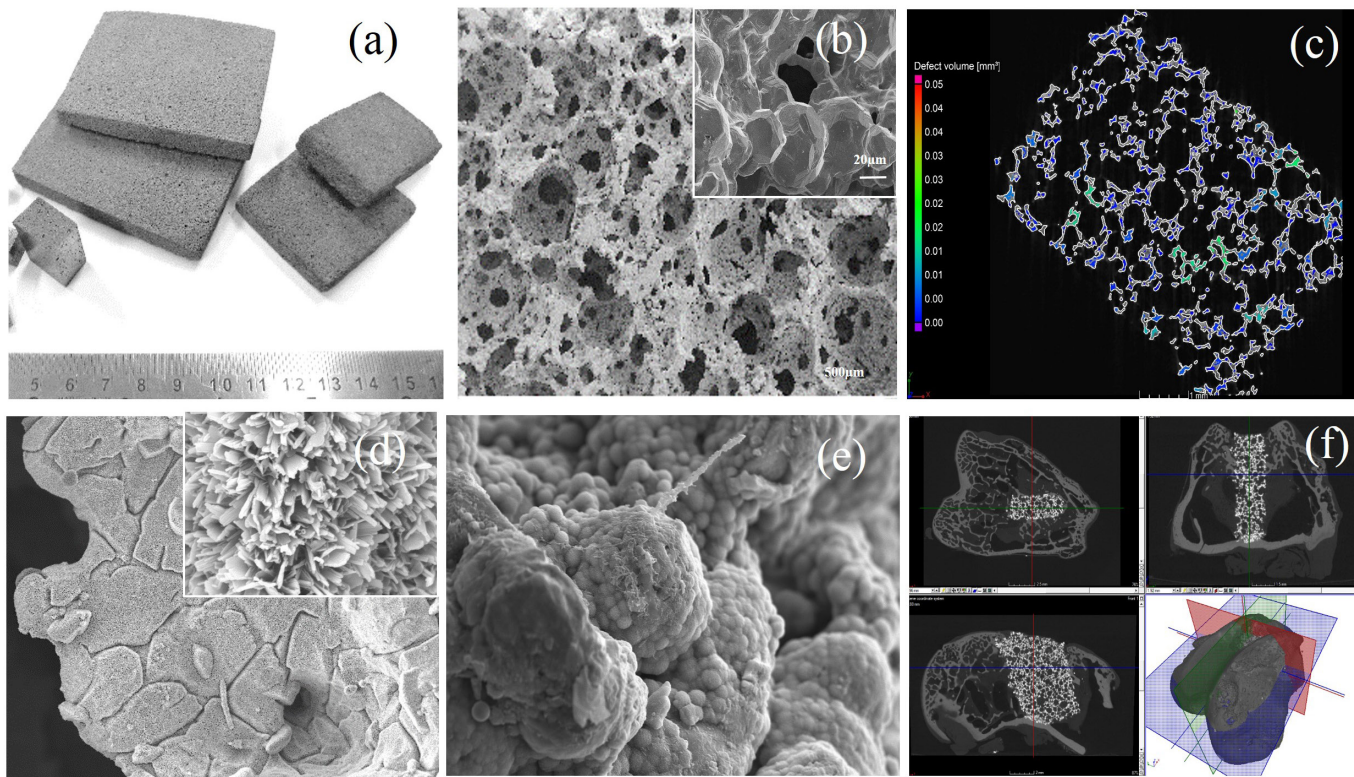
Team members:
Pavan Kumar Srivas

Metallic implants have a routine history of interfacial failure due to modulus mismatch with bone, leading to stress-shielding, osteolysis and implant loosening. Biocompatible, osteo-conductive titanium-based implants have potentially substituted autologous bone grafts and overcome their scarcity and various complications.

These bioactive implants allow mechanical interlocking with the surrounding tissue as well as promote biological fixation. Most of the conventional techniques for metal foam fabrication mostly generate pore size of $>1\text{mm}$, unsuitable for biomedical application. Therefore, a stable slurry-based processing of metallic foam, with tailorable porosity up to 90%, pore-size distribution of 50-600 micron and high-

pore interconnectivity is developed.

The respective features of titanium foam are not only advantageous for load-bearing applications but, are also useful for defence, automobile and aerospace applications. Bioactivation of the metallic implants' surface is a pre-requisite for higher cellular activity. A simple hydrothermal technique has been developed for creating nanostructures with simultaneous bioactivation of the porous titanium implants within two hours. Combination of foam fabrication and bioactivation technique also adds up newer dimensions to the titanium implants. Studies have also revealed promising outcomes in terms of cell activity, bone in-growth and cartilage healing.



Porous Ti6Al4V samples (a) Optical image, (b) SEM microstructures, (c) Micro CT image, (d) SEM image after surface modification, (e) Cell attachment after 5 days, and (f) Micro CT after 3 months of Tibial implantation in rabbit

PAS: We have not found any patent or published article in searchable database on internet for *titanium foam for skeletal tissue reunion* (both patent and non-patent database).



Bhuvaneshwaran Subramanian

Flexible, biodegradable and anti-microbial new advanced form of Intra Uterine Contraceptive Device (IUCD)

Bhuvaneshwaran Subramanian
Indian Institute of Technology, Kharagpur

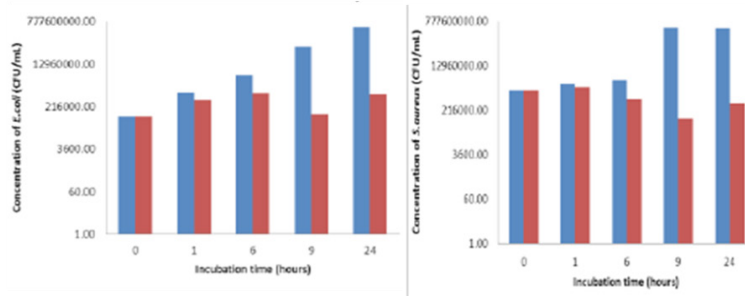
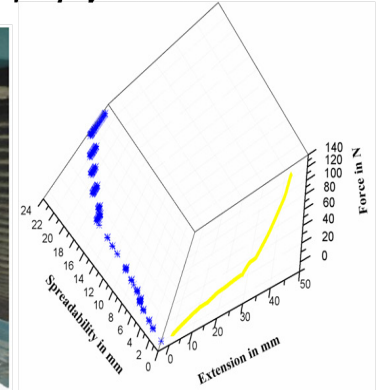
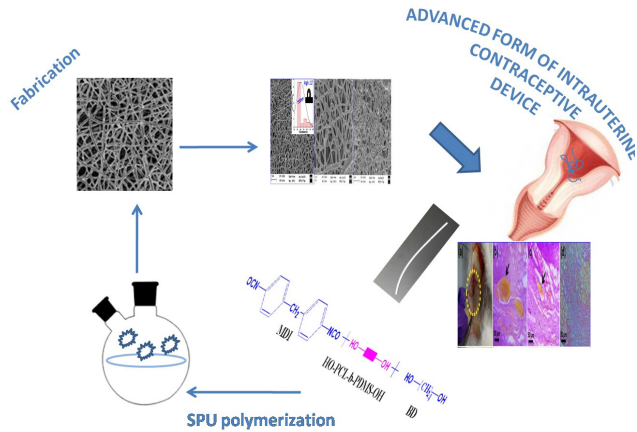
Guided by:
Prof Dr Sujoy K Guha

Fertility control device which prevents implantation of embryo but sometimes causes trauma, leading to cramps and microbial infection. Also, because of the fixed shape and size, it is not appropriate for every women anatomically. Thus, a new form of IUCD has been developed, having controlled biodegradability, anti-microbial and radio-opaque properties.

This IUCD, when introduced into the uterine cavity, adopts a shape matching with that of the individual uterine cavity. Also, its shape changes continuously in accordance with the uterine cavity changes, though being resistant to spontaneous expulsion. It has a hollow tube of segmented polyurethane (SPU), doped with Bismuth Oxide, filled with spongy foam and grafted with aloe vera and neem extracts which are non-toxic and destroy sperm cells. After

implantation of this new IUCD, the flexible property helps it accommodate inside the dynamic uterine environment and the biodegradable property minimises the rejection mechanism by the endometrial tissues. SPU also releases antibiotic fragments which render the inner wall of the uterine cavity antimicrobial and protects the individual from sexually transmitted diseases. It solves the problem of cramps and perforation. The fertility can be restored after complete degradation of the new form of antimicrobial IUCD.

Mechanical property of SPU IUCD



PAS: We have not found any patent or published article in searchable database on internet for *flexible, biodegradable and anti-microbial new advanced form of Intra Uterine Contraceptive Device(IUCD)* (both patent and non-patent database).



Automated opto-fluidic microscope for cellular diagnostic testing

Veerendra Kalyan Jagannadh

Indian Institute of Science, Bengaluru

Team member: Jayesh V Adhikari, L Albina Nirupa

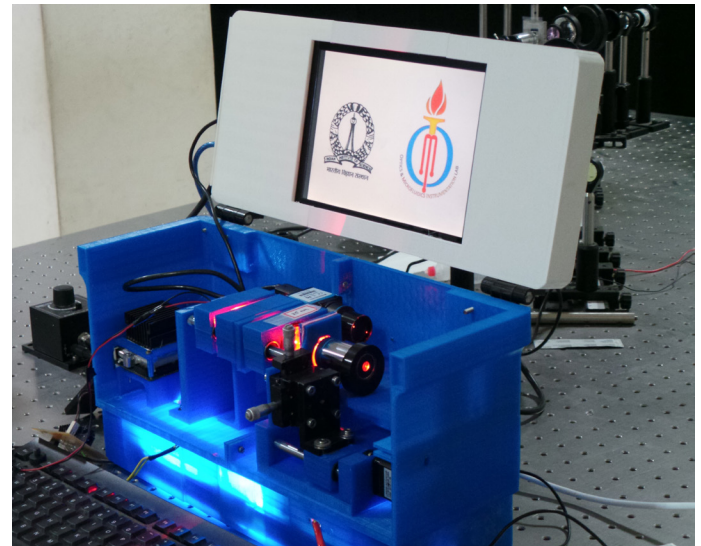
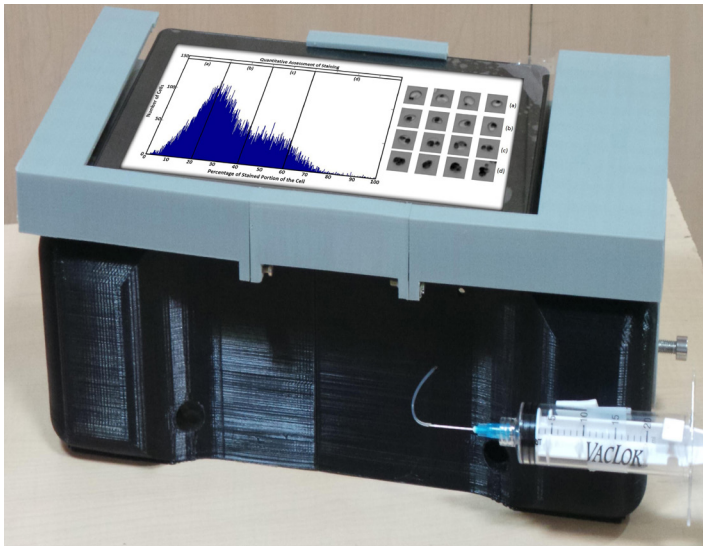
Julius, Rashmi S, Bindu P Bhat

Guided by:

Dr Sai Siva Gorthi

India's healthcare system lacks the requisite number of doctors and healthcare personnel. It is also very expensive. The central theme of the proposed innovation is to offer a holistic and fully-automated point-of-care diagnostic solution which would substantially augment India's ailing healthcare system. In order to compensate for the lack of skilled labour, the instrument has been designed to function in an automated manner. It is designed as dedicated optical reader (portable microscope), which functions along with replaceable microfluidic lab-on-chip devices. For each test, the only cost incurred is of the microfluidic chip. Also, with the use of microfluidics the sample volume and thereby reagent volumes are significantly reduced.

Thereby, it is also lowering the cost-per-test. The instrument employs a syringe suction-based pumping mechanism which enables sample flow without needing electrical power. This enables operation in remote settings with power shortage. Hence, the developed instrument would potentially have low set up as well as running costs (costs-per-test). We believe the instrument would significantly help alleviate the problems of India's rural and urban healthcare system.



PAS: The innovator has filed 3 patents for his work on *automated opto-fluidic microscope for cellular diagnostic testing*.

Reference: 1



Ms Sanskrita Das

3D-printed hydroxyapatite tray for segmental mandibular bone reconstruction by stem cell delivery for oral cancer patients

Ms Sanskrita Das
Indian Institute of Technology, Delhi

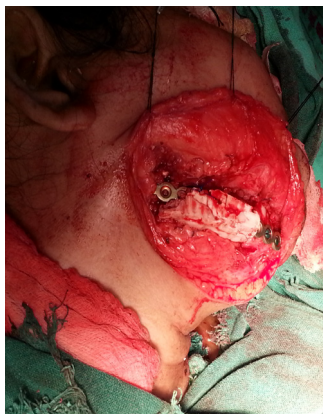
Guided by:
Dr Sourabh Ghosh

Ameloblastoma, a localised malignant tumour in mandible, causes severe abnormalities of the face and jaw. Resection and reconstruction with only titanium plate provides aesthetics but results in functional or partly-functional deformities. Microvascular tissue transfer increases the cost & morbidity and requires more skills.

Therefore, in order to enhance translational potential, a 3D-printing technique is utilised to develop personalised 3D-hydroxyapatite constructs, custom-made to form a tray and have implanted at the area of defect after surgical resection of the recurrent tumour for mandibular reconstruction by stem-cell delivery for oral cancer patients. 3D-hydroxyapatite constructs are fabricated by direct-write assembly and an anatomically-shaped tray is formed by fusing the constructs using bone cement. In vivo

studies and clinical trials are performed and function of mandible is found to be more or less achievable as far as chewing, talking and swallowing are concerned. The recorded Oral Health Quality Of Life is satisfactory. It has shown no signs of immune rejection with minimal tissue.

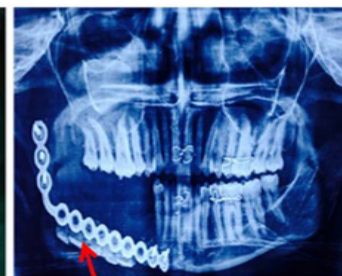
Thus, titanium reconstruction plate with the adhered hydroxyapatite tray is easily adapted to the mandible, highlighting that this system offers a versatile tool to efficient patient-specific oromandibular reconstruction by solving the problems associated with large mandibular defect. It can contribute suitably to functional oral and mandibular rehabilitation.



Pre-operative X-ray image of tumoro-
genic growth in mandibular region



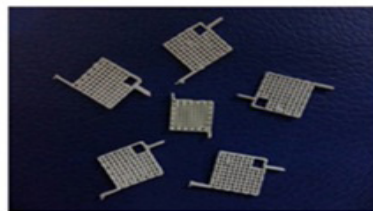
Implanted hydroxyapatite tray



Post-operative X-ray image showing
implanted hydroxyapatite tray



3D printer
(direct-write assembly)



3D hydroxyapatite constructs prepared via
direct-write assembly



3D hydroxyapatite tray
fabricated by using bone cement

PAS: We have not found any patent or published article in searchable database on internet for *3D-printed hydroxyapatite tray for segmental mandibular bone reconstruction by stem cell delivery for oral cancer patients* (both patent and non-patent database).



Anand Parikh

NStomoz - Vascular anastomosis assist device

Anand Parikh
Indian Institute of Technology, Madras

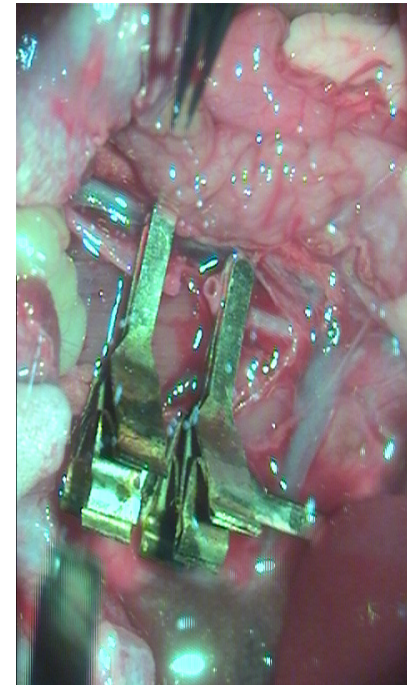
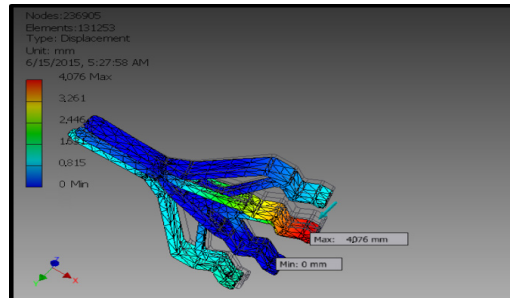
Guided by:
Prof Venkatesh Balasubramanian,
Dr V B Narayanamurthy

Connecting vascular tissues is a common practice in surgeries. For the tissue to survive, its donor vessels need to be connected to the corresponding recipient blood vessels. This process is known as vascular anastomosis. Presented here is an anastomotic assist device, to enable surgeons of all specialties to perform anastomosis faster, safer and with an easier learning curve.

Vascular clamps, while preventing blood from flowing into the field of surgery causes collapse of the blood vessel lumen, thus creating a bottleneck for manipulating and suturing delicate vasculature. This novel technology keeps the lumen open to the surgeon, view while simultaneously clamping the blood vessel. This greatly de-skills the process by allowing the surgeon to suture with minimal manipulation of the

vessel, thereby reducing the possibility of vessel damage and saving pricey operation theatre (OT) time lost during manipulation.

It has leveraged the efficiency of sutures and eliminated its biggest flaw, in order to create a reusable, sterilisable, easy-to-use alternative to vascular clamps whose operation is majorly aligned with the standard technique. This is achieved at a low price. It combines frugality with quality by providing better care to patients with lower occupational hazards, to surgeons, thereby generating greater value for all



PAS: The innovator has filed 2 patents for his work on *NStomoz - Vascular anastomosis assist device*.

Reference: 2 (a and b)



Bhushan N Kharbikar

Wearable drug delivery device based on microneedles for efficient management of chemotherapy induced nausea and vomiting (CINV) & nausea and vomiting in pregnancy (NVP)

Bhushan N Kharbikar

Indian Institute of Technology, Bombay

Team member: Harish Kumar, Rahul Gope

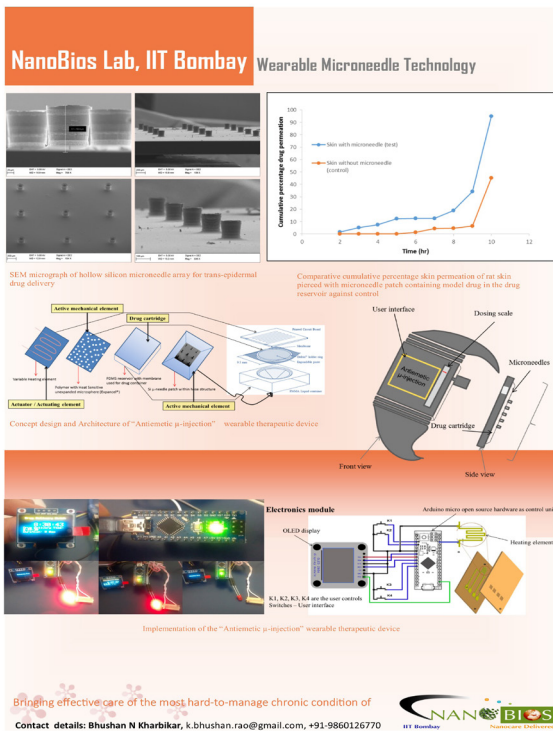
Guided by:

Prof Rohit Srivastava

Increasing CINV is a serious health concern. Conventional routes for administering anti-emetics (oral and parenteral) have several drawbacks such as painful injections, poor patient compliance, dependence on skilled personnel, non-affordability to majority of population (parenteral), lack of programmability and sub-optimal bioavailability (oral). Hence, a transepidermal anti-emetic drug-delivery patch using out-of-plane hollow silicon microneedle array is developed.

Microneedles are pointed micron-scale structures that pierce the epidermal layer to reach dermal blood vessels and can directly release the drug in their vicinity. They are painless by virtue of avoiding significant

contact with dermal sensory nerve endings. Microneedles' mechanical stability, physico-chemical properties and performance in vitro, ex vivo and in vivo studies are assessed. Functional efficacy of the device in transepidermal delivery of anti-emetics, its programmability, ease of use and biosafety are also established. It is successfully tested with model drug and applied using thumb pressure. Hence, it is very easy to use with no or minimal supervision/training. The integrated hollow silicon microneedle-based transepidermal drug-delivery patch/system is able to handle the drug with different dosage efficaciously. Hence, it enables us to manage the acute, anticipatory, delayed, breakthrough, refractory and chronic phases of CINV efficiently.



NanoBios Lab, IIT Bombay Wearable Microneedle Technology

Wearable Hollow Microstructured Trans-epi-dermal System

Patient friendly microneedle technology designed for efficient management of Chemotherapy Induced Nausea and Vomiting

Wearable therapeutic transforms medicine through the convergence of optimized drug delivery, embedded MEMS technology to monitor compliance and with connected, personalized behavioral support for patient. This approach takes care of other crucial aspects viz., no special training of personnel is required, painless, no anxiety and patient discomfort, negligible tissue damage and possibility infection, no needle phobia, avoid inappropriate use of needle

Transepidermal solution	Microneedle solution	Wearable Therapeutic
<ul style="list-style-type: none"> good patient compliance, good absorption reduced side effects controlled and programmed drug release involuntary expulsion of anti-emetic medicine (oral route) a CINV 	<ul style="list-style-type: none"> good diffusion of large molecules suitable for every potent drugs painless upon injection packaged advantages of both transdermal and injections no special training of personnel negligible tissue damage no needle phobia 	<ul style="list-style-type: none"> tackle treatment of chronic condition well viz. "CINV auto-drug dosing and delivery rate just-in-time nudges passive data tracking convenient, save time, and improve self-image patient centric, minimize the patient energy focused on their disease.

Wearable Microneedle patch in comparison with classical syringe needles

Bringing effective care of the most hard-to-manage chronic condition of

Contact details: Bhushan N Kharbikar, k.bhushan.rao@gmail.com, +91-9860126770

PAS: The innovator has published paper on *microneedles-based device for efficient management of chemotherapy induced nausea and vomiting (cinv) & nausea and vomiting in pregnancy (NVP).*

Reference: 3



Neenu Jose



Athira K R



Athul K Raj



Neenu P

Automatic urine and fecal disposal system

Neenu Jose

Sahrdaya College of Engineering and Technology,

Calicut university, Kerala

Team member: Athul K Raj, Athira.K R, Neenu P

Guided by:

Prof Jinu Sebastian

Prof Jimin Jose

Bedridden patients always require help in their ablutions and hence are dependent on others. Sometimes, this leads to unhygienic conditions. Therefore, an automatic urine and fecal disposal system has been presented for bedridden patients. It helps in the improvement of the method required for proper disposal and cleaning of bedridden patients.

It is based on switch mechanism for bedridden patients to excrete independently. The main control system is implemented by using electric drive mode and by mechanical movements of bed. Here, the bed is partitioned mainly into two parts. The first part possesses linear as well as angular movement simultaneously, in a way that the patient gets seated on the toilet

provided below the bed. From here, the waste is bio-decomposed. For proper degradation of the waste, two methods can be implemented -- biodegradation or thermal degradation. Since it is degraded it can be used as a biomanure so as to favour an eco-friendly environment. A pressurised water gun, along with a blower system, is equipped for cleaning. The system is easy to handle since it employs only an electric drive mode.



PAS: We have not found any patent or published article in searchable database on internet for development of *automatic urine and fecal disposal system* (both patent and non-patent database).



Vichal P M

Device for intrapartum materno-fetal care

Vichal P M

*BMS College of Engineering, Visvesvaraya
Technological University, Bengaluru*

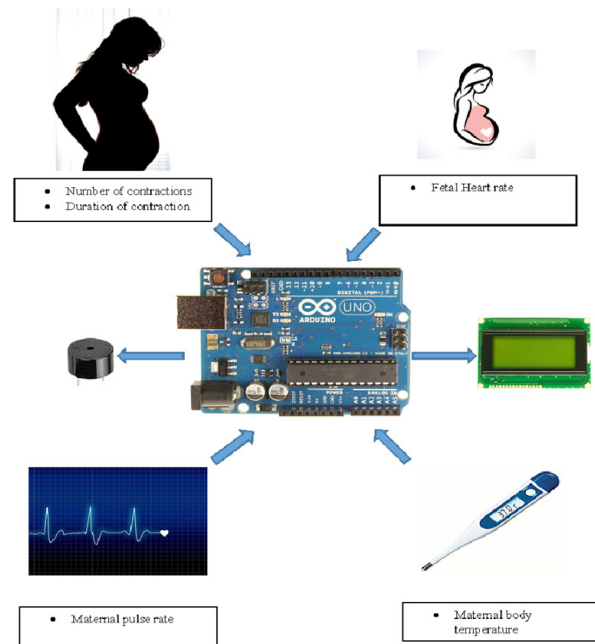
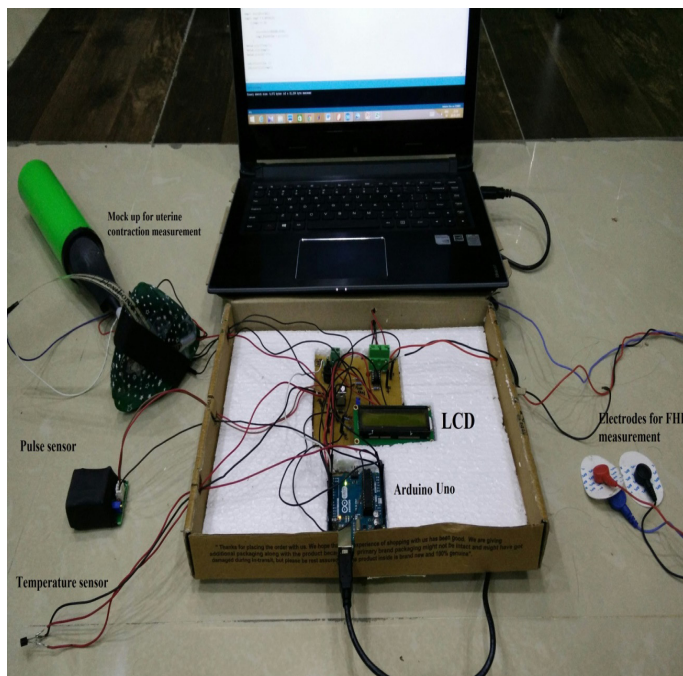
Guided by:

Appaji M Abhishek, Dr Manish Arora,
Dr Lavanya Kiran

Increasing rate of neonatal and maternal mortality, due to lack of proper care during labour, demanded an urgent need to form an affordable device in all hospitals. Thus, this prototype represents a low-cost, wearable medical device which has been validated against existing devices like fetal heart-rate monitor and tocodynamometer with satisfactory accuracy.

high. It also provides treatment on time and decides if the mother needs to be taken in for a Cesarean section.

A partogram is a graphical record of the data, measured electronically, related to the maternal and fetal care during labour. It continuously monitors uterine contractions, fetal heart rate, maternal heart rate and maternal body temperature, displays them continuously and alarms in case of any abnormality. It removes the issues of usability and provides timely clinical intervention, especially in places where the patient load is



PAS: We have not found any patent or published article in searchable database on internet for development of *device for intrapartum materno-fetal care* (both patent and non-patent database).



Prasanta Kalita



Nitish Goel



Ruchika Sharma

Rapid endotoxin entrapment and detection on surface-engineered glass substrates

Prasanta Kalita,
Indian Institute of Technology, Delhi
Team member: Nitish Goel, Ruchika Sharma

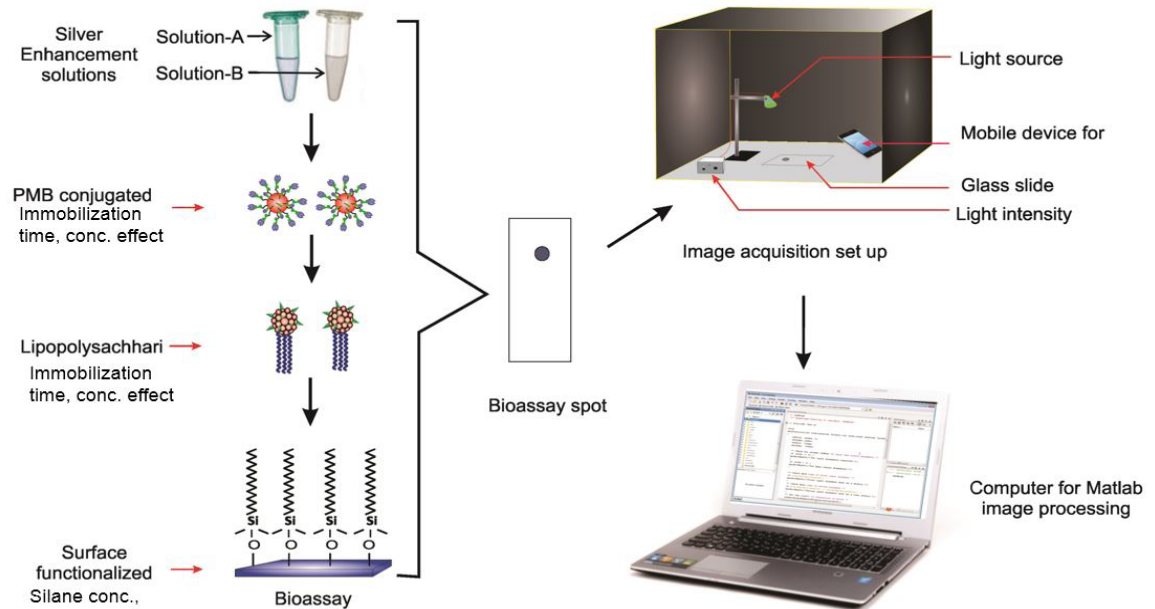
Guided by:
Dr Shalini Gupta
Dr V Sritharan

Endotoxin or lipopolysaccharide (LPS) is a major constituent of the Gram-negative bacterial cell wall that causes a life-threatening disorder – septicemia -- resulting from unregulated activation of innate immune system. Thus, a simple colourimetric assay for the detection of LPS in human blood/sera and water is developed.

Here, LPS is captured from an analyte on a long-chain silane-functionalised glass substrate and tagged with gold nanoparticle (GNP) probes, surface-engineered with a narrow-spectrum antibiotic drug -- polymyxin B -- that has high specificity for LPS molecules. The signal sensitivity after GNP binding is further amplified using a 30-second silver reduction step that produces colourimetric spots in the upper femto-molar range but still visible to

the naked eye. The colour intensity is also quantified using an LED smartphone-based optical acquisition system and a MATLAB image-processing code. The enhancement of net sensitivity of detection beyond the clinical limit to allow pre-symptomatic (sub-clinical) stage monitoring and screening is performed.

A calibration curve is also generated from spiked endotoxin levels to determine their unknown concentration in clinical samples. The results are benchmarked to a commercial ELISA kit and other patient data (microbiology, CBC, haematology reports etc.). The overall approach is found to be simple, sensitive, robust and cost-effective, suggesting great utility for clinical usage.



Schematic for Quantification of LPS Concentration

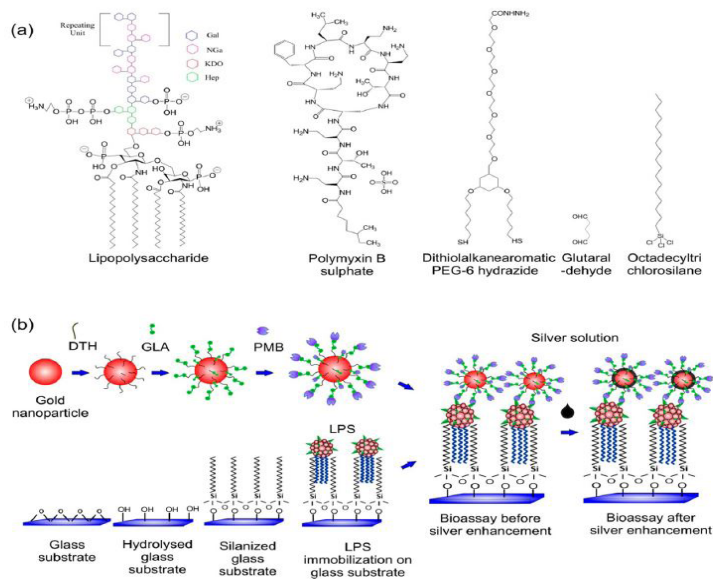
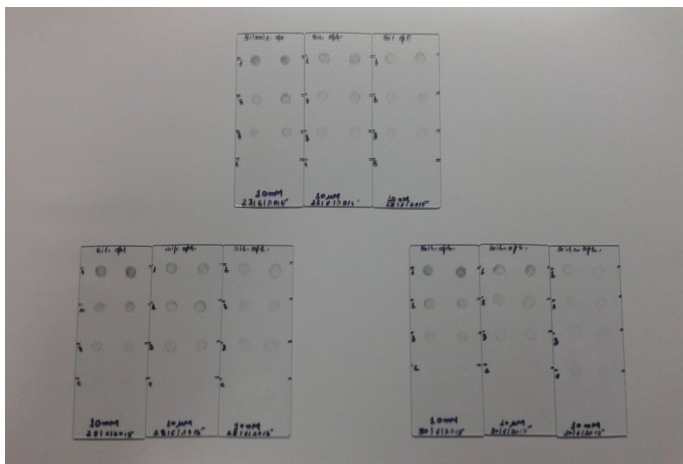


Figure 1. (a) Molecules used in this study: lipopolysaccharide (LPS), polymyxin B sulfate (PMB), dithiolalkane aromatic PEG₆ hydrazide (DTH), glutaraldehyde (GLA), octadecyltrichlorosilane (OTS). (b) Schematic of the bioassay for LPS detection. Gold NPs were chemically modified with PMB drug molecules comprising LPS-binding domains. Target LPS molecules were hydrophobically trapped on silanized glass substrates and tagged with reporter gold NP-PMB conjugates. The spots were developed using a silver enhancement agent which amplified the signal and enabled visual detection of LPS by eye.



PAS: The innovator has filed the patent for his work on *rapid endotoxin entrapment and detection on surface-engineered glass substrates*.

Reference: 4



Aditya Garai

Near infrared light-activable iron (III) complex as a remarkable and organelle-targeted anti-cancer agent for the photodynamic therapy application

Aditya Garai

Indian Institute of Science, Bengaluru

Guided by:

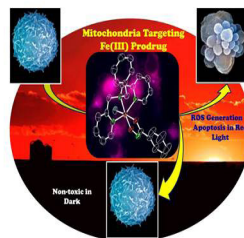
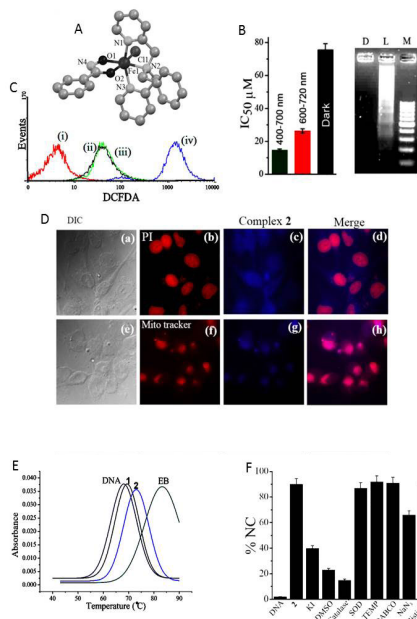
Prof A R Chakravarty

Presently, chemotherapy, surgery, radiation therapy, etc. are routinely-used modes of treatments given to the cancer patients; limitation being that the repeated chemotherapeutic dose given to a patient leads to serious side effects and eventually makes him/her immune to the drug. Therefore, photodynamic therapy (PDT) is one of the non-invasive techniques, involving localised activation of drug by irradiation of light of certain wavelength.

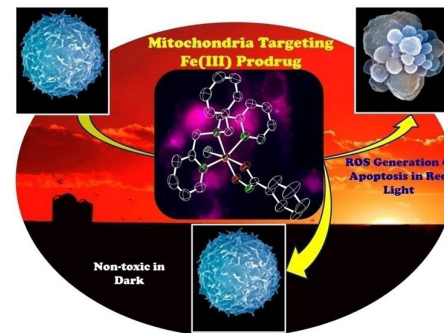
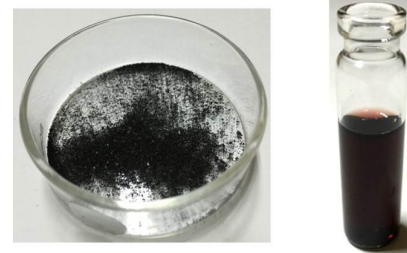
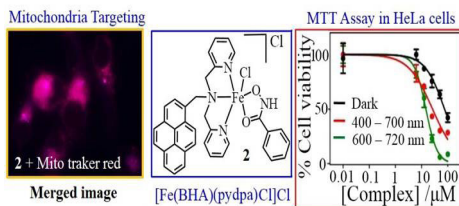
Metal-based complexes might serve as better targets to treat cancer. They have versatile coordination geometry and can involve in photo-redox pathways for the generation of reactive oxygen species (ROS) to kill cancer cells. Thus, a benzhydroxamate iron (III) complexes are prepared and their photocytotoxicity is evaluated. This complex

exhibits preferential localisation in the mitochondria and shows photocytotoxicity in red light in HeLa cancer cells.

This complex is non-toxic under dark condition, indicating the lead role of photoactivation to kill cancer cells. The complex is localised in nucleus and mitochondria where it produces ROS upon irradiation. The mode of cell death is apoptosis, absent in cancer cells. Therefore, this project highlights the potential use of such biorelevant metal complexes as effective PDT agents.



Graphical representation of the photoactivation of the Iron(II) complex in the red and visible light to kill the cancer cells



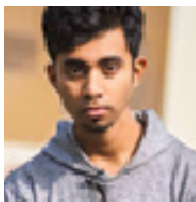
A. Crystal structure of complex 1; B. Phototoxicity and DNA laddering; C. Detection of ROS by DCFDA assay; D. Cellular and mitochondrial localization of complex 2; E. DNA melting studies; F. DNA cleavage studies (647 nm laser)

PAS: The innovator has filed the patent for his work on *near infrared light-activable Iron (III) complex as a remarkable and organelle-targeted anti-cancer agent for the photodynamic therapy application.*

Reference : 5



Sreemoyee Ghosh Ray



Gourav Dhar Bhowmick

Energy-efficient combined process of microbial fuel cell (MFC) and membrane bioreactor (MBR) for high efficiency and reliable treatment of organic wastewater

Sreemoyee Ghosh Ray
Indian Institute of Technology, Kharagpur
Team member: Gourav Dhar Bhowmick

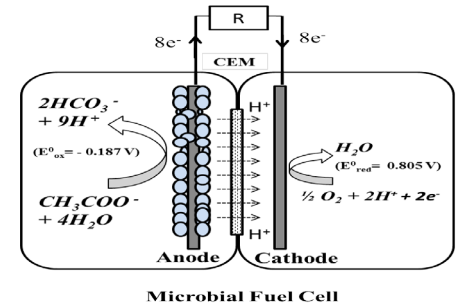
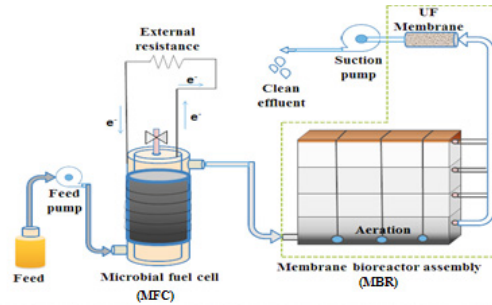
Guide:
Prof M M Ghangrekar

Currently available MBR technology is highly expensive and has a limitation to achieve the required treatment efficiency for inland surface water disposal or to utilise the effluent for irrigation without further treatment. Therefore, a two-stage continuous process is developed, combining MFC and submerged MBR, with intermittent suction of high-quality effluent through ultrafiltration membrane, which can be used for treatment of sewage as well as medium-strength industrial wastewater and consequently generate high-quality effluent and bioelectricity in this process.

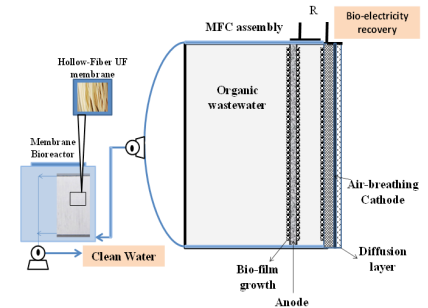
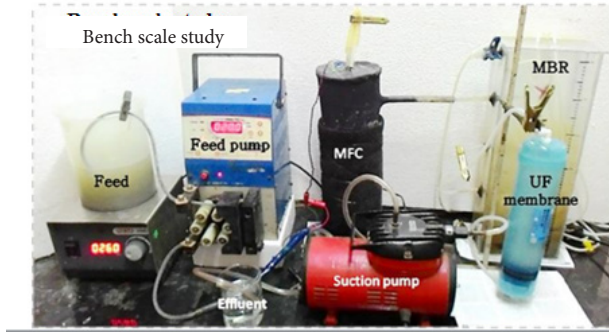
The air-cathode MFC is constructed with a low-cost ceramic cylinder, considered as the anodic chamber. Acetone is used as

a mixing solvent. Untreated carbon felt is used as anode and cathode current collector. The MFC is kept in an open environment under the influence of fluorescent light. Synthetic wastewater with sucrose as carbon source is introduced in MFC and effluent is continuously collected in the aerobic MBR. Further, submerged hollow fibre-ultrafiltration unit is attached inside the aeration tank and effluent extraction is carried out under constant membrane flux. The effluent is then collected in an aeration tank as a carbon/nutrient source for aerobic microorganisms. It is extracted by high-permeate flux through hollow fibre-ultrafiltration membrane followed by frequent membrane back flushing.

Schematic of MFC MBR combined processor wastewater treatment



Bench scale study



PAS: We have not found any patent or published article in searchable database on internet for development of *energy-efficient combined process of microbial fuel cell (MFC) and membrane bioreactor (MBR) for high efficiency and reliable treatment of organic wastewater* (both patent and non-patent database).



Divakara S S Murthy



Padma Akkapeddi



Goutham Belagula Manjunath

A novel compound restores obsolete antibiotics to NDM-1 superbugs

Divakara S S Murthy Uppu

Jawaharlal Nehru Centre for Advanced Scientific

Research, Bengaluru

Team member: Padma Akkapeddi,

Goutham B Manjunath

Guided by:

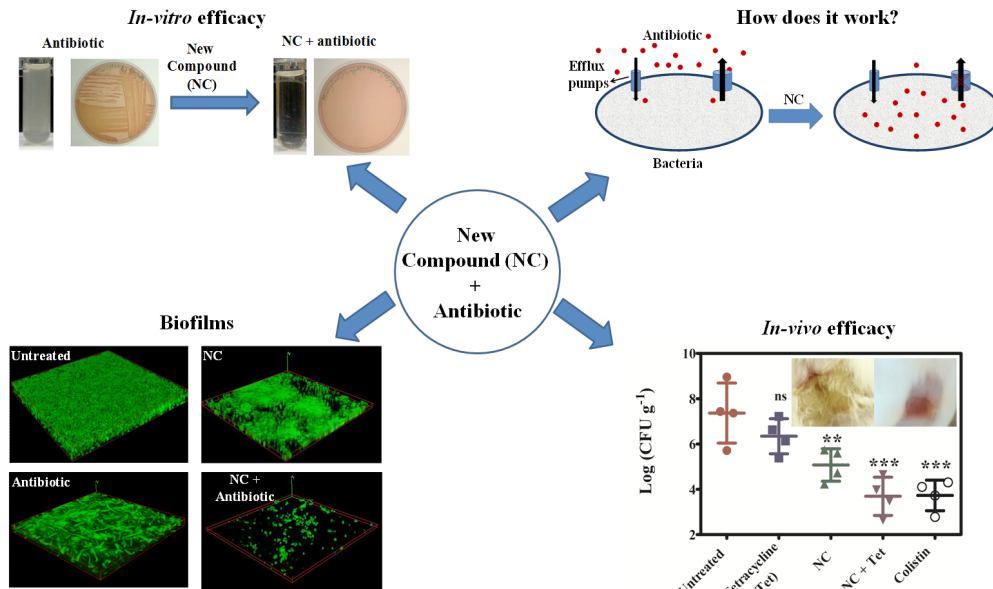
Prof Jayanta Haldar

Alarming increase of antibiotic-resistant bacteria and rapid decline of new antibiotics in the market have created a global havoc in healthcare. Hence, a new compound that restores the efficacy of antibiotics, that have become ineffective because superbugs have developed resistance to them, has been developed.

This new compound restores the efficacy (enhancement by >80-1,250 fold) of tetracycline antibiotics towards NDM-1 (*K. pneumoniae* and *E. coli*) clinical isolates. The mechanism being that this new compound shuts down the energy required for the efflux pumps of bacteria that throw these antibiotics out. It also potentiates the antibiotics to more dangerous and tough-

to-kill biofilms of carbapenem resistant *A. baumannii*, prevalent in hospital surfaces.

The combination of this new compound and antibiotic effectively treats acute and chronic burn/surgical wound infections in mice models, caused by the carbapenem resistant *A. baumannii* and KPC superbugs. It stops the bacteria from developing resistance to antibiotics and does not have the limitation of development of bacterial resistance. Thus, it will revolutionise the antibiotic therapy for treatment of bacterial infections caused by antibiotic-resistant superbugs.



PAS: The innovator has filed the patent for his work at Patent Office and United States Patent and Trademark Office. This invention has also been filed for National Phase Applications in USA, Europe and South Korea.



Development of a novel, non-biological pyrogen/microcellular components detection technique for purification and depyrogenation of water

Yadav Vijay Dukhran

Institute of Chemical Technology, Mumbai

Team member: Rohan Chhabra, Nikhil Kalane,

Anomitra Dey, Tejal Pant

Guided by:

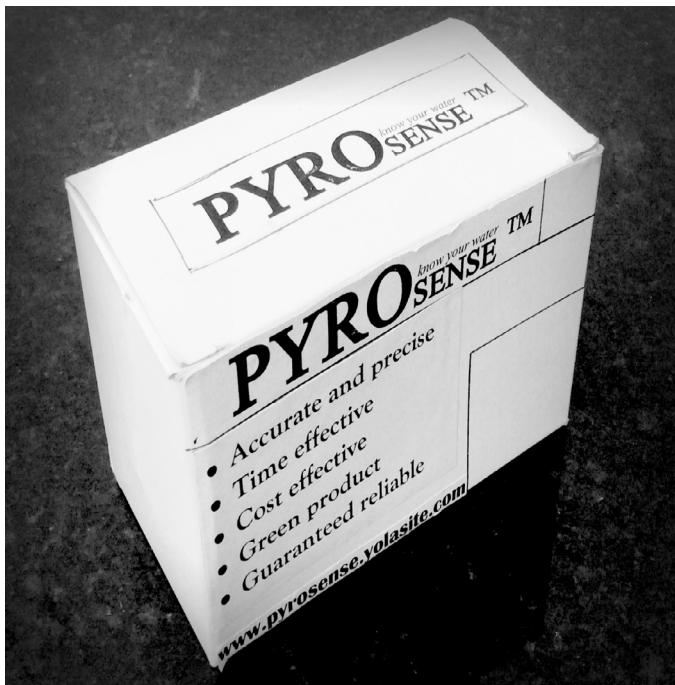
Dr Prajakta Dandekar Jain,

Dr Ratnesh Jain

The advent of the hypodermic needle provided a new route to administer drugs. However, the early parenteral drugs were crude and unsafe. To tackle this problem, a non-biological pyrogen detection technique, which can be subsequently used for depyrogenation of water, is developed.

The technology of PyroSense™ is based on oxidation of aldehyde moiety or pyrone ring present in pyrogen. The oxidation process converts these moieties in carboxylic group which further gets converted into polyols. PyroSense™ can oxidise a spectrum of microcellular components, including viruses, nucleic acid and proteins. It is based on green chemistry which uses non-biological reagent, devoid of any storage requirement.

This technique is economically viable and operational. The operation cost will not differ much from the existing one. It is cost-effective, has long shelf life, provides high sensitivity and accuracy with no or minimal storage conditions. This technique also supports green and clean chemistry. The reprocessing of generated waste to the initial raw materials is feasible. Moreover, the reagents used in the process are in parts-per-billion and parts-per-million levels and no adverse effect of the environment. Thus, the technology will be readily accepted by the regulatory authorities



PYROSENSETM know your water

Currently worldwide, many problems are associated with the lack of clean water and it is well known that 1.2 billion people lack access to clean and safe drinking water. It has been estimated that 2.6 billion have little or no sanitation and millions of people die annually including 3900 children a day from diseases, transmitted through unsafe water or human excretion. Diarrheal and intestinal parasitic infections caused by enteric virus and water borne bacteria have become a leading cause of malnutrition owing to poor digestion of the food. Moreover, modern injection solutions are safer, yet the literature continues to report adverse reactions because of the presence of pyrogens.

Pyrogen contamination in biotechnological, pharmaceutical product and medical devices can induce life threatening fever, allergic reaction, immunochemical response, so it is mandatory to ensure that the pyrogen concentration do not exceed particular limit as per pharmacopeia. Sterility test cannot address the complete elimination of pyrogenic structure. They are persistent after elimination of living pathogen. In this issue we share the concerns for the patients who cannot take fluids orally, due to surgery or illness and who may suffer the consequences of toxins, if present in the parenteral product.

The overall idea is to improve water quality, safe guard environment not only in industrialized world, but in the developing regions of the world as well, where less chemical and energy intensive technologies are greatly needed. Conventional existing technology cannot remove lysed microcellular component and viruses from water. But PYROSENSE a non-biological pyrogen/ microcellular component detection technique can be subsequently used for complete decontamination and depyrogenation of water.

ADVANTAGES

- Sustainable and clean chemistry
- High selectivity/specificity
- Chromogenic free technology
- Novel Concept
- Non Biological Source
- Accurate and precise operation results
- More shelf life
- Easy operation
- Time effective
- Cost effective
- No technical skills required
- Room temperature storage

APPLICATIONS

- **DIAGNOSTICS**
Pharmaceuticals, Biotechnology, genetics and medical devices
- **WATER QUALITY AWARENESS**
Educational and Public
- Reference standard
- Separation of low and high molecular weight lipopolysaccharides

CONTACT US

Pyrosense Water Technologies Pvt. Ltd.
Email: info.pyrosense@gmail.com
www.pyrosense.yolasite.com
Mob: +91-9819140980



PAS: The innovator has filed the patent for his work on development of a *non-biological pyrogen/ microcellular components detection technique for purification and depyrogenation of water.*

Reference: 7



Abhishek Kumar Jha

A compact microwave sensor for characterisation of radomes and dielectric signature detection of materials in 3G and 4G GSM bands

Abhishek Kumar Jha
Indian Institute of Technology, Kanpur

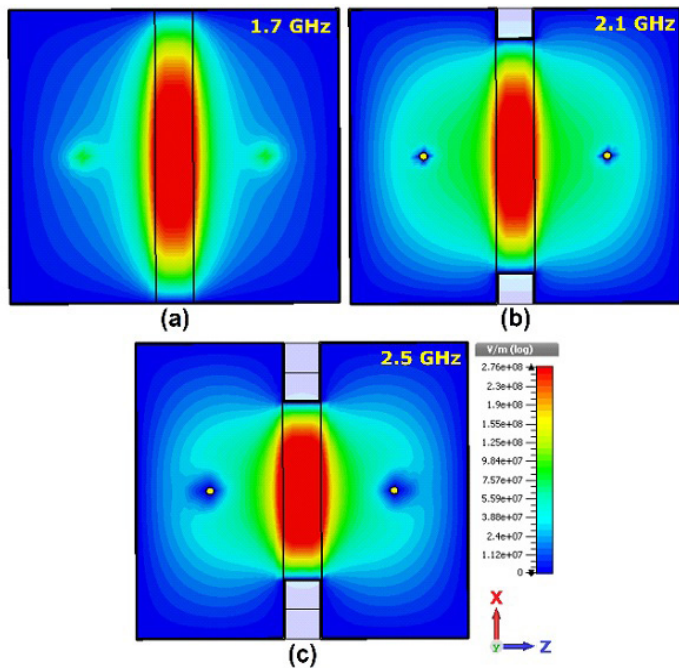
Guided by:
Dr M J Akhtar

The conventional waveguide resonator techniques provide better accuracy in the loss tangent calculation. The cost, weight, and size of the corresponding cavity becomes quite large, especially in the lower frequency bands which are quite bulky and expensive, thus making it inconvenient for microwave sample testing. Therefore, a novel and highly-compact tri-band epsilon-near-zero (ENZ) substrate-integrated waveguide (SIW)-based microwave sensor for material testing at the global system for mobile communications (GSM) bands is proposed.

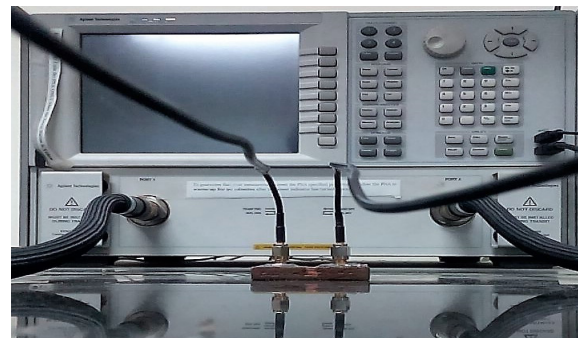
It is designed, simulated, and tested in-house for the microwave characterisation of materials under test in 3G and 4G frequency bands. Its size is less and facilitates a sample placement design for microwave measurement of the sample under test at

various frequencies of 3G and 4G bands. The detection of dielectric signature of the material under test at multiple frequencies with reasonable sensitivity has been done.

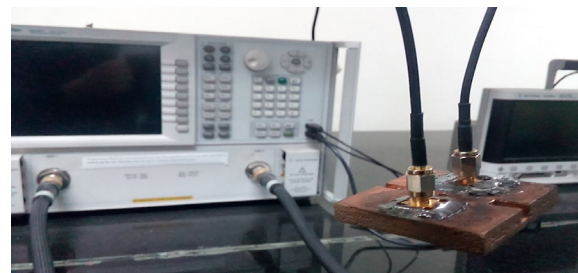
It is fabricated using multilayer FR4 substrate where a three-layered ENZ tunnel is machined for the testing. The RF signal is being coupled to the prototype using the SubMiniature version A (SMA) connectors which are then collected at other end, using the network analyser. The measured data is then processed with the standard algorithm for getting the dielectric signature of various reference samples. It is found to be in good agreement with their reference values thus validating the design methodology, proposed technique and the developed prototype.



Electric field distribution inside the proposed structure at different layers along Y-direction in the middle of tunnel (a) T1, (b) T2 and (c) T3 in XZ-plane



Prototype sensor with vector network analyzer as the measurement setup



A perspective view of the prototype sensor with complete measurement setup

PAS: The innovator has been awarded the prestigious Microwave Graduate Fellowship, 2015. This award is given each year to 8-11 selected graduates across the globe by IEEE Microwave Theory and Technique Society.

Reference: 8



Bharat Lal Meena

Development of a portable device based on polarised fluorescence for detection of cervical pre-cancer

Bharat Lal Meena,
Indian Institute of Technology, Kanpur

Team member:
Ms Seema Devi, Dr Kiran Pandey,
Dr Asha Agrawal

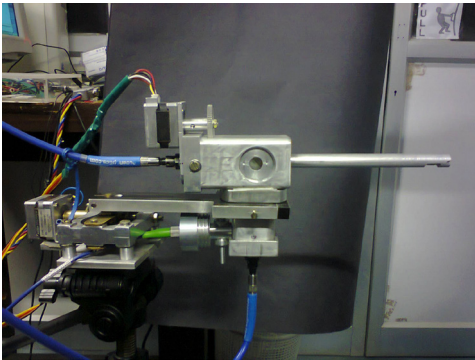
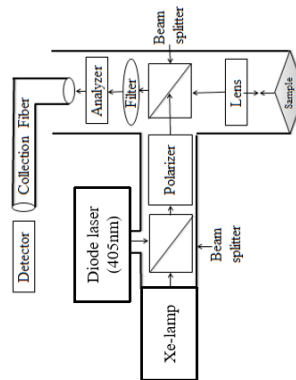
Guided by:
Prof Asima Pradhan

In order to combat cervical cancer, a portable device to obtain the intrinsic fluorescence from human cervical tissue samples by measuring polarised fluorescence and polarised elastic scattering signals, has been developed.

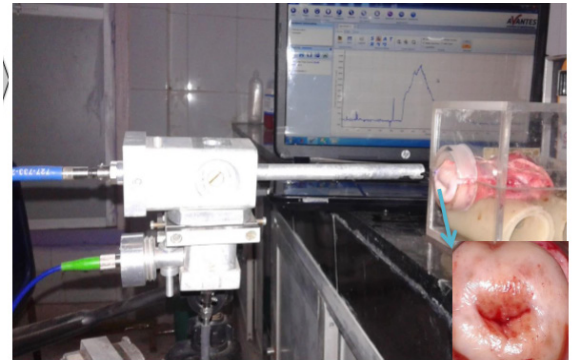
This device consists of a laser diode (405 nm) and white light source (Xe-lamp), to measure the polarised fluorescence and the polarised elastic-scattering spectra, respectively. Vertical polarised light falls on the sample and co- and cross-polarised fluorescence and elastic-scattering spectrum are measured by automated rotation of the analyser. Signal is subsequently collected through an optical fibre and directed towards miniature spectrometer. All data are

collected at 180 degree angle (backscattering mode) with respect to incident-polarised light (as shown in attached image).

The sensitivity and the specificity for discrimination of pre-cancerous (CIN I, II and III; CIN: Cervical Intraepithelial Neoplasia) samples from normal samples are found to be 100%, with confidence interval of 99%. This portable device is cost-effective, fast, accurate, minimally-invasive, and has the potential to become a part of the regular screening tools for in vivo detection of cervical cancer in the clinic.



Block diagram and photograph of the portable device, based on polarised fluorescence for detection of cervical pre-cancer



PAS: The innovator has filed the patent for his work on development of *portable device based on polarised fluorescence for detection of cervical pre-cancer*.

Reference: 9



Gaurav Gupta

X-niff: Microcantilever-based electronic nose platform for airborne chemical vapour-sensing applications

Gaurav Gupta

Indian Institute of Technology, Bombay

Guided by:

Prof Valipe Ramgopal Rao

Prof Maryam Shojaei Baghini

Team members: Vijay S Palaparthi,
Shambhulingayya Ningayya Doddapujar,
Pallabi Das

Detection of explosives has been the holy grail of product development and research in the personnel and parameter security space for the past two decades. The alarming rise in use of chemically-explosive compounds such as RDX, TNT and PETN by anti-social, anti-national and terrorist outfits for executing lethal attacks has led to an imminent need to detect the presence of these explosive materials quickly and accurately. These compounds (lethal) have such low presence in vapour phase that sniffing them is a task assigned to only highly sensitive, trained sniffer dogs.

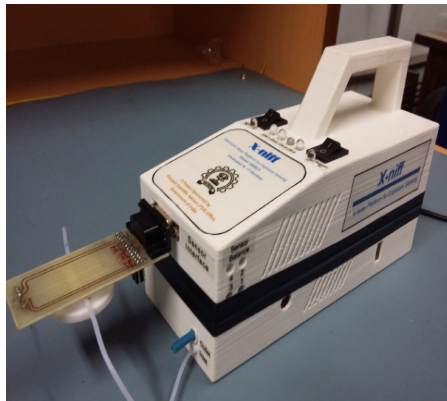
The past decade has seen several technologies emerge to replace dogs

since they suffer from fatigue and loss in sensitivity due to changing environmental conditions; however, these products have been known to be bulky and very expensive, limiting their use to only airports and high security zones in the country.

A project team led by Prof Ramgopal Rao at IIT Bombay has been working on developing cost-effective and portable technologies for detection of explosive compounds. The sensors, made of silicon compounds and polymers and coated with monolayers of receptor chemicals engineered to capture explosive compounds, could detect the presence of explosives at concentrations as low as only a few molecules, making

them as sensitive as a sniffer dog. These micro sensors are small enough to be integrated into portable hand-held metal detectors, adding a huge edge to personnel security scanning systems. Recently, the project team has developed the advanced sensing platform called X-niff which is the integrated multi- channel electronic nose (e-nose) platform developed at IIT Bombay for detecting and indentifying the trace level of explosives among various interferents with high level of sensitivity and selectively.

In principal, it consist of three main components: sensor array for response collection to targeted analyte, related electronics circuit to detect and collect the sensor response and pattern recognition software to analyse and recognise the particular analyte based on the sensor response pattern. The developed system works in the close resemblance to human nose hence the name.



X-niff electronic nose sensor



X-niff electronic nose sensor integration with IoT



Difference models - X-niff electronic nose sensor



Difference models - X-niff electronic nose sensor

PAS : The innovator has filed pattern for hiw work on *method and apparatus for electronic nose system for explosive sensor application.*

Reference: 10



Ajit A Mohekar



Tanmay N Shah



Ramkrishna N Patil



Nikhil S Pawar

Design of an innovative retrofitted tricycle for a disabled person

Ajit A Mohekar

Maharashtra Institute of Technology, Pune

Guided by:

Prof Pushkaraj D Sonawane

Prof Dr Sandip T Chavan

Team member: Tanmay N Shah, Ramkrishna N

Patil, Nikhil S Pawar

The various means of mobility like hand driven tricycles, wheelchairs, retrofitted vehicles etc. assist in the basic functional moving of the disabled people, without considering many important aspects of safety, ergonomics and aesthetics. There has been a focus on improving the mobility of the wheelchair with customized motorized vehicles such as buses, vans, cars and motorcycles. The existing customized tricycles used by a disabled person, however, require him to dismount from the wheelchair and be seated on the tricycle – very inconvenient and challenging task for a disabled person.

Addressing this challenge, a motorized retrofitted tricycle has been designed and fabricated which allows the disabled person

to drive the tricycle without dismounting from the wheelchair. The tricycle is designed to accommodate a disabled person along with the wheelchair with ease and convenience. This was achieved by providing a specifically designed platform and automated ramp, which allowed the wheelchair to be wheeled up or down.

The prototype was designed using Computer-aided design (CAD) which helps to increase productivity by allowing the visualization of the desired component through the use of a large array of tools for analysis and design. Prototype testing including bump testing and steering testing has been carried out and the results obtained were quite satisfactory. The finalization of the design of the tricycle has been done by performing safety tests as

per ARAI scheme.

This work targets a unique, cost effective and convenient mechanism in providing smooth transfer and mobility for the people who have disabilities.



Retrofitted tricycle: Front side



Retrofitted tricycle: Back side



Retrofitted tricycle for paraplegic rehab centre

PAS: The innovator has published paper on *design of an innovative retrofitted tricycle for a disabled person*.

Reference : 11



Utkarsh Bhutani

Soya nuggets: A novel drug delivery vehicle

Utkarsh Bhutani

Indian Institute of Technology, Hyderabad

Guided by:

Dr Saptarshi Majumdar

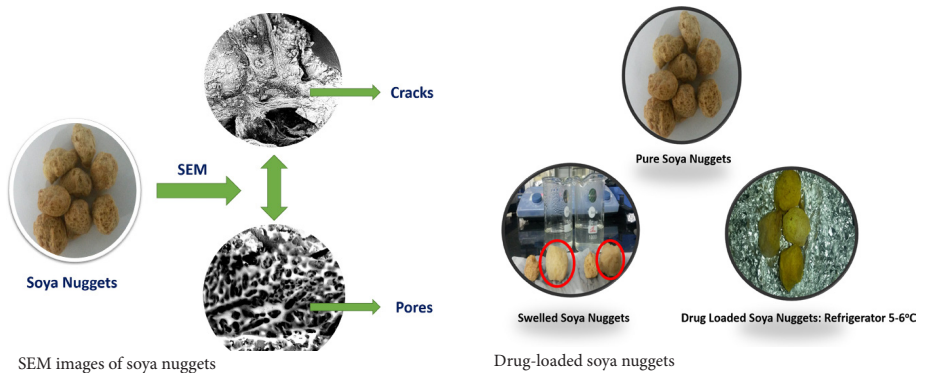
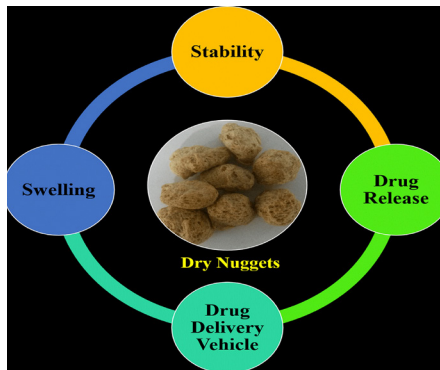
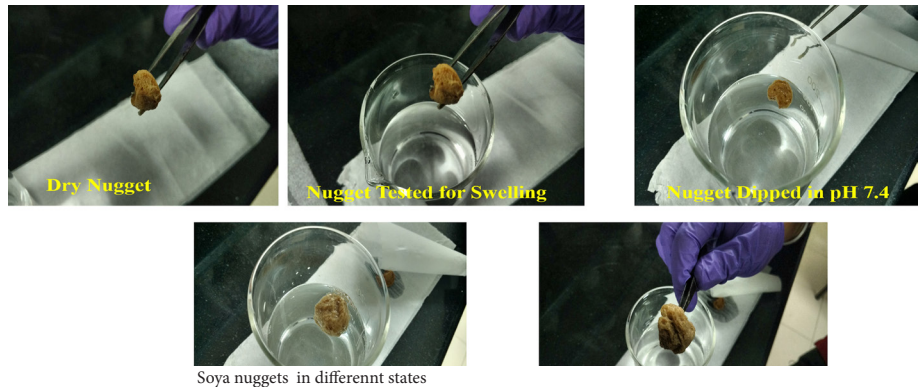
The rapidly advancing drug delivery research demands innovative carriers. Biodegradable polymers like gelatin, alginate, chitosan, dextran, gellan gum, starch and cellulose have been innovative drug delivery vehicles/carriers, achieving controlled drug release with minimal side effects. However, most of these polymers, being water soluble, do not ensure uniform distribution of hydrophobic drugs inside the vehicle. The synthesis of polymeric beads, polymeric and drug nanoparticles with beta-cyclodextrins overcomes this challenge but limited by the use of some toxic chemicals during the formulation stage. Further, the hydrogels prepared from sodium alginate and gelatin requires cross-linkers for improved mechanical properties.

This work, aimed at minimising the above drawbacks, brings into the picture the first

use of soya nuggets as potential drug delivery vehicles. Soya nuggets' potential as a highly-effective drug carrier is owing to their ability to undergo tremendous swelling due to their high porosity and network structure, proving useful for drug loading and release.

Soya nuggets are rich in proteins and are a well-accepted food throughout the world. The nuggets require minimum processing, only in terms of swelling degree, drug loading and release, and reduce the production cost. To have control over swelling, the nuggets were coated with low viscosity (1%) sodium alginate and further surface-crosslinking with 5% CaCl_2 , resulting in tighter control on swelling as well as on drug release (slow and steady release up to 24 hr). The study also found that the swelling degree, drug loading and release are dependent on the weight of soya nuggets. The FTIR analysis

confirmed the stability of drug inside the nuggets. Multiple drugs, both hydrophobic as well as hydrophilic were encapsulated and studied for drug release. The swelling degree of soya nuggets also adds to an advantage allowing the loading of high drug amount inside



PAS: The innovator has published paper on *A potential carrier: Swelling kinetics and release of hydrophobic drugs.*

Reference: 12



Mr Manoj Kumar Patel

Air-assisted electrostatic sprayer (AAESS)

Mr Manoj Kumar Patel

*Academy of Scientific and Innovative Research,
Chandigarh*

Guided by:

Dr C Ghanshyam
Dr Manoj Nayak

The problems associated with the existing electrostatic sprayers are -- directionality, variability in canopy coverage, target coverage distance and incapability of spraying in presence of strong wind and transient environment. In the case of electrostatic spraying, the droplet size is in the order of less than 60-80 microns. The smaller size of droplets, electrostatic repulsion among them and the presence of wind causes the droplets to drift from their target (spray drift). Presently available sprayers have no arrangement which can be used in windy conditions. There is a need to provide a solution to avoid spray drift. In this work, a manually-controlled external air-assisted electrostatic nozzle has been designed with the help of externally-supplied high-pressurised air. External air supply improves the aerodynamics between

the spray exit from the nozzle and the actual target. This work relates to electrostatic spraying apparatus, having an external air-assistive arrangement for the variable target coverage, high-range target distance and applicable to the transient agro-climatic conditions such as presence of strong wind. This minimises the off-target losses of active ingredients to soil, water and atmosphere.

Electrostatic spray technology has a cut above performance in getting better droplet size, size distribution and deposition uniformity. It increases transfer efficiency, bio-efficacy, uniform deposition, maximum canopy coverage and reaches areas underneath of the target. This sprayer is light-weight and highly reduces pesticide use and human health risks, and is friendly to the environment.



Air-assisted electrostatic sprayer

PAS: The innovator has filed a patent for his work on *manually-controlled variable coverage high-range electrostatic sprayer*, nationally as well as internationally.

Reference : 13



Srividhyasakthi

An indigenous oxygen-dosing device to conserve oxygen using patient monitoring system

Srividhyasakthi

Sri Ramakrishna Engineering College, Coimbatore

Student of Rajalakshmi Enginnering College, Chennai;

Worked at Aries Biomed Technology Pvt Ltd,

Coimbatore

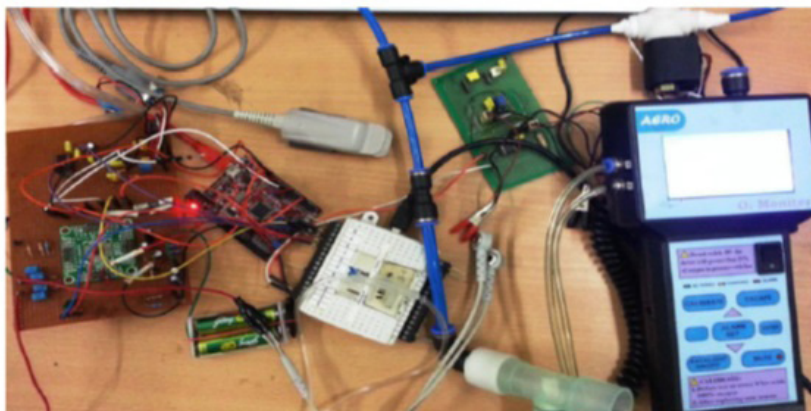
Guided by :

Mr R Prem Kumar

Oxygen-dosing devices are designed to deliver oxygen only during inspiration phase of the respiration cycle. The pressure sensors are used to identify inspiration phase. Here the oxygen-dosing devices are designed to work with the patient monitoring system. The system obtains respiratory impedance pneumograph using two ECG (electrocardiogram) electrodes placed over the chest, along with SpO₂ which is used to measure oxygen saturation in blood. The impedance pneumography signal is used for identifying inspiration phase of a patient. The controller circuit identifies the variation in impedance during respiration. Additionally, the oxygen level of the patient is also measured by SpO₂ probe. Normally, oxygen dose is controlled according to

the patient's SpO₂ level. This respiratory impedance pneumography circuit checks for the inspiration signal when SpO₂ level goes low. The solenoid valve is opened by comparing the signals obtained from the patient.

The solenoid valve is controlled with the help of lab view DAQ. This set up can also be used for monitoring apnea. A visual indication alarms if inspiration is not sensed for 10 seconds. The advantage of this oxygen-dosing device is that it has redundancy to avoid false triggering and it can be used across all age groups.



PAS: The innovator has published his work on an indigenous oxygen-dosing device to conserve oxygen using patient monitoring system in an international conference at Coimbatore in 2015.



Varsha Singh

Neuronal cells produced from non-neuronal cell line using walnut oil

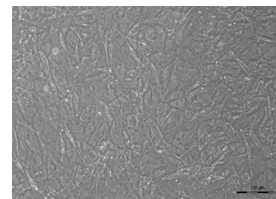
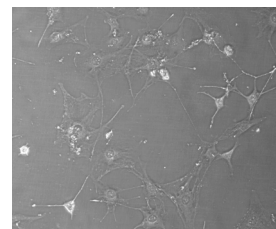
Varsha Singh
Chitkara University, Chandigarh

Guided by :
Dr Preethi Pradhan

The present invention shows neuronal cells, derived from a specific murine (mouse) C3H10T1/2 mesodermal cell line (which is not known to produce neuronal cells) and a cheap and cost-effective method of producing neuronal cells from the said cell line, under in vitro conditions.

Murine C3H10T1/2 are treated with walnut oil (cold-pressed) which gives rise to neuronal cells after 72 hours of culture under standard conditions of incubation, at 37 degree Celsius and 5% carbon dioxide. After 24 hours of treatment with walnut oil, the murine mesenchymal cells become thin and elongated and show neuronal-like appearance on the third day. The neural nature of the cells is further confirmed by

Cresyl violet acetate staining.



PAS: The innovator has filed the patent for his work on *neuronal cells produced from non-neuronal cell line using walnut oil*.

Reference: 15



Debjyoti Chowdhury



Cost-effective self-stabilising smart handheld platform (spoon/pen) for elderly or Parkinsons' disease-affected patients

Debjyoti Chowdhury,
Heritage Institute of Technology, Kolkata

Guided by:
Dr Madhurima Chattopadhyay

This work deals with the development of a cost-effective, self-stabilising, smart platform (spoon/pen) for bringing stability to the hands of elderly people or patients affected with Parkinson's disease, using MEMS tri-axial accelerometer. It introduces an easy-to-adopt hand mount device which can be used to support the tremors in the hands of the elderly people or in persons affected with the said disease. The support would help in day-to-day activities like writing, having food with a spoon and also holding crockery/knives. The designed system is built around an 8-bit AVR microcontroller, along with a 6-DOF (degree of freedom) tri-axis IMU (inertial measurement unit) in the

form of a hand-held hardware. The person's hand movements are read by the system in the form of acceleration data which is then fetched from the IMU and is made to go through an embedded Kalman filter which performs estimation on the data acquired.

In order to drive the system, a custom-designed electromagnetic (a servo) drive is designed to work with an embedded microcontroller-based application. Every time there is a change in acceleration data, the servo is actuated in a direction opposite to the recorded value from the person's hand movement. This device uses six point-based sensor data calibration to eliminate discrepancies in output due to zero-G and installation errors.

PAS: The innovator has already patented his work as Liftware. Novelty denied.

Reference: 16



Avisek Barla

Milk adulteration detection kit

Avisek Barla

Indian Institute of Technology, Madras

Team member: Sameer Sharma, Srikanth

Chandrasekaran, Junaid Babu, Aparajitha K

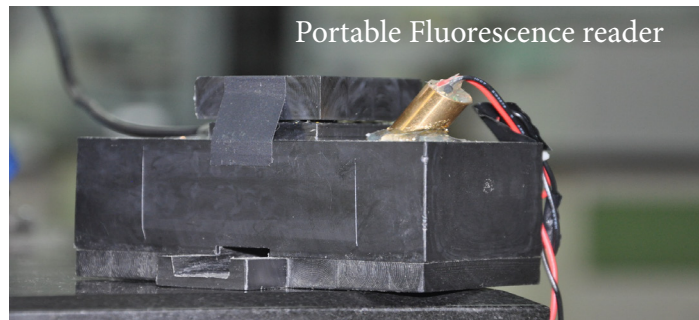
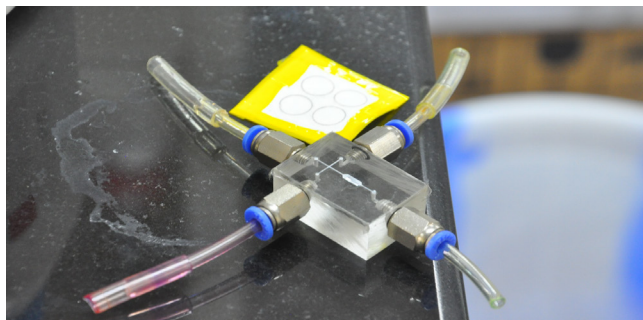
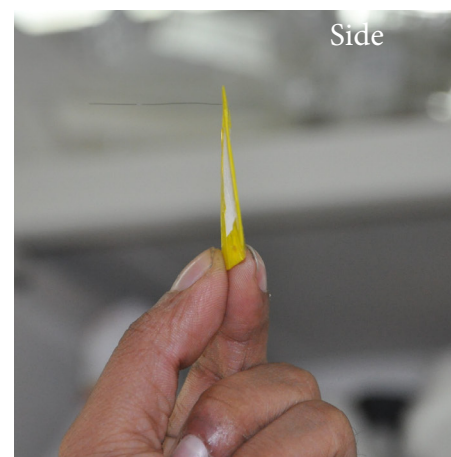
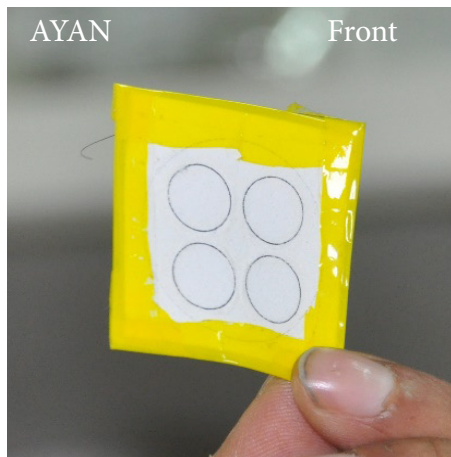
Guided by:

Dr Ashwin Mahalingam

A paper strip through which tests for five adulterants (glucose, urea, detergent, starch and fat) can be done simultaneously has been developed. Ayan has been designed keeping the end user in mind. The unique selling proposition is the number of tests it can perform at a very low production cost of Rs 1.60. The user needs to dip one end of the test strip in the milk and, through the natural capillary action, the milk reacts with the reagents in their respective reaction zones. The results can be seen through the change in colour that occurs.

industrial grade device which will sport a microfluidic chip, image processing unit and a spectrophotometer. A scaled up prototype for testing has been developed.

This is a capillary-type microfluidic device. The chemicals are printed on the paper using a normal inkjet printer. Paper as a medium and chemicals in small quantity bring down the costs. Ayan pro is an



PAS: We have not found any patent or published article in searchable database on internet for *development of milk adulteration detection kit* (both patent and non-patent database).



Shiva Kalyani Adepu

Multimechanistic polymer-based novel drug eluting stent coating

Ms Shiva Kalyani Adepu,
Dr Govinda Kapuseeti, Dr Kiran Kalia
*National Institute of Pharmaceutical Education &
Research, Ahmedabad*

Guided by:
Dr Kiran Kalia

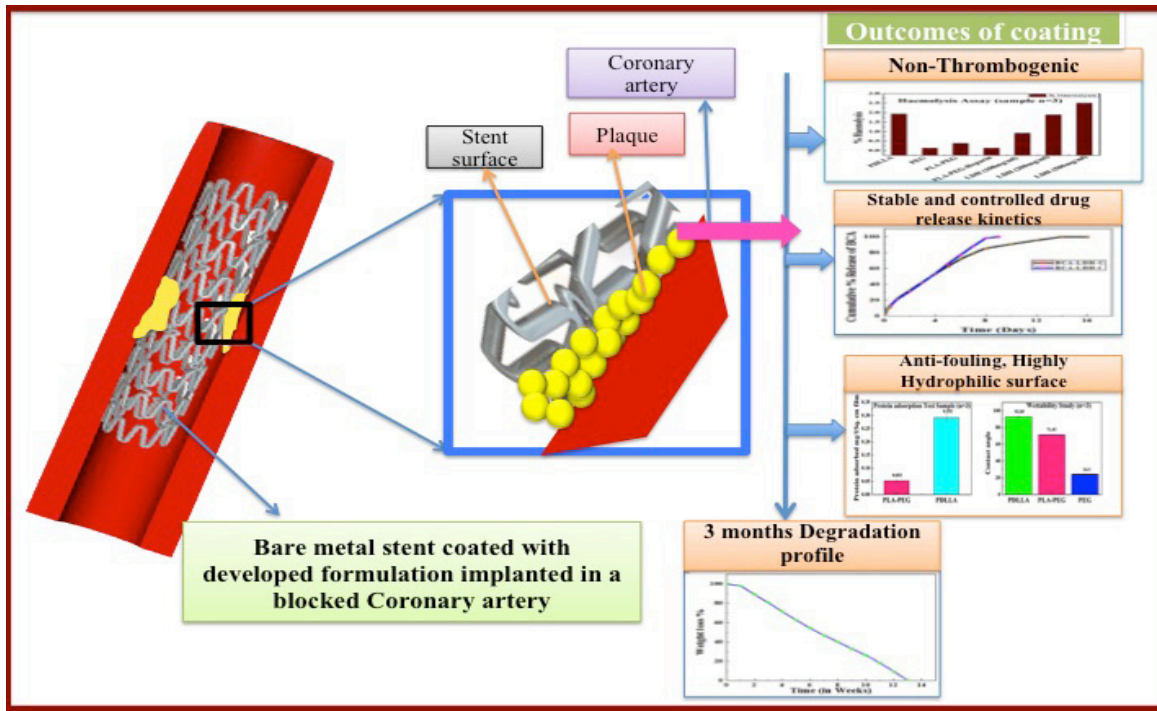
Stent Thrombosis (ST) and delayed re-endothelialisation pose to be the major problems associated with currently-available drug-eluting stents (DES). Therefore, a multi-mechanistic polymer-based novel DES coating is developed.

Layered double hydroxide (LDH) nanoparticles have been successfully synthesised and are confirmed by FTIR, XRD, and TEM & Zeta potential. Significant drug loading (63%) has been observed in LDH nanoparticles, with a desirable controlled-drug release profile up to 16 days. PLA-PEG copolymer and Heparin-tagged PLA-PEG copolymer have been successfully synthesised and are confirmed by FTIR. Complete degradation of PLA-PEG copolymer has been observed at

around 90 days.

Nano-encapsulation of BCA-LDH has been successfully done for the final stent coating.

The developed stent surface coating is non-thrombogenic, anti-fouling and sufficiently hydrophilic. It releases the drug in a controlled manner, with a desirable polymer degradation profile. Therefore, it is concluded that the developed stent surface coating offers non-thrombogenicity and may prevent restenosis without delaying re-endothelialisation. Hence, the developed stent surface coating is superior to the existing formulation coatings.



PAS: We have not found any patent or published article in searchable database on internet for *development of multimechanistic polymer-based novel drug-eluting stent coating* (both patent and non-patent database).



Manisha B Padwal

Harnessing microair jets for spraying viscous non-Newtonian fuels

Manisha B Padwal,
Indian Institute of Technology, Kanpur

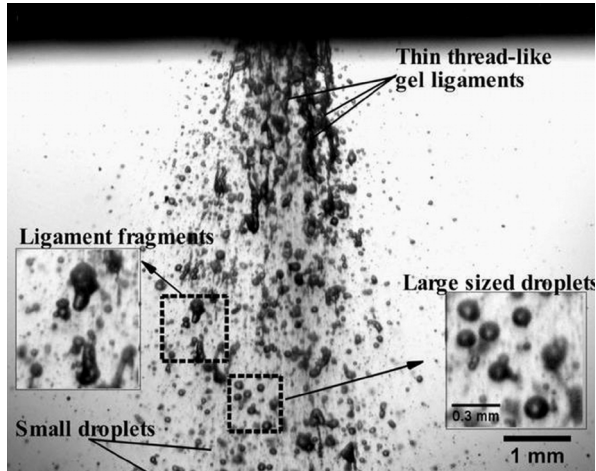
Guided by:
Prof D P Mishra

The innovation is in the form of a two-fluid atomiser, a device that transforms bulk liquid into millions of micron-sized droplets. It is an internally-impinging atomiser to reflect its basic working principle, which uses multiple micro jets of air at low-to-moderate pressure within the atomiser body.

prepared to improve safety in storage and handling stages of propellant life cycle and replace less versatile solid propellants. It also tends to reduce environmental pollution and improve overall efficiency of propulsion engines.

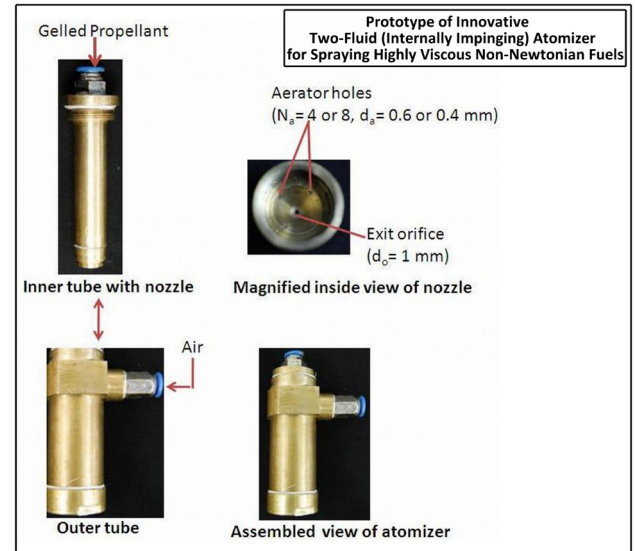
The innovation generally concerns the field of enhancing the atomisation and quality of highly-viscous non-Newtonian fluids by utilising only a small amount of atomising air. This has been made possible with the introduction of high-momentum atomising air in a cross-flow arrangement into the incoming viscous liquid at the conical section, just upstream of exit orifice.

Thus, a versatile atomiser design is disclosed. The innovative atomiser is especially suitable for atomisation of fuel formulations



High-Resolution Image of Micron-Size Droplets of Gelled Jet A1 Propellant Spray Produced by the Innovative Two-Fluid (Internally Impinging) Atomizer.

Two-fluid atomiser: Proof of concept



Two-fluid atomiser - Prototype

PAS: The innovator has filed a patent for his work on *two-fluid atomiser*.

Reference: 17



Mitradip Bhattacharjee

Paper-based resistive touchpad for electronic applications

Mitradip Bhattacharjee
Indian Institute of Technology, Guwahati

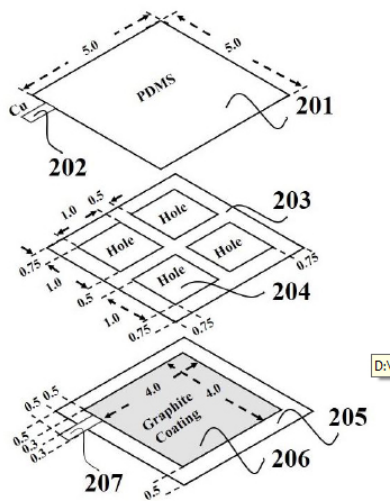
Guided by:
Dr Dipankar Bandyopadhyay

A paper-based resistive touchpad has been developed which is economic, eco-friendly and biodegradable. It employs commonly-available materials like paper, PDMS and graphitic coating.

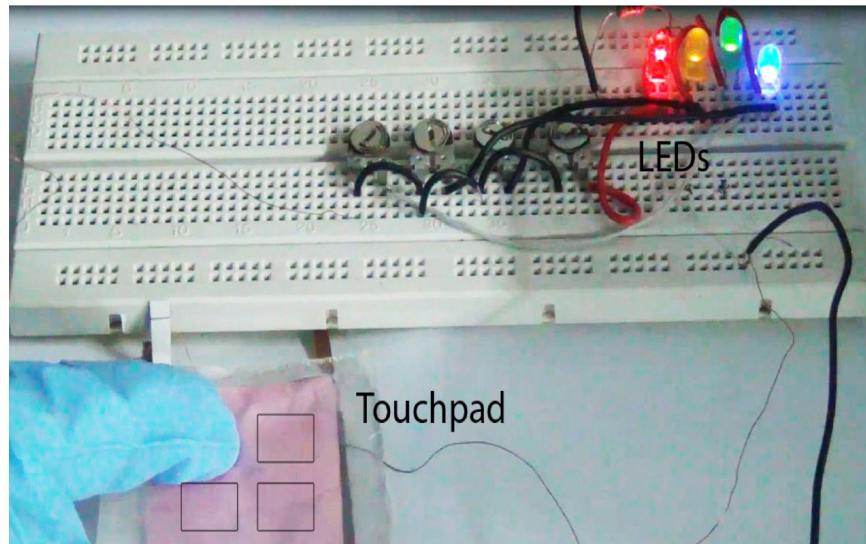
In this, the touch location is identified by the change in the output resistance of a particular place and is flexible from both the sides because the building blocks are composed of soft materials such as paper and PDMS. While the graphite-coated paper layers act as conductive layers in the touchpad, the transparent coating of PDMS, in the middle of the papers, acts as a dielectric layer between them.

It is a resistive touchpad where the touch area comprises two pieces of graphite-coated paper, acting as two conductive

surfaces, and comes in contact to give a particular output resistance at the touch location. Here, the conductive papers are coated with a transparent polymer, acting as a protective coating; the conductive papers are separated by patterned thin film of non-conducting polymer and, the polymer coating is the only transparent element in the device. The prototype can reduce the cost for a wide range of applications such as mobile phones, television screen, ATMs, laptops, computers, healthcare devices and i-pads.



Schematic diagram of 3 different layers of touchpad - Prototype



Illustration

PAS: The innovator has paper published on *self-spinning nanoparticle-laden microdroplets for sensing and energy harvesting*.

Reference: 18



Roystan Vijay Castelino

High-altitude wind energy using kite: A revolution in renewable energy

Roystan Vijay Castelino

*Srinivas Institute of Technology, Merlapadavu,
Valachil, Mangaluru*

Guided by:

Prof Lokesh B

The problems posed by electric energy generation from fossil sources include high costs due to large demand but limited resources, pollution and CO₂ production, and the geopolitics of producer countries. Therefore, the feasibility of using tethered kites to generate power from the wind is studied here.

oscillating tether tension, caused by the vertical motion of a kite, into rotary shaft motion to drive a generator. Another mechanism is designed which converts the continuous pull of the kite into electric power. The design uses a commercially-available parafoil kite which is 4.5 meters squared in size which is found to be useful.

Generating electricity using kites instead of wind turbines have certain advantages like generating power at low cost while eliminating certain environmental problems associated with wind turbines; kites can fly at greater heights than wind turbines. Since wind speed increases with height and the available power is proportional to wind speed cubed, the wind power potential is larger for kites.

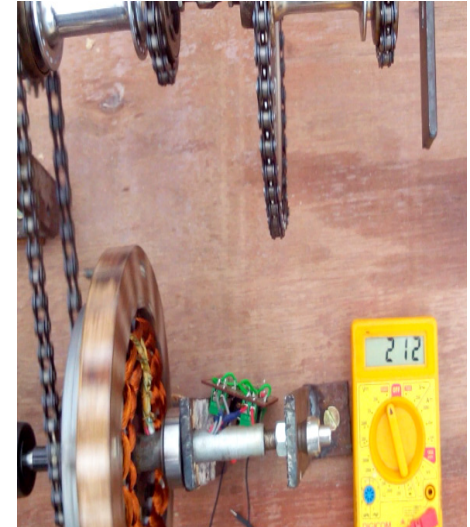
A mechanism is designed to convert the



Kite energy - Prototype



Kite energy - Testing Kite flying



Kite energy - Power generation

PAS: We have not found any patent or published article in searchable database on internet for *High-altitude wind energy using kite - A revolution in renewable energy*.



Vinay Gangaraju

Nanomaterial-based flexible aqueous power cell for energy conversion and storage (self-charging and flexible aqueous power cell)

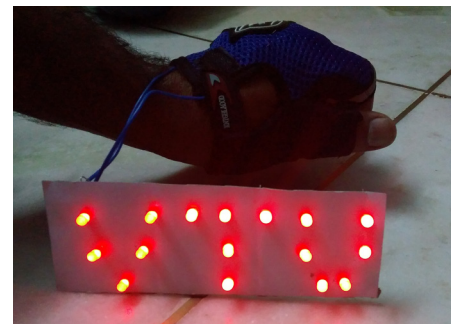
Vinay Gangaraju, Dr D.S. Prasanna
*Dept. of Nanotechnology, PG Center Bangalore Region,
Visvesvaraya Technological University*

Guided by:
Prof Dinesh Rangappa

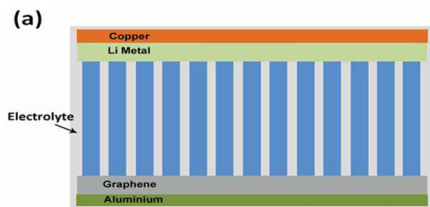
Nanomaterial-based flexible, aqueous power cell for energy conversion and storage for harvesting mechanical energy has been developed. This power cell is fabricated using zinc oxide (ZnO) nanoparticle as piezoelectric material (which converts mechanical energy into electrical). Graphene nanosheets are employed as anode material. Aluminum is used as the current collector for anode. The LiMn₂O₄ cathode, extracted from waste lithium-ion batteries, is used as cathode.

Application of ZnO nanoparticles has been of greater advantage in the operation of the device as the size of the material is small, where more amount of charge/ion transport can take place. The materials synthesised are characterised using SEM, XRD, FTIR and cyclic voltammetry. The size of the

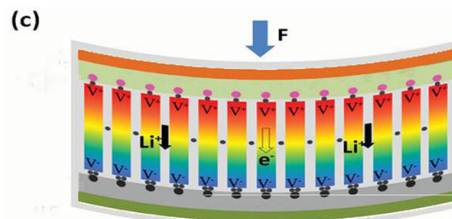
ZnO is about 50 nm, as observed under SEM. Particles show rod-like morphology. Flexible battery is fabricated which exhibits 1.2-1.5 V output.



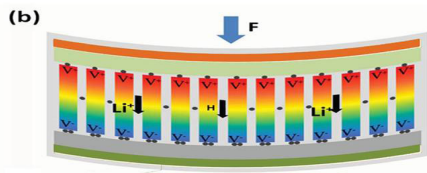
Prototype



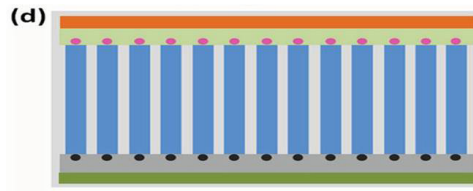
RFAPC in its discharged state with LiMn_2O_4 as cathode and graphene as anode.



Under the piezoelectric field, Li ions will migrate through the ZnO film separator from the cathode to the anode as shown above



When a compressive stress is applied onto the device, the ZnO piezoelectric separator layer creates a piezoelectric field with positive piezo potential at the cathode side and negative piezo potential at the anode



After the applied force is released, the piezoelectric field of the ZnO disappears, and a cycle of charge is complete

PAS: We have not found any patent or published article in searchable database on internet for *nanomaterial-based flexible aqueous power cell for energy conversion and storage (self-charging and flexible aqueous power cell)*.



Aiswarya Paramadathil

Low-cost sanitary napkin disposal machine

Aiswarya Paramadathil

*AdiShankara Institute of Engineering and
Technology, Kerala*

The issue of sanitary waste is a major problem. So, a technology is developed for the disposal of sanitary napkins using low-cost chemicals.

The napkin-dissolving solution collects in a septic tank and thereby does not pave way for any kind of pollution. The device works under the principle that cotton gets dissolved in a chemical named Cuprammonium Hydroxide $[\text{Cu}(\text{NH}_3)_4(\text{OH})_2]$ and its non-woven part can be recycled and used for making bags and covers. The cotton-dissolving chemical solution is passed to the septic tank while the undissolved non-woven cotton is collected in a waste tray. The used napkin is put through the inlet of the machine, where it is shred to pieces by the AC single-phase induction motor. The shred napkin pieces go to the reaction chamber,

where the reaction between the napkin and $\text{Cu}(\text{NH}_3)_4(\text{OH})_2$ takes place. The required amount of both chemicals needed for destroying one napkin is delivered into the reaction chamber through a tube, controlled by a solenoid valve.

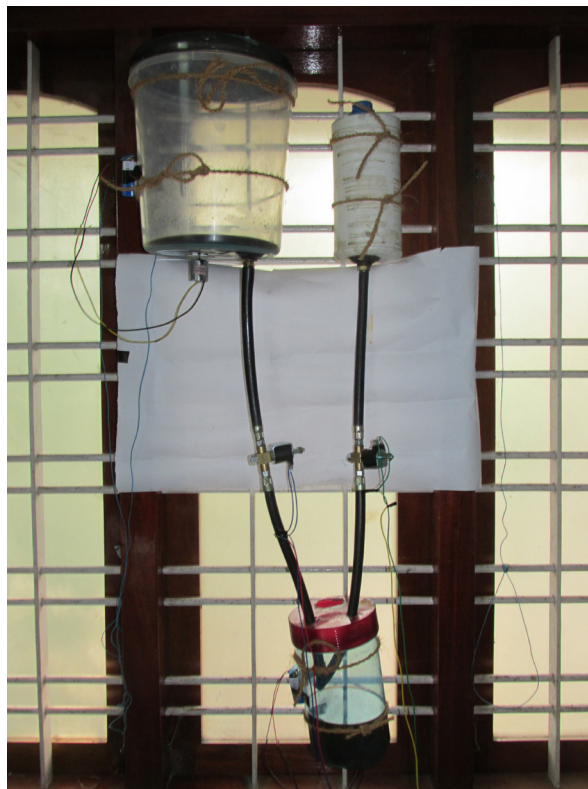
The approximate amount of the final chemical required to destroy one napkin is about 150 ml. 150 ml of dissolving solution contains 87 ml NH_4OH and 8 gm of $\text{Cu}(\text{OH})_2$. Thus, the sanitary napkins are completely destroyed.



Torn napkin



Chemicals mixed in the correct proportion



Prototype

PAS: The innovator has filed a patent for his work on internet for *low-cost sanitary napkin disposal machine*.

Reference: 19



Shashwat Sanghavi



Rahul Patel

CHEC Kit: A low-cost mobile OMR system

Shahwat Sanghavi

Institute of Engineering & Technology, Ahmedabad

Guided by:

Dr MehulRaval

Mr Dhruv Gupta

Team member: Rahul Patel

In the current exam assessment system, students suffer heavily due to half-cooked evaluation schemes with irregular evaluation. Optical mark recognition (OMR) response sheets are checked manually because of resource limitations and results in infeasibility of an institute to deliver results accurately and quickly. For this, CHEC Kit, a mobile phone-based OMR system is used for automatic checking of the users' response sheets.

CHEC Kit exploits prior information about the OMR sheet layout, which helps in achieving high speed and accuracy.

The system incorporates computer vision and image processing, computer communication and networking, and database user interface. The backend is developed in Python and

OpenCV library while the front end is done using HTML and Android. The overall system cost is low as software is developed using open-source technology and does not necessitate scanning hardware. The desirability and viability aspect of the system development is done based on extensive market survey and after interviewing several stakeholders



Divya Anand

Green flexible conducting paper from edible bacteria-derived 3D nanocellulose matrix and polyaniline

Divya Anand

Indian Institute of Technology, Hyderabad

Guided by:

Dr Mudrika Khandelwal

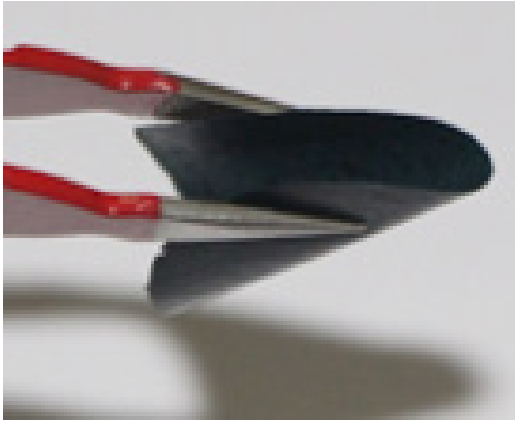
A new, greener material for conducting paper is sought for applications such as security paper, actuators and anti-static packaging. It is required that the material for these applications possess low density and a good mechanical integrity. Thus, a way to produce bacterial nanocellulose (BC) polyaniline (PANI) nanocomposites by in situ polymerisation in suspension of cellulose nanowhiskers has been shown here.

The advantages of using BC are its ultra-network structure, sufficient porosity, high purity and crystallinity, good mechanical properties, great water holding capability and low environmental impact. The BC/PANI composites formed by optimised synthesis of PANI within cellulose nanowhiskers possess good electrical conductivity in addition to its excellent mechanical properties and flexibility.

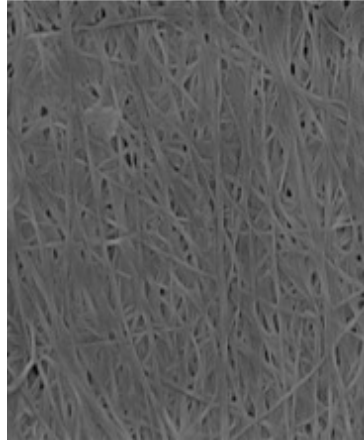


Prototype: Conducting paper

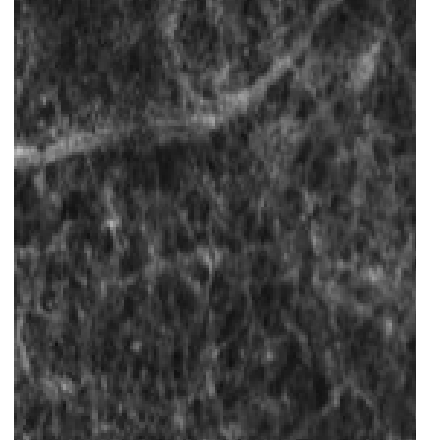
SEM images of cellulose-based paper



Green, flexible conducting paper



(a) Bacterial cellulose



(b) Filter paper

PAS: The innovator has published a paper on *novel conducting paper from bacterial cellulose and polyaniline*.

Reference: 21



Semi-automatic flower knotting device

C Cornelius Durai

Velammal College of Engineering and Technology,

Chennai

Team member: S Lakshmana Raja, S Sriram

Guided by:

Dr G Senthil Kumar

There is a growing demand for value-added products like flower crowns and garlands from Indians in the West Asia and other countries. The usage of flowers all over the world is unlimited. Farmers feel that winding the flowers manually takes too much of time and is boring. Thus, in order to improve their lifestyle, a novel flower-winding machine is designed.

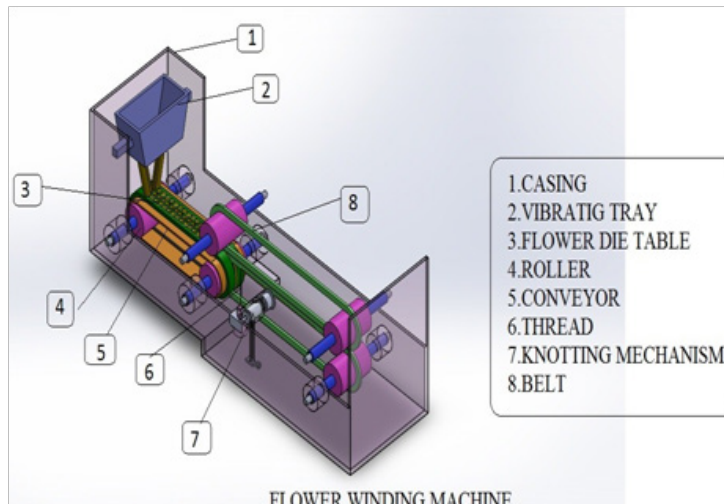
It consists of flower tank, flower assembly belt, flower clamping belt, knot mechanism, cam and a vibration system. The tank is used to store the flowers. At the bottom of the tank, flower-shaped holes are provided. The hole exists up to the conveyor belt. The flowers come out of the tank and fall on the conveyor. At the end of the conveyor belt, two more belts are constructed in the

opposite direction for proper clamping of the flowers. Finally, the knot mechanism is introduced to make a knot. In this way, winded flowers are extracted from this machine.

This machine will help lift flower vendors' lifestyle.



Prototype



Working mechanism

PAS: The innovator has filed one patent on *design of flower winding machine*.

Reference: 22



Cart for physically-challenged

Vishrut Bhatt

L J Polytechnic, Gujarat

Team member: SumanthMudaliar,

Joshi Ashay, Dave Kaushal

Guided by:

Mr Harshul Bhrahmbhatt

The physically-challenged people having problem in their legs use *patla* currently, on which they move forward by pushing the ground backwards. Because of using *patla*, they face problems. One, they get blisters on hands; two, the hands become unhygienic for eating off them or using them in sanitary purposes. Therefore, a vehicle is designed which can be propelled by wiggling the front steering wheel, attached to two pivoting wheels touching the ground. It harnesses natural forces of inertia, centrifugal force, gravity, and friction in order to drive the car forward and backward. It does not require a power source such as battery, fuel, pedal or gears. Instead, it simply runs on the person's ability to wiggle the steering wheel. It can be

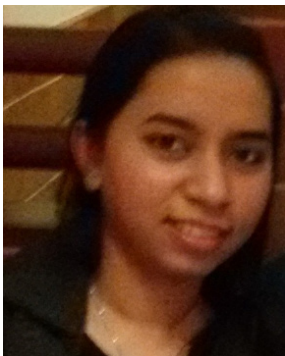
operated indoors and/or outdoors, though it works best on a smooth, flat surface.

The aerodynamic shape gives better speed and more comfort to the user as it has less ground clearance. Children can also ride on it for fun. Sunmica on plywood is provided for sitting. This device is also comparatively cheaper and durable than other vehicles and wheelchair available for the handicapped.



Prototype

PAS: We have not found any patent or published article in searchable database on internet for *cart for physically-challenged* (both patent and non-patent database).



Neelima Tripathi

Biobased adhesive formulation for construction applications

Neelima Tripathi

Indian Institute of Technology, Guwahati

Guided by:

Dr Vimal Katiyar

Synthesis of bio-based, non-toxic and eco-friendly adhesive for high-performance structural applications is presented. The formulation and process are environmental friendly as ingredients of these adhesive are derived from renewable feedstock.

The adhesive is prepared by in situ polycondensation of hydroxycarboxylic acid/oligomers and its conjugates with polysaccharide/protein by conventional heating reaction method and reaction in the presence of microwaves. This is used as adhesive by applying it on the full or partial surfaces of the substrate of any shape and size, at elevated temperature and subsequently, by compressing these coated surfaces on, with or without coated surfaces, which leads to the integration of substrates having partial and complete interface of conjugate/blend

system.

The synthesised green adhesive showed excellent shear strength and matchless adhesive properties with respect to the present bio-based adhesives. It has an excellent ability to bind glass and granite substrates. Thus, it has the capability to replace the present market products.

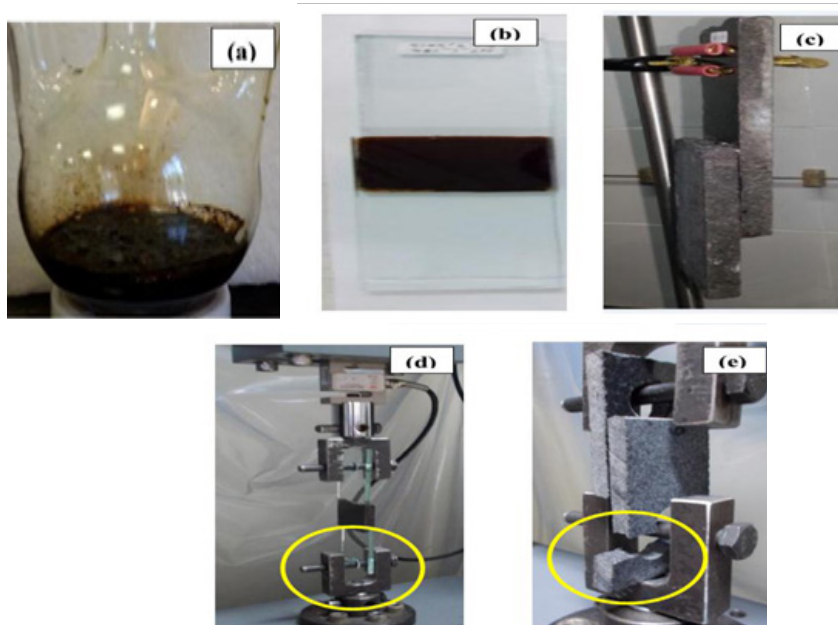


Fig. 1: Biobased adhesive for single-lap shear test (a) Biobased adhesive (b) Glass laminate before shear test (c) Granite laminate before shear test (d) Glass laminate after shear test (e) Granite laminate after shear test

PAS: The innovator has filed patent for his work on *biobased adhesive for structural applications*.

Reference: 23



Ajin Omanakuttan

Latex (natural rubber) backpack

Ajin Omanakuttan

*Amaljyothi College of Engineering, Kanjirappally,
Kerala*

Guided by:

Prof Abi Varghese

The traditional method of collecting latex requires much strain and causes body imbalance. It is very uncomfortable as we need to bend frequently to collect the latex. It also requires more time. Thus, a latex backpack is developed which intends to make latex collection and carrying it much easier, safer and comfortable.

Here, latex is collected in a specially-designed container which lies in the backpack. This facilitates carrying more latex conveniently, without using any external power. It is an economically-feasible product that offers better body stability and ease of carrying.

By using the latex backpack, we can reduce the chances of causing accidents and there is no need to bend frequently. Moreover, the

time required to collect latex is reduced by a great extent. Hence, latex backpack is proved to be a novel idea in the field of natural rubber cultivation industry.



Latex backpack



Latex backpack field use

PAS: The innovator filed a patent for his work on *latex (natural rubber) backpack*.

Reference: 24



Mannam Naga Praveen Babu

Bio-inspired flapping near surface underwater vehicle

Mannam Naga Praveen Babu,
Indian Institute of Technology Madras

Guided by:
Prof Krishnankutty. P

The growing demand for reduction in CO₂ emissions from marine vehicles enthused researchers and scientists to come up with more efficient propulsion systems. Therefore, in this research, a novel design of a bio-inspired robotic fish, with pectoral and caudal fins, which operates at subsurface, is considered.

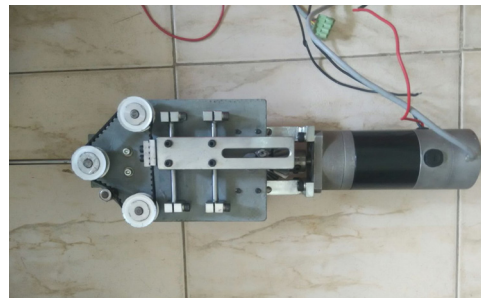
Observations have shown that the tail fin movements of fishes generate forces for propulsion and maneuvering. A lift-based propulsion theory is used to estimate the thrust generated by pectoral fins (used as auxiliary thrust device) and an empirical method is used to estimate the torque at the caudal fin.

Numerical and experimental studies are conducted with the robotic fish to determine

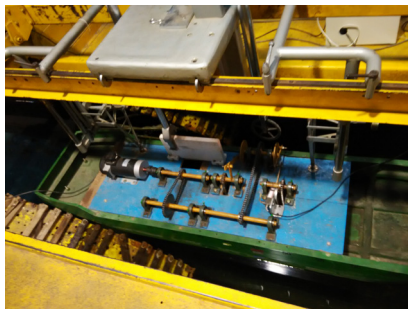
its resistance in bare hull and also, for the case fitted with fins. The propulsive performance and stopping ability of the bio-inspired underwater vehicle is studied experimentally in towing tank and analysed, which is found to be extremely good



Propeller -I



Propeller -II



Ship: Underwater vehicle

PAS: We have not found any patent or published article in searchable database on internet for *bio-inspired flapping near surface underwater vehicle*.



E-Droid meter

Bitu C Ghoniya

Sarvajani College of Engineering & Technology,

Gujrat

Team member: Shruti B Patel,

Jigisha M Karangiya, Jinal N Modi

Guided by:

Urmi Desai

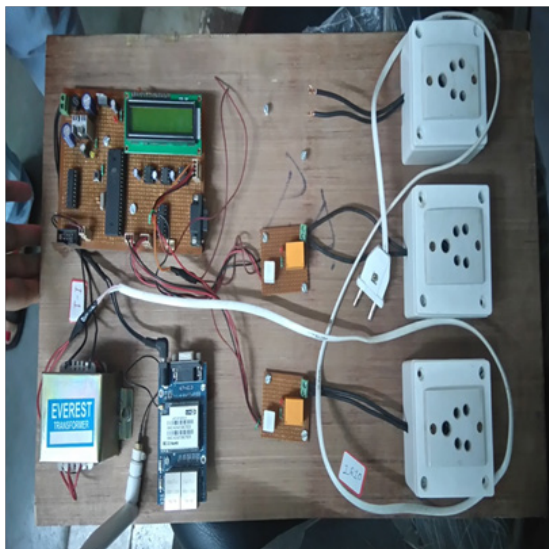
Problems with electricity bill have always off automatically.

been there, for example one cannot ensure that how accurate his/her bill is, one cannot predict the bill and cannot find out how much one pays per unit. So, a project which can help in solving these problems is built.

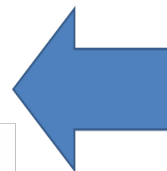
The consumption of individual appliances is analysed. A device is made which will continuously measure consumption of every appliances and these data will be transferred to the server so that one can check and see the usage of appliances graphically.

The device can be used in residential and commercial areas, for analysing power consumption of appliances and to save energy.

The biggest advantage of this system is that one can turn on/off the power of appliances remotely. One can get notifications when any appliance exceeds its threshold value and that particular appliance will be turned



Prototype



PAS: We have not found any patent or published article in searchable database on internet for flexible *E-Droid meter*.



Design and development of multipurpose electric cycle

Patel Krunal

*Shri Satsangi Saketdham Ram Ashram Group of
Institutions, Vadasma, GTU*

Team member:

Solanki Prashant, Brijesh Patel, Jigar Parmar

Guided by:

Mr Sandip Godse

Imagine you are cycling on the road and meet an accident or suffer injuries by falling down. This project presents an electric motorised bicycle which can easily convert into a wheelchair and transport you (the injured) to the nearest hospital.

This cycle is designed to run on electric power, with two electric motors fixed to wheels. However, it could be manually-run when the battery is down. Once the purpose is served, it can be folded to a compact size within a minute, without needing any tools.



Multipurpose electric cycle



Multipurpose electric-cycle wheel chair

PAS: We have not found any patent or published article in searchable database on *multipurpose electric cycle* (both patent and non-patent database).



*Nilkantha
Gadakh Nilkantha Dashrath*



Ganesh Anarase



Ganesh Gaikwad



Jondhale Shailesh

Automatic sugarcane juicer

Nilkantha Gadakh, Nilkantha Dashrath
*K K Wagh Institute of Engineering Education and
Research, Nashik*

Team member: Gaikwad Ganesh Balasaheb,
Jondhale Shailesh Bhausaheb,
Anarase Ganesh Raosaheb

Guided By:
Prof M R Pardeshi

The conventional sugarcane juice machines normally have two powered crushing rollers which do not crush the cane in a single crush, hence providing low juice extraction efficiency. The operators have to continuously handle the sugarcane which carries the risk of hand injury. Also, it makes the juice unhygienic. Some sugarcane juice extractors allow extracting the juice in a single pass, but the feeding of sugarcane into the machine is again with manual help. In these crushers, the openings provided for the entry and exit of sugarcane. These openings remain open when idle.

The presented machine provides 20 per cent increase in juice extraction efficiency

as compared to the existing machines. The selected methodology and design are very effective in reducing the fiber content in juice, with very little fiber deposition on juice extracting rollers. Cleaning system contributes to improved juice quality by quick removal of juice from crusher components. Crusher inlet and outlet closures help prevent the introduction of foreign matter while machine is in working

state. Manual work is limited to storing of clean sugarcane in the storage box and giving instructions to the machine by operating switches, completely isolating the operator from any injury or accidents.

This innovation presents an automatic and compact sugarcane juicer with higher juice extraction efficiency, lesser power consumption and effective isolation to prevent injury to the operator, also producing clean and hygienic juice.



Prototype



PAS: We have not found any patent or published article in searchable database on *automatic sugarcane juicer* (both patent and non-patent database).



Vineesh K P

Cost-effective mechanical testing equipment for characterising creep behaviour of materials under combined tension-torsion loading

Vineesh K P

Indian Institute of Technology, Kharagpur

Guided by:

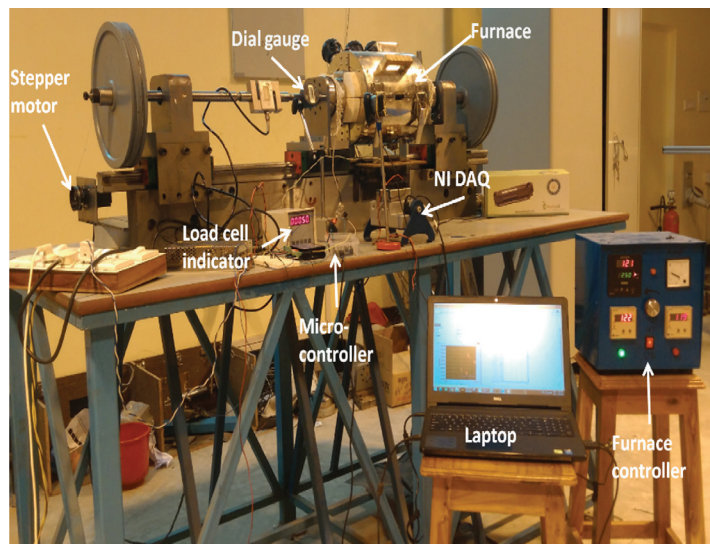
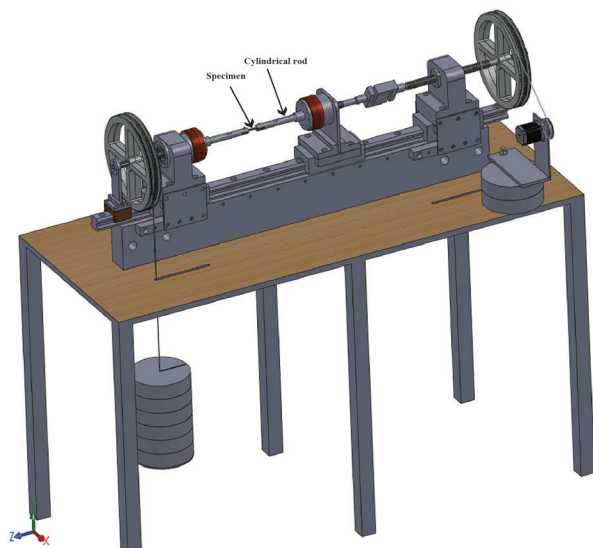
Prof Vikranth Racherla

Components in several engineering applications like gas turbines, nuclear power plants, boilers etc., experience stress at relatively high temperatures, causing them to undergo time-dependent permanent deformation (referred to as creep deformation). It is important to characterise the creep behaviour of materials for various loading and temperature histories, to be able to predict shape changes and component life in such applications.

The team has designed, fabricated and tested a mechanical-cum-creep testing machine that can measure elongation and twist, with high resolution in samples, subjected to tension and torsion loadings at given temperatures.

The fabricated prototype of our machine is different from other commercially available ones in the following regard: (i)

Ability to apply combined tension-torsion loads, (ii) Measurement of creep behaviour under time-varying temperature/loads, (iii) High measurement resolution (length changes of the order of 100 nm), (iv) Horizontal machine layout, simplifying reconfiguration, maintenance and assembly, (v) Lower cost, and (vi) Modular nature of machine, allowing easy reconfigurability.



PAS: Innovator team has filed patent on *cost-effective mechanical testing equipment for characterising creep behavior of materials under combined tension-torsion loadings*.

Reference: 25



Ms Dhafani Ishita



Mr Sadariya Gautam R.

Application of nanomaterial to analyse strength of concrete

Ms Dhafani Ishita,
Mr Sadariya Gautam R
*Vyavasayi Vidya Pratishthan's Sanch College of
Engineering, Rajkot*

Guided by:
Mr Hitesh Rameshchandra Ashani,
Dr Davit Dhruv

Cement-based materials have poor mechanical properties and are highly permeable to water and other aggressive chemicals. This reduces their durability and strength. Nanotechnology is applied in understanding of the hydration of cement particles. There are various ways to incorporate nanotechnology into concrete that will greatly improve its desirable properties like durability, strength, ductility, cleanliness, etc. Fineness test, consistency test, initial and final setting time, and soundness test are done after the addition of these nanoparticles in cement and its properties are studied.

A substantial improvement in the mechanical properties and durability of cementation materials is observed with assimilation of nanomaterials such as nano- Al_2O_3 , carbon nanotubes, etc. If the performance of the basic civil engineering raw materials is enhanced, the productivity will increase.



PAS: We have not found any patent or published article in searchable database on *application of nanomaterial to analyse strength of concrete* (both patent and non-patent database).



Shuchita Gupta



Yashovardhan Sharma

mSleep: Measure your sleep

Shuchita Gupta, Yashovardhan Sharma
*Indraprastha Institute of Information Technology,
Delhi*

Guided by:
Dr Vinayak Naik

The amount of sleep affects an individual's health. The gold standard of measuring sleep and diagnosing sleep disorders like sleep apnoea is polysomnography which, though accurate, is expensive and lacks portability. A number of wearable devices with embedded sensors have emerged in the recent past as an alternative for regular sleep monitoring directly by the user. These devices, however, are intrusive and cause discomfort besides being expensive.

This work presents an algorithm to detect sleep by using a smartphone, with the help of its inbuilt accelerometer sensor. The device consists of airflow (for rate of respiration), pulse oximeter (for heart rate and oxygen saturation), accelerometer (PLM) and EEG (brain waves) sensors.

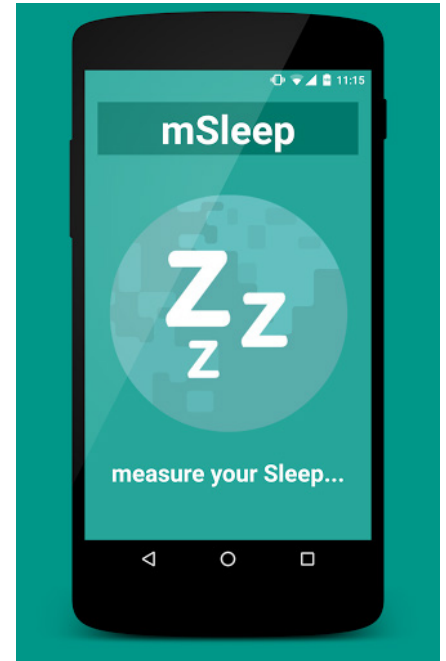
The data is stored on cloud; results are

summarised and seen on phone by the doctors and patients. The accuracy of sleep detection was compared with that of Zeo sensor, based on electroencephalogram (EEG) sensor to detect sleep. In order to concisely represent the sleep quality of people, the sleep data was modeled using Hidden Markov Model (HMM).

The innovation allows people to easily and seamlessly measure their sleep, without requiring a lot of technical know-how, while helping to diagnose a very commonly occurring disease (>10% of the population), sleep apnoea. This also aids the doctors in tracking and studying the sleeping habits of patients remotely.



Prototype



PAS: The innovator has published a paper on his on *An smartphone-based algorithm to measure and model quantity of sleep.*

Reference: 26



Sharad Parekh

Straut AERO: Solar industrial hot-air generator

Sharad Parekh

*University college of engineering & Technology,
Ahmedabad*

Guided by:

Dr Nilesh Bhatt

The hot air is a preferred choice of the industry as a source of process heat fluid when compared with other sources like thermal fluid or water. The industries currently use natural gas, coal or biomass as a fuel to heat air. A typical small industry consumes about 20-30 one million British Thermal Units (MMBTU) per day for hot air. However, the increasing cost of fossil fuels and emissions are a continuous concern. The consumption of coal and natural gas for heating of air leads to carbon emissions. More efficient or greener sources of process heat/hot air is required to avoid these carbon emissions.

To address this problem, the innovator developed a product called STRAUT Aero. It uses solar energy to generate hot air which is ready to be deployed for industrial

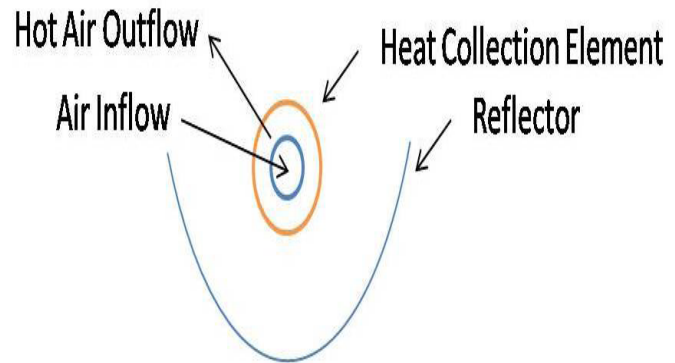
purposes. The prototype of solar air heater generator uses a heat collector. It consists of three major elements: heat collection element, reflector and header.

Heat collection element receives the reflected energy available from the reflector. Reflector increases the aperture area and reflects the energy on the heat collection element while the header is used to provide for inflow and outflow of the energy. In AERO, this heat collection element is having a special design that makes it very efficient with air as a fluid. The reflector is also used to increase the aperture area. The concentration ratio of reflector and receiver depends on the temperature and mass flow rate. The successful working prototype is already operational. The maximum temperature of 300 deg.C can be achieved by this

solution, which covers all major process air heat application of industries.



Straut AERO: Prototype



Straut AERO: Internal mechanism

PAS: We have not found any patent or published article in searchable database on *Straut AERO: Solar Industrial Hot Air Generator*.

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Honey Bee Network

Honey Bee Network (HBN), a new social movement, pioneered open innovation culture much before the term became popular. For the past 25 years, it has been the vanguard of protecting knowledge, resources and rights of the 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 knowledgeholders, 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 200,000 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 Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI), Grassroots Innovation Augmentation Network (GIAN), National Innovation Foundation (NIF) and inspired many national and international innovation policies. It is a global platform where like-minded individuals, innovators, farmers,

academicians, policymakers, entrepreneurs and non-governmental organisations (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:

- 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
- 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

- Mentoring individual innovators in various sectors and linking them with each other and informal sector innovators. Lobbying for policy and institutional changes in support of grassroots creativity and innovations at regional, national and international levels
- Supporting knowledge and intellectual property rights (IPR) 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
- Linking innovators with formal research and development (R&D) institutions, market and communication institutions & networks, media etc., so that more and more people are inspired to find solutions to problems of our society
- Supporting NIF (www.nifindia.org), part of Department of Science & Technology now, and helping take HBN goals to much larger level by focusing on technological innovations at grassroots and among school children. SRISTI (www.sristi.org) and GIAN (www.gian.org) provide institutional support to the Network, along with other volunteers
- HBN is mainly a voluntary movement supported by a large number of volunteers. It has a very strong network in China (CHIN -TUBE President and SRISTI have signed an agreement)
- Linking technology students with small industry entrepreneurs and informal sector through techpedia.in and facilitating Gandhian Young Technological Innovation Awards by SRISTI
- Creating world's largest open-source pool of sustainable solutions developed by people without outside help, accessible to communities worldwide
- Bringing out HBN newsletter, a unique voice of creative and innovative people at grassroots in different languages
- Motivating commercial organisations and public systems to become more empathetic in providing extremely affordable services and products to common people

SRISTI

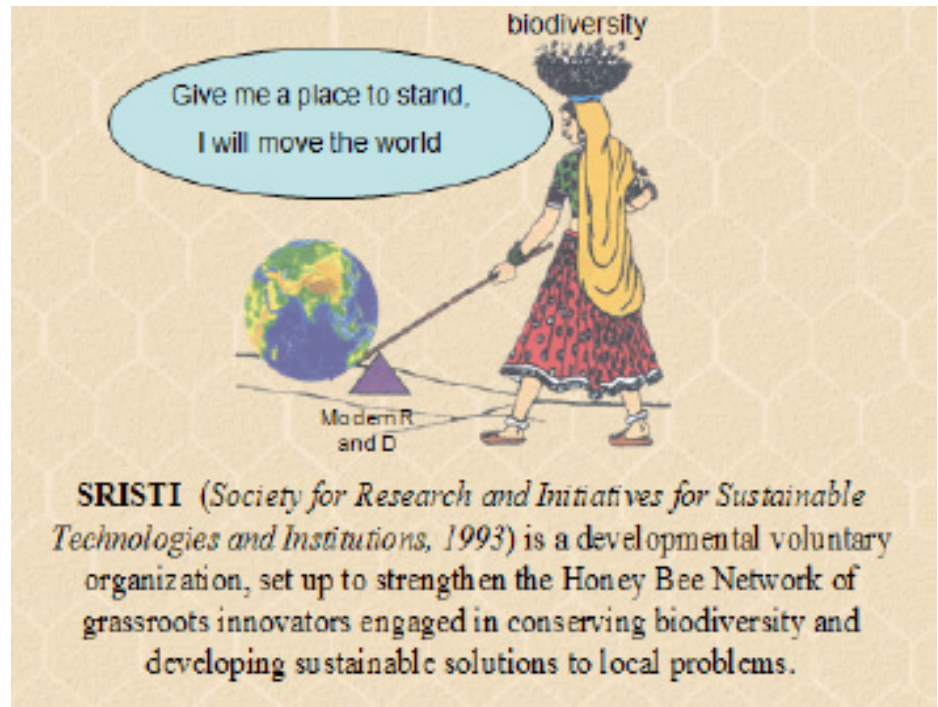
Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI), which means creation, was born in 1993, essentially to support the activities of the Honey Bee Network to recognise, respect and reward creativity at the grassroots. The objectives were: systematic documentation, dissemination of and value addition in grassroots green innovations, providing them IPR protection and risk capital 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 establish GIAN, NIF, MVIF and AASTIHK 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: English (Honeybee), Gujarati (Loksarvani), Hindi (Sujh Bujh, Aas Paas Ki), Tamil (Nam Vazhi Velanmai), Kannada (Hittalagida), Telugu (Palle Srujana), Malayalam (Ini Karshakan Samsarikatte), 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, a natural product laboratory and innovations in education, culture and institutions. However, ethical fulcrum of its activities can be captured by eight Es (ethics, empathy, equity, efficiency, excellence, environment, education and entrepreneurship) – the values that are central to the existence of Honey Bee Network. SRISTI organises Shodhyatra (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 for the past 25 years, protecting knowledge rights 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 biodiversity 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 sciences and other applied technologies, in the form of Gandhian Young Technological Innovation (GYTI) Awards since 2012. SRISTI Samman is given periodically to outstanding social change agents. SRISTI is trying to build an online sanctuary of social, technological and institutional innovations through blend of open innovation, collaborative design, crowdfunding, incubation, e-commerce and challenge awards. Volunteers and collaborators are invited.



National Innovation Foundation (NIF) – India

towards a creative, compassionate and collaborative India

The National Innovation Foundation (NIF) – India, set up in 2000 by the Department of Science & Technology, building upon the Honey Bee philosophy¹, 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 IPR of the contemporary, unaided technological innovators as well as of outstanding traditional knowledgeholders on a commercial as well as a non-commercial basis.

With major contribution from the Honey Bee Network, NIF has been able to build a database of over 185,000 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

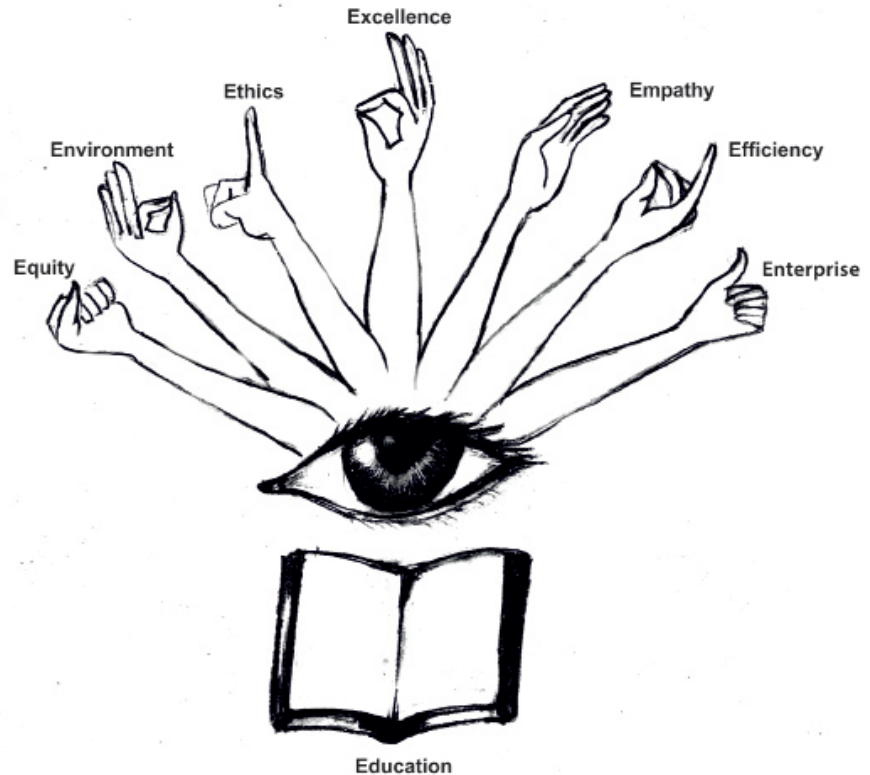
functions. Through the collaborations with various R&D and academic institutions, agricultural & veterinary universities and others, NIF has helped in getting thousands of grassroots technologies validated and value added. It has also set up a Fabrication Laboratory (Fab Lab) with the help of Massachusetts Institute of Technology (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 file over 743 patents (including eight filed in USA and 27 patent cooperation treaty applications) on behalf of the innovators and outstanding traditional knowledgeholders of which 39 patents have been granted in India and five in the USA. It has also filed applications for 38 plant varieties developed by farmers at the Protection of Plant Varieties and Farmers' Rights Authority. Micro Venture Innovation Fund (MVIF)

at NIF, with the support of Small Industries Development Bank of India (SIDBI), has provided risk capital of over Rs 3.84 crore to 193 projects, which are at different stages of incubation. NIF has received over 950 product inquiries from around 108

¹The honey bee 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

countries for various technologies and has succeeded in commercialising products across countries in six continents, apart from being successful in materialising 89 cases of technology licensing, many with the support of GIAN.

NIF has proved that Indian innovators can match anyone in the world when it comes to solving problems creatively. Where they perform better than the 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 creativity and innovations at grassroots. 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.



Techpedia (www.techpedia.in)

Techpedia, 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 young technology students across the country. For the past sixty years, India has not utilised much of 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 repeat what has already been done before. This will be possible only when they can find out what has been done before. Techpedia has 190,000 technology projects done by about 600,000 students from more than 600 colleges in India.
- Connecting the technical students with the problems of informal unorganised sectors and grassroots innovators.
- Putting the technical problems of medium and small-scale enterprises on the agenda of students so that affordable real-time solutions can be generated.
- To harness collaborative potential of students across disciplines and colleges to solve persistent problems of our country in formal and informal sectors.
- Explore the relay model (relay) of product development; the idea is that if one student group has brought the solution of a particular problem to a specific stage, the next group of the same/other department should be able to build upon it and take it forward.

- To pose challenges for students to address unsolved problems of our society. Gandhiji had announced an award of 7,700 pounds (Rs 100,000) to redesign charkha (spinning wheel). Today, the value of this prize will be more than Rs 10 crore. Industry association, government and others can offer attractive prizes for solving those problems which have remained unsolved for 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 National Mentoring Network (NMN) to harness skills, insights and experiences 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 ecosystem more responsive to societal needs and aspirations of young talent
- Organise summer schools to 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 models, pioneered by the Honey Bee Network, are further diffused among student communities worldwide.

GYTI -2012 Winners

S. No.	Project Title	Student Team	Supervisor	University	College
1	LPG Based Refrigerator	Jainil Bhatt, Dhruvinkagdi, Tirthjani, Kunjaljadav	Prof Tushar Patel	GTU, Gujarat Technological University	LDRP Institute of Technology and Research, Gandhinagar
2	Domestic Refrigerator With Water Heater	Dhruv Patel	Prof N.M.Bhatt	GTU, Gujarat Technological University	Gandhinagar Institute Of Technology, Gandhinagar
3	LPG Based Refrigerator	Chintan Patel, Mayank D Patel, Mayank I Patel Biren Patel	Prof YI Raol, Prof Ab Patel	GTU, Gujarat Technological University	Laljibhai Chaturbhai Institute Of Technology, Mehsana
4	Vardaan: Stair Climbing Wheelchair	Shanu Sharma	Dr J. Ramkumar, Shatrupa Thakruta Roy, Dr Satyaki Roy.		Indian Institute of Technology, Kanpur
5	Incense Stick Maker	Keshav G	Dr Murali Damodaran		Indian Institute of technology, Gandhinagar

S. No.	Project Title	Student Team	Supervisor	University	College
6	Multi Desire Wheelchair	Pratik Gandhi , Chintak Dholakia ,Sumit Shatwara, Bhargav Desai, Priyesh Rajnikant, Vanraj Kamliya	Prof B H.parmar	GTU, Gujarat Technological University	L.D.college of Engineering, Ahmedabad
7	A Tsunami Warning System Using Ionospheric Measurements	Jhonny Jha ,Deepika Thakur, Tushar Jadhav, Sanyam Mulay	Professor. Krishna Sudhakar		Indian Institute Of Technology Bombay
8	Ultra Sensitive, Low Cost Hand Held Explosive Detector System	Neena Avinash Gilda ,Sandeep S, Seena V, Sheetal Patil	Prof V Ramgopal Rao, Prof Dinesh K Sharma, Prof Maryam S Baghini		Indian Institute Of Technology Bombay
9	Smart Grid Forecasting Technique	V S K Murthy Balijepalli			Indian Institute Of Technology Bombay

S. No.	Project Title	Student Team	Supervisor	University	College
10	Tiles Measurement And Grade Classifying Equipment	Deep M. Bhimani ,Dulari K. Kothari, Khyati K. Kotecha, Jasmin Nandaniya, Chirag P. Patel	Dr C. H. Vithalani	GTU, Gujarat Technological University	Government Engineering College, Rajkot
11	Image, Speech Recognition And Speech Synthesis For Physically Disabled	Saurabh Saket ,Rahul Ranjan	Inderdeep Singh Grewal	Punjab Technical University	Bhutta College Of Engineering
12	Jeevan Dhara Handpump With Integrated Filtering System	Kirti Ranjan ,Sankhya Mohanty			Indian Institute Of Technology , Kharagpur
13	Design, Synthesis & Evaluation Of Novel Steroidal Aromatase Inhibitors In Breast Cancer	Dr Prafulla M. Sabale		Gujarat Technological University,	Parul Institute Of Pharmacy, Limda, Vadodara
13	Automobile Air Conditioning Using Engine Exhaust	Harish Umashankar Tiwari ,Prof Dr G.v. Parishwad,	Prof Dr G. V. Parishwad	Pune University	College of Engineering Pune

GYTI-2013 Winners

Awarded Innovators 2013

S. No.	Project Title	Student Team	Supervisor	University	College
1	Apparatus For Making Silk Fiber Based Lamellar Biomaterials To Solve Problem Of Lower Back Pain	Maumita Bhattacharjee	Dr Sourabh Ghosh. Prof Alok R Ray	Gujarat Technological University	Indian Institute Of Technology, Delhi
2	Electronic Support System For Physically Disabled(deaf & Dumb)	Margie Ashok Joshi ,Vishal Patel, Chirag Patel, Jay Patel	Ms Dipti Patel		C.K.Pithawalla College of Engineering ,Surat
3	Reactor & Catalyst Development For Oxygen Evolving Step In Sulfur-iodine Cycle For Hydrogen Production	Kishore Kondamudi	Dr Sreedevi Upadhyayula		Indian Institute of Technology, Delhi
4	The Third Eye	Naveen Kumar Rai	Dr Amit Sethi		Indian Institute Of Technology, Guwahati
5	Clubfoot Orthosis	Kanwaljit Singh	Dr P.m. Pandey (Dept Of Mechanical Engineering, Iit Delhi)		Indian Institute Of Technology, Delhi

Awarded Innovators 2013

S. No.	Project Title	Student Team	Supervisor	University	College
6	She- Society Harnessing Equipment	Manisha Mohan ,Rimpi Tripathi	Prof Keyur Sorathia	SRM University , Chennai, Main Campus	SRM Univeristy , Chennai
7	Vajra(vessel Desk)	Raghunath P Lohar		The Aeronautical Society Of India	Ganesh Institute Of Engineering
8	Chetna - Celebrate Your Pregnancy	Keyur Sorathia ,Amit Ranjan, Jagriti Kumar			Indian Institute Of Technology ,Guwahati
9	Automatic Fish Scaling Machine	M.rajesh Kanna ,C.mathan, M.V. krishna -moorthy, Mahesh Mithilesh	DrPrajesh Kanna		Velammal College Of Engineering And Technology, Madurai
10	Spectral Eye	Sai Vijay Gole ,Saket Choudhary, Yashesh Gaur	DrPrajesh Kanna		Sai Gole- IIT Madras, Saket Choudhary- IIT Bombay, Yashesh Gaur- DAIICT
11	Vision For The Blind Using Ultrasonic Sensors	Santosh Kumar Bhandari ,Amrita Pattnaik, Vinod K		SRM University	SRM University

Awarded Innovators 2013

S. No.	Project Title	Student Team	Supervisor	University	College
12	E-diagnoser: An Advanced Low Cost Patient Monitoring Watch	Libin Varghese, Pillai Sareesh, Shibin Joseph, Adarsh .S, Chithira Jacob, Nithya Merin, Anoop.P	Asst.Profreshmi.v	Mahatma Gandhi University,kottayam	Amal Jyothi College Of Engineering
13	Ultra Low Cost Tunable Nano Scale Patterns	Nandini Bhandaru	Dr Rabibrata Mukherjee		Indian Institute Of Technology Kharagpur
14	Novel Stand-alone 1-phase Ac Generator For Rural Electrification Using Renewable Energy	Sandeep Vuddanti	Prof S.s. Murthy & Prof Bhim Singh		Indian Institute Of Technology ,Delhi
15	Laser Ignited Internal Combustion Engine	Kewal Dharamshi	Prof Avinash K Agarwal		Indian Institute Of Technology Kanpur
16	A Portable And Efficient Electronic Filter For Sub-micron Particles From Fluids	Aswathi R Nair	Sanjiv Sambandan		Indian Institute of Science

Awarded Innovators 2013

S. No.	Project Title	Student Team	Supervisor	University	College
17	Highly Gas Impermeable Elastomeric Rubber-rubber Blend Nano Composites	Ajesh K Zachariah	Prof(Dr) Sabu Thomas	Mahatma Gandhi University VNIT Nagpur	Mar Thoma College
18	Multifunctional Nano-in-micro Alginate Microspheres For Biosensing, Drug Delivery And Mri	Rashmi Dilip Chaudhari ,Abhijeet Joshi	Prof Rohit Srivastava		Indian Institute Of Technology Bombay
19	Digital Pen	Kalpesh Wani ,Vivek Bavishi, Venkat Rao			Visvesvaraya National Institute Of Technology, Nagpur
20	Nanofinishing Of Freeform Surfaces Of Prosthesis Knee Joint Implants	Sidpara Ajay Muljibhai	Prof V. K. Jain, Prof V. K. Suri, Prof R. Bala -subramanian		Indian Institute Of Technology Kanpur
21	Hydro-operated Square-bottom Paper And Jute Bag Making Machine	Anirudh Thakur			LLRIET Moga

Awarded Innovators 2013

S. No.	Project Title	Student Team	Supervisor	University	College
22	Saral Parikshan - An Advancement In Cutting Edge Technology For Rural Area To Detect Vitamin B12 For Pernicious Anemia	L. Sagaya Selva Kumar ,Prof M.s. Thakur	Prof M.s. Thakur	Mysore University	Council Of Scientific & Industrial Research-central Food Technological Research Institute (csir-cftri).

Appreciated Innovators 2013

S. No.	Project Title	Student Team	Supervisor	University	College
23	Self-cleaning Functional Molecular Material	M. B. Avinash ,T. Govindaraju, Carsten Schmuck, Elisabeth Verheggen	T. Govindaraju	JNCASR	JNCASR
24	High Performance Cooking Stove	Mayur Rastogi	Prof S Ray		Indian Institute Of Technology Khargpur
25	Robotic Dredger	Amit Dinanath Maurya ,Digvijay Maheshwari	C. Amarnath		Indian Institute Of Technology Bombay

Appreciated Innovators 2013

S. No.	Project Title	Student Team	Supervisor	University	College
26	Comprehensive Protection From Electrocutation	Ramdas M U ,Sonu Unnikrishnan K, Ashfaq Muhammed T, Shahin.t.a, Sreelakshmy Suresh And Sruthy	Dr Sudha Balagopalan And Ms Mary P Varghese	University Of Calicut	Vidya Academy Of Science And Technology, Thrissur
27	Cross Linked Antibacterial Hydrogel	Mr Chakavala Soyeb Rafikbhai ,Ms Vaishali Thakkar	Dr Nirav V Patel, Dr Tejal R. Gandhi	Gujarat Technology University	Anand Pharmacy College
28	Graphics Model For Power Systems In Cim Framework And Design Of Online Web-based Network Visualizations And Integration Of Control Center Applications	Gelli Ravikumar	Prof S. A. Khaparde		Indian Institute Of Technology, Bombay

Appreciated Innovators 2013

S. No.	Project Title	Student Team	Supervisor	University	College
29	Snippets-memory Aid For People With Disability	Devender Goyal, Aditi Srinivasan (bangalore), nirali Savla(mumbai)	Kshitij Marwah (Mit- Media Labs)	University Of Calicut	Indian Institute Of Technology Hyderabad
30	Design Of A Smart Automotive Ventilation System For Parked Vehicles	Gaurav Kumar Jaiswal ,Mohit Gandhi, Sanket Phalgaonkar, Harshal Upadhyay, Ankit Agrawal	Dr Vasudevan R.	VIT University	Vellore Institute Of Technology, Vellore
31	Hybrid Classifier For Marine Vessel Based On Propulsion	Piyush Aggarwal	Ms Mukta Goyal		Jaypee Institute Of Information Technology University, Noida
32	Saree Cutting Machine For Mat Making Handlooms	Alap Kshirsagar ,Abhijit Patil, Vikalp Jambhulkar	Prof Suhas Joshi		Indian Institute Of Technology, Bombay
33	Development Of A Geo-hazard Warning Communication System	Devanjan Bhattacharya	Dr Jayanta Kumar Ghosh, Dr Narendra Kumar Samadhiya		Indian Institute Of Technology Roorkee

Appreciated Innovators 2013

S. No.	Project Title	Student Team	Supervisor	University	College
34	Prognosis Of Pre-diabetes And Type 2 Diabetes Based On The Non-invasive Estimation Of Blood Glucose Using Infrared Thermography Against The Bio-marker	Sivanandam S ,B. Venkatraman, Menaka M, Sharath D	Dr M.anburajan		SRM University
35	Cow Dung Based Microbial Fuel Cells (cdfcs) To Light Up Indian Villages	Vishnu Jayaprakash ,ProfT.S Natarajan	Prof T S Natarajan , IIT Madras	University Of California, Berkeley, USA	University Of California At Berkeley
36	Semi-automatic Rubber Tapping Machine	G.r.malarmannan ,S.emmanuel Richards	Drp.rajeshkanna	Anna University ,Chennai	Velammal College Of Engineering And Technology, Madurai
37	Target Oriented Niosome Based Delivery Of An Antitubercular Drug, Development And Charecterisation	Gyanendra Singh ,A.k. Srivastava	Prof Shubhini Saraf	Banaras Hindu University	Department Of Pharmaceutics Indian Institute Of Technology Banaras Hindu University, Varanasi
38	Mosquitocidal Endotoxin From Vellore Poultry Farm Wastes	Bishwambhar Mishra ,Abhishek Gupta	Dr Suneetha Vuppu, Associate Professor	VIT University, Vellore	VIT University, Vellore

Appreciated Innovators 2013

S. No.	Project Title	Student Team	Supervisor	University	College
39	Sancharak: A Cell-phone For Blind People	Rohit Bharkatkar Singh, Hitarth Narsi Patel, Navnath Bhimrao Mane, Tanmay Vinay Shinde, Rahul Dilip Kapoor	Dr K.T.V.Reddy	Mumbai University	Padmabhushan Vasantdada Patil Pratishthan\'s College Of Engineering
40	Development Bamboo-epoxy Nanocomposites For Manufacturing Of Helmets And Other Structural Applications	Vivek Kumar	Dr Sanat Mohanty		Indian Institute Of Technology, Delhi
41	Re-arranging Unused Contacts In Mobile Phones For Quick Access	Bala Vishnu R ,T. Kartick Kumar, Pgowtham Raj , M.murali Prasanth	P.Natesan		Kongu Engineering College
42	Ambulatory Health Network App	Jayesh Vrujlal Khasatiya	Ankita Shah	Gujarat Technological University	Narnarayan Shastri Institute Of Technology, Jetalpur

GYTI 2014

Sr. No.	Project Title	Innovator	College
1	Development and Evaluation of Women Friendly Vaginal In Situ Hydrogel For Sperm Immobilisation.	DrVaishali T.Thakkar	Anand Pharmacy College
2	Novel Algal Bioreactor for Wastewater Treatment and Biofuel (lipid) Production	Durga Madhab Mahapatra	Indian Institute of Science, Bangalore
3	Laser Technology Detects Hidden Materials: Applications to Security and Medicine	SanchitaSil	Indian Institute of Science
4	Ultra-High Actuation in a Carbon Nanotube Actuator	PrarthanaGowda	IISc
5	Amsler Grid Test Android App	NagarjunPola	Indian Institute of Technology Guwahati, R V College of Engineering Bangalore, National Institute of Design Bangalore
6	Integrated Circuit (IC)-based Flexible Electronic Devices and Displays (ICFEDD)	Prakash Kodali	Indian Institute of Science, Bangalore
7	Laser light based fully computerized automated breast cancer and muscle screening system development	Samir Kumar Biswas	Indian Institute of Science
8	Synthesis And Design Of Indigenous Polycentric Knee For Trans femoral Prosthesis	Anand TS	Indian Institute of Technology Madras
9	Low-cost Diagnosis of Pneumonia	Abhishek Khanolkar	Indian Institute of Technology Madras
10	Wireless Communication And Security System Embedded Safety Helmet	Sivagurunatha Pandian.M	Easwari Engineering College
11	Cost Effective Vegetable Chiller for Rural Small Farmers	Vishnu Padmanaban	Amrita School of Engineering - Coimbatore
12	Android application for women safety	Akhil Aggarwal	Indian Institute of Technology Delhi

13	Paper-pencil based self pumping and self breathing fuel cell	Ravi Kumar Arun	CSIR-Central Mechanical Engineering Research institute, Durgapur
14	Parichaya - A Low-cost Medical Device To Increase Adherence Among Tuberculosis Patients In Rural Assam	Himanshu Seth	Indian Institute of Technology (IIT) - Guwahati
15	Concept of β Breaker Dipeptides and its Application in Alzheimer's Amyloid Disruption	Nadimpally Krishna Chaitanya	Indian Institute of Technology Guwahati
16	Injectable silk fibroin hydrogel for tissue engineering and drug delivery	Surojeet Das	Indian Institute of Technology Guwahati (IITG)
17	Bio mimicked Polymer Surfaces Exhibiting Super hydrophobic and Anti-reflective Properties	Srinadh Mattaparthi	Indian Institute of Technology Hyderabad
18	Microwave coplanar sensor system for detecting contamination in food products	Makkattary Shaji	Indian Institute of Technology Kanpur
19	Fabrication of organic thin film transistor using single drops of organic or hybrid insulator, conductor and semiconductor materials.	Gunda Manideep	Indian Institute of Technology, Kanpur
20	Microfluidic Immunosensor	Ramchander Chepyala	Indian Institute Of Technology Kanpur
21	Development and Pilot Testing of Nano-sized TiO ₂ based Photo catalytic Oxidation Technology for Controlling VOCs	Indramani Dhada	Indian Institute of Technology Kanpur
22	Highly Stable Metallic Nanoparticle-semiconductor Heterostructures Via Click Chemistry For Photo electro/Photo catalytic Applications	Arun Prakash Upadhyay	Indian Institute Of Technology Kanpur
23	Fabrication Of Stable Liquid Crystal Based Biosensor	Arun Prakash Upadhyay	Indian Institute Of Technology Kanpur
24	Identification of Safest Path using Crime Records	Puneet Singh	Indian Institute of Technology Kanpur
25	'Paper-and-pencil' Microfluidic Device for Point-of-Care Diagnostics	Ranabir Dey	Indian Institute of Technology Kharagpur

26	Adsorptive removal of phenolic compounds using mixed matrix membrane of cellulose acetate phthalate and alumina nanoparticle	Raka Mukherjee	Indian Institute of Technology, Kharagpur
27	Open Source E-Mailing System For The Visually Impaired	Aakash Anuj	Indian Institute Of Technology, Kharagpur
28	Performance Enhancement of Microthruster using Nano-engineered MEMS Structure for Long Term Space Mission	Pijus Kundu	Indian Institute of Technology, Kharagpur
29	A low cost cardiovascular diagnostic instrument for rural healthcare	Pradip Gatkine	Indian Institute of Technology, Bombay
30	Care Mother-Mobile Pregnancy Care	Shantanu Pathak	Science for Society
31	A simple and cost effective retrofitting to improve the thermal and combustion performance of traditional cook stoves	Vijay Hanmant Honka-laskar	Centre for Technology Alternatives for Rural Areas, Indian Institute of Technology Bombay
32	3D model generation from 2D X-Ray images	Vikas Dhruwdas Karade	Indian Institute of Technology - Bombay
33	Development of microbial fuel cells with improved performance	Jayesh Manohar Sonawane	Indian Institute of Technology Bombay
34	Jaivik Prakash (Bio photonics): A simple tool for detection of hazardous materials and sanitary condition at rural level	Rajeev Ranjan	CSIR-Central Food Technological Research Institute
35	A Transceiver for Satellite based Communication during Emergency using TV White Spaces	Rajan Kapoor	Indian Institute of Technology Patna
36	Stampede Control Using Image Analysis Technology	S.Vidya Sagar	Kongu Engineering College
37	Touchpad for malignant tumour (epithelial) detection and imaging	Sritam Parashar Rout	Indian Institute of Technology, BHU
38	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)

39	Macrophage-specific targeting of mannose-functionalized biodegradable polymeric nanoparticles of some anti-Leishmanial drugs- Development, characterization and efficacy evaluation	Pramila Chaubey	Department of Pharmaceutics, Indian Institute of Technology (Banaras Hindu University), Varanasi, Uttar Pradesh
40	Voice Activated Safety App	Mithila Harish	Vellore Institute of Technology, Vellore

GYTI 2015

Sr. No.	Project Title	Innovator	College
1	Targeting Lymphatics To Treat HIV Using Lipid Based Formulations	Rashmi Jain	B.V. Patel PERD Centre
2	Redefined Spoon For Parkinson's Patient	Dhyey Mayankkumar Shah	Indian Institute of Technology Gandhinagar
3	Radial Arterial pulse pressure waveform Acquisition using fiber bragg grating pulse recorder	Sharath U.	IISc Bangalore
4	Gift of New Abilities	Shiva Kumar H R	IISc Bangalore
5	Novel Nanozyme Technology for combating Oxidative Stress Related Disorders	Amit A. Vernekar	IISc Bangalore
6	Methane Sensing Module: From Concept To Prototype	Anwesha Mukherjee	Indian Institute of Science, Bangalore
7	One Drug To Cure Them All	Chandradhish Ghosh	Jawaharlal Nehru Centre for Advanced Scientific Research
8	Agriculture	Abhitha R	IISc Bangalore
9	Development of A Powerful New Antibiotic That Kills All Drug-Resistant Bacteria	Venkateswarlu Yarlagadda	Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR)
10	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	IIT Madras
11	Development of Shape Controlled Palladium Structures as Electrocatalysts for Fuel Cell Applications	Kranthi Kumar Maniam	IIT Madras

12	Affordable Power-Assist For Wheelchair	Sripriya Kalidoss	IIT Madras
13	Virtual Reality Based Minimally Invasive Surgical Simulator With Haptics Feedback	Raghu Prasad M.S	IIT Madras
14	Energy Efficient Robust Controller For Autonomous Underwater Vehicle	Meenakshi Sarkar	CSIR - Central Mechanical Engineering Research Institute
15	A Novel Process To Commoditize Carbon Dioxide Gas Into Fuels And High Value Nutraceuticals At Commercially Viable Scale	Dilip Singh	DBT-IOC Center for Advanced Bio -energy Research
16	Injection Mouldable Polymeric Composite Based Passive Polycentric Knee Joint	S. Arun	IIT Guwahati
17	Rightbiotic: The Fastest Antibiotic Finder	Shivani Gupta	Birla Institute of Technology and Science (BITS) Pilani, Hyderabad Campus
18	Rapid Diagnosis Of Brain Injury-A Novel Approach Using Citrate-Capped Gold Nanoparticles	Srishti Agarwal	IIT Hyderabad
19	Electrospun Cellulose Acetate Nanofibers For Female Hygiene Applications	Shital Yadav	IIT Hyderabad
20	Development of Membrane Technology for Industrial Progress, Societal Benefit and Environmental Safety	Siddhartha Moulik	CSIR-Indian Institute of Chemical Technology
21	Suchi-Ahvana	Pratik Raj	IIITDM Jabalpur
22	Prashamana- A Smart Hospital Bed	Toshib Bagde	IIT Kanpur
23	Food Vending Machine For Schools	Subrahmanya Shridhar Shetty Shivanada L.C, Udaya G	N.M.A.M Institute of Technology
24	Utilization of marine algae as substrate and methanogen inhibitor in microbial fuel cell	Rajesh P. P	Indian Institute of Technology, Kharagpur

25	Development of X-Ray Visible Polymers Via In Situ Iodination-Crosslinking For Non-Invasive Real Time Imaging	Paulomi Ghosh	Indian Institute of Technology Kharagpur
26	Fabrication of Nano Object Imaging Probe Using Simple & Fast Hydro -Mechanical Etching Technique	Fazle Kibria	University of Calcutta
27	Biodegradable Liposau Nanoparticles For Photothermal Ablation of Cancer	Arvind Kumar Rengan	IIT Bombay
28	Effect of Encapsulated Linseed Oil to Enrich Cardiac and Brain Lipids with Omega-3 Fatty Acids in Rats	D. Sugasini	CSIR-CFTRI,Mysore
29	Double Disk Ultrasonic Assisted Magnetic Abrasive Polishing Device	Prateek Kala	IIT Delhi
30	Reduced Converters And Brushless Generators Based Standalone Microgrid For Rural Electrification	Krishan Kant	Indian Institute of Technology Delhi
31	Real Time Wound Management System Wound Segmentation & Analysis Using Image Processing On Mobile Platform (Android).	Abhiraj Gupta	Manipal Institute of Technology,Delhi
32	Flexicast: A Breathable, Washable And Customized Cast For Immobilization of Fractured Limb	Jamdade Nikhil Kailas	Stanford India Biodesign (SIB), New Delhi
33	Biomechanical Investigation of Extracorporeal Irradiation Therapy In Malignant Bone Tumours	Sakshi Chauhan	IIT Delhi
34	Tedkit- An Audio Tactile Storybook For Visually Impaired Children	Ankita Gulati	IIT Delhi
35	Rapid Non-Invasive Diagnostics Kits For Diabetics Patients To Check Glucose Level Thrice A Day	Vijay Yadav	ICT,Mumbai
36	Recyclable Porous Sheets For Low-Cost Water Filter	Abhishek Gandhi	IIT Delhi
37	Inch worm mechanism for solar panel cleaning robot	Bhivraj Suthar	IIT Delhi
38	Clubfoot Deformity Measuring Device	Dr Kanwaljit Singh	Indian Institute of Technology, Delhi

39	Sway: The Rhythm Within	Janhavi Joshi	MIT Institute of Design
40	Valproic Acid Prevents Progression Of The Diabetic Nephropathy: Elucidation of Molecular Mechanisms And Proof of Concept For Promising Therapeutic Usefulness	Sabbir Khan	NIPER, S.A.S Nagar
41	Use of High Nutrient, Low Cost Natural Materials for Preparation of Well-Engineered Emulsions for Variety of Applications	Lad Virangkumar Nanubhai	Sardar Vallabhbhai National Institute of Technology - Surat (NIT-Surat)
42	Linearly Polarised Planar Inverted F-Antenna For Global Positioning System And Worldwide Interoperability For Microwave Access Applications	Mayank Agarwal	Indian Institute of Technology (Banaras Hindu University), Varanasi
43	Taparch	Krishna Sai Inkoolu	Gitam University

Gandhian Young Technological Innovation Awards (GYTI) 2017

Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI) has established three national awards for innovative student projects in engineering, pharmacy, and science & other applied technologies. These will be given away by Dr R A Mashelkar, chairperson, National Innovation Foundation (NIF) at Rashtrapati Bhavan, New Delhi in March 2017. The awards will be given to young innovators in the following categories:

- MLM (More from Less for Many) Award
- SRISTI Socially-Relevant Technological Innovation Award
- Strategic Innovation and/or Technological Edge Award

Student projects which address an important social, environmental or technological problem faced by masses or disadvantaged people/sectors/spaces or micro & 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 from the institutes/universities, the faculty members who supervised the project, can also apply.

A: MLM (More from Less from 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 benchmarking such innovations.

B: SRISTI Social Technological Award: The best students' projects which have a demonstrable proof of concept/ prototype, having significant amount of novelty and social applications, are eligible for this award. Any project completed in or after 2012 can be submitted by the students or their faculty supervisors on their behalf.

C: Strategic Innovation and/or 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.

Full project reports of the shortlisted projects will be needed for the final evaluation. The last date for the submission of entries is **January 31, 2017**.

All the shortlisted entries will be displayed by winners at the annual exhibition at Rashtrapati Bhavan, New Delhi in **March 2017**. The submitted entries will be included in www.techpedia.in database with due acknowledgement of the names of the team members, supervisor, college, department and their contact information. The exhibition will be visited by leading policymakers and practitioners of the country. The prototypes 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 institutions.

The nominations have to be submitted at <http://www.techpedia.in/award> and only abstract of the content submitted along with the innovators' detail would be published at the site or shared otherwise. If the students wish to have any incubation support, they should clearly indicate the same in their form. For those interested in intellectual property rights (IPR) support, assistance from a network of pro bono attorneys can be mobilised at a concessional term.

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