

**GANDHIAN YOUNG TECHNOLOGICAL
INNOVATION AWARDS
GYTI 2018**

INTRODUCTION

The Gandhian Young Technological Innovation Awards set up by SRISTI and Honey Bee Network have created new points of reference for recognizing technological excellence imbued with social relevance among students. Thanks to the review support by hundreds of faculty members, and senior executives from private sector with in India and abroad, we are able to select some of the most promising early stage technologies being developed by the Indian youth. It is now a challenge to the entire Inclusive Innovation Ecosystem of the country that these early stage scholars and innovators don't leave the domain and pursue their ideas to logical conclusion through mentoring, financial and technological support so that the country gets concrete results from their research and technological innovations. We received 2915 entries in 54 technology domains from 312 universities & institutes belonging to 34 states & Union Territories.

Fifteen BIRAC-SRISTI GYTI awardees getting Rs 15 lac research grant each as student are expected to bid for bigger grants

soon after and set up their enterprises. Others awardees who could not get financial award this time are also encouraged to pursue their dreams relentlessly. Those who have made distinctive contribution and are being appreciated are no less important part of innovation ecosystem. I hope in due course, we will perhaps find more public and private sponsors to support as many students as possible. It is these young innovation champions who are expected to being about transformation in the developmental status of our country mediated by empathetic Science and technology.

BIRAC supported BIONEST incubator at SRISTI Innovations aims to support early stage student led ideas and innovations, sometimes only at proof of concept level, for recognition and further development in the field of medical devices, diagnostics and biotech applications for meeting unmet social needs in extremely frugal and potentially sustainable manner.

Some of the key challenges before GYTI awardees and appreciated scholars or fellows are:

- a) The should visit each other, foster collaboration across institutional and disciplinary boundaries and give feedback to each other to improve translational prospects of respective technologies. We have not made much progress in this regard but without doing this the ecosystem for innovations will not become more nurturant.
- b) The inclusive development requires meeting the unmet social needs of disadvantaged communities in 'aspirational districts', and other regions where the level of economic development has remained low. It also requires leveraging peoples knowledge system for developing most frugal, affordable, and sustainable innovative products and services.
- c) GYTI fellows should recruit younger students from schools and even outside to be inducted in the curiosity driven world of translational research.
- d) Many of the GYTI awardees go for post-doc research abroad to improve their career prospects on coming back in

India. Unless we change an informal requirement of such post doc abroad for faculty appointments in elite tech institutions, this disruption in translational research will remain. May be for GYTI awardees such requirement may be waived. But those awardees wish to become entrepreneur; such a problem may not arise.

e) Access to each other's lab will also help strengthen the innovation eco-system. Ideally, each public sector lab should put up all the equipment and services available to young innovators at a nominal charge on its website. There is a gross under-utilization of such facilities across the country. On the other hand, many start-ups suffer for want of such facilities. Hope that the guides of the GYTI winners will take lead in this regard.

f) The share of women scholars is still low and needs considerable improvement to make the ecosystem more gender-accommodative and appreciative. SRISTI has also announced a women-only Biotechnological Innovation Ignition School (BIIS) where around 45 students from around the country validate and value add in the grassroots

innovations and sustainable practices for water treatment, pest control, human and livestock disease management, medical devices, and other agri/health applications. What can be more pedagogical innovations to bring greater gender parity in using such opportunities?

g) The involvement of younger scholars in research team is very important to ensure continuity, and this need to be at one place but can be through a relay process.

h) Uploading abstracts of student projects at **techpedia.sristi.in** which already has information about 200,000 engineering and other tech projects regularly is a big challenge. Not all leading institutes keep local databases of such information. For a young student wanting to be original and innovative, it is not possible to go to thousands of institutional websites to find out what has been done by whom where and how can that work be taken forward.

Techpedia.sristi.org database encourages relay or kho-kho model of technology development so that the whole country becomes a single lab. How to make technology leaders and faculty more generous in sharing the abstracts of the work of

their students to promote originality and innovation quotient of the country. Without such a generosity among thousands of the teachers, this database and consequent GYTI awards would not have come about. Honey Bee Network appreciates such a spirit of caring and sharing and hope it grows further in coming years.

i) Fostering Connection between high tech research and grassroots innovation system is one of the key purposes of having GYTI award function at FINE. National Innovation Foundation-India (**nifindia.org**) encourages students and scholars to join hands in blending formal and in formal science and technology, and hopefully many of the awardees this year will take up some voluntary projects to strengthen Indian aspiration to become global leader of sustainable, frugal and extremely affordable solutions for the whole world, preferably made available in open source.

j) GIAN.org also wishes to leverage such linkages particularly in western India. It particularly seeks cooperation in validating and value adding food and nutritional knowledge of grandmothers. Widespread malnutrition

among infants and in many cases mothers need innovative solutions.

k) Teachers, research assistants, lab attendants, mechanics maintaining lab and workshop equipments, glass blowers designing glassware in lab, and all others involved in facilitating science and technology pursuits innovate. We wish to recognize such silent contributors also. GYTI participants and winners have to help in scouting such lab and workshop floor innovator sin coming years.

We are grateful to various science and technology departments, policy makers, leaders, students and scholars for making India uniquely poised to pool and share in open source technological ideas through **techpedia.sristi.org**. GYTI award is a natural offshoot of such an attempt. How we can we make the model of the BIRAC-SRISTI cooperation possible in other technological disciplines is a challenge in coming years. All areas of manufacturing need high tech innovation as much as grassroots innovations. Together they make Indian innovation ecosystem sustainable and inclusive. We are grateful to the office of the President of India to

encourage young tech students to showcase their innovations from all over the country at FINE in collaboration with NIF.

Looking forward to get feedback from all collaborators in taking this initiative of the Honey Bee Network forward with vigour to give even more voice, visibility and velocity to creative minds of India than ever before. We are also seeking ideas about an Academy of Inclusive Innovations the Honey Bee network proposes to set up in coming years.

jai hind



anil k gupta

Highlights of GYTI 2018 Awards

The winners of GYTI 2018 include innovations on the technological edge, some transcending frontiers of frugality and others meeting unmet social needs in most affordable manner. A variety of solutions or project aiming to develop solutions have been received from IISc, IITs, regional universities & private and public research institutions. It is true that awards are dominated by students from elite institutions; the appreciated technologies do include some from less renowned institutions also. Now that a kind of national benchmark is available in the form of these awards, we hope that quality of students projects from smaller institutions will further improve in coming years.

In the health category, emerging challenge of studying host-pathogen interaction to curb the problem of MDR (multi drug resistant) was worked upon by Abhishek Narayan from IIT Madras; Detection of a novel mechanism for bacterial infection through specific change in interaction profile, potentially contribute to MDR (multi drug resistant) research

for development of unique drug / antibiotics. Vikas Pandey and team from IIT Delhi has developed A fluorescence adapter to upgrade the existing microscopes to fluorescence microscope for cost effective detection of Tuberculosis from sputum smear. Mr. Shibu Chameettachal & Dr. M S Sridhar from IIT Hyderabad has developed Decellularized Corneal Matrix (DCM) based injectable hydrogel for Severe Corneal Keratoconus for strengthening cornea matrix. Trivikram Annamalai, IIT Mumbai has designed a Low Cost, extremely affordabl Infrared Vein Detector, based on NIR spectroscopy, where infrared waves are absorbed differently by oxygenated and de-oxygenated blood in the veins thereby appearing darker - this helps the doctors and nurses to locate the veins easily and conduct one successful vein puncture instead of multiple painful ones.

Debasmita Mondal and Sourabh Agrawal, the students from IIT Bombay developed a pioneering smartphone-enabled

disposable, label-free, impedimetric biosensor to detect two common cardiac biomarkers, Myoglobin (Myo) and Myeloperoxidase (MPO).

Much needed strategy to block the transmission of Malaria came from Divya Beri and team, IISc Bangalore (also got recognition in Nature Scientific Reports, 2017). Brince Paul and team, IIT Hyderabad has developed A low-cost disposable microfluidic biochip for diagnosis of malaria, the integrated biochip also offers a promising cost-effective approach for detection of several other infectious disease.

Kiran Kumar Amireddy, IIT Madras have Overcome the diffraction limit in Super-Resolution Ultrasonic Imaging by custom designed holey metamaterial lenses and cost-effective method of making meta-lenses. Amit Girishkumar Mirani and Prashant Girish Upadhaya, Institute of Chemical Technology have tried the Prevention of HIV problem associated with unintended pregnancy and unprotected sexual intercourse by developing NanoSpermicide. The technologies related to agriculture include innovative solution for precision farming

such as fertilizer & micronutrient application and monitoring the agricultural field parameters. Ekdeep Singh Lubana of IIT Roorkee Designed SNAP - A RAW images based setup that can calculate nutrient concentration in leaves with high levels of accuracy. A ray of hope for Farmers to check the nutrient deficiency in their crops by themselves; Pallabi Das & Kasturi Sarmah, Tezpur University Soil conditioner for agricultural application, a novel technique to replenish the micronutrients of the soil by manufacturing iron (oxalate) capped metal oxide [Fe(ox)-Fe₃O₄ (OCIO), Fe(ox)Fe-MnOx (OCIMn), and Fe(ox)Fe-CuOx (OCICu)] nanomaterials for increasing micronutrient availability to plants ; Anandarup Mukherjee, Arijit Roy and Sanku Kumar Roy, IIT Kharagpur have Fabricated Battery less IoT Sensing Nodes for monitoring the agricultural field parameters.

Ravi Prakash, NDRI Karnal has tried to address a long unmet needs of low cost chillers and developed A advanced design and development of Phase Change Material (PCM) based milking cum cooling pail. Rohit Shivaji Pawar & Swati Suhas Vyas, ICT. Mumbai has developed Point of Care Nano

Diagnostic Kit for Brucellosis based on fluorescence silica nanosensors for detection of intact Brucella antibodies in non-serological samples.

The technologies related to Environment and Sanitation included many addressing needs of neglected sectors and social segments. Ramesh Kumar & Swathy Ravindran, IIT, Madras have developed Roll Pure, to purify water without electricity, it can provide chemical and biological contaminant free water to our rural people with minimal transportation effort. The hippo roller was well known for transporting water. But the missing link was development of low cost water purification while doing so. This innovation has done precisely that. Neeta Ganesh Wagle & team from Dr. D.Y. Patil Vidyapeeth Fabricated biological air purifier-Biosmotrap, A smart solution for the problem of indoor and outdoor air pollution with replaceable adsorbent in biodegradable pouches.

Shelaka Gupta & team, IIT Delhi is Developing a technology based on integrated bio and chemo-catalytic reactions for the conversion of biomass in to food grade flavors, fuels and

value-added chemicals. Bikash Ranjan Tiwari & Md. Tabish Noori, IIT Kharagpur have Designed a novel membrane separator for microbial fuel cell for treating distillery wastewater.

In the other engineering disciplines, an innovative strategy was devised for Wireless power transfer (WPT), Magnetic tool for Nano-finishing holes, Window solar cooker, Road accident detection by summarizing techniques to enrich the speed of visualization and a search engine to save people from the trouble of finding spam & irrelevant results in their search process on internet.

Amit Kumar Baghel & Shashank Satish Kulkarni, IIT Guwahati has increased the efficiency of far-field WPT using metamaterial. A total of 40 arrays having eight unit cell in each is placed at an optimized distance from the aperture of the proposed horn antenna (Tx antenna); Girish Chandra Verma, IIT Delhi arranged the magnet in such a way that, similar pole of both the magnets faces each other. Due to this the magnetic lines of force from both the magnets get directed to radial direction. The developed tool produces

variable magnetic flux density so that material of different hardness can be finished; Avinash Prabhune, IIT Mumbai has developed Window solar cooker and changed the perception of box- type solar cooker. The efficiency has improved and the time taken for cooking is also reduced. The cylindrical form provides uniform sunlight throughout the day; Dr. Sinnu Susan Thomas, IIT Kanpur has developed video summarization techniques to enrich the speed of visualizing the accident content based on the change in the appearance of perceptual features such as motion, color, shape, and size for Road Accident Detection; Abhik Saha, a student, Don Bosco High School, Assam has developed Origgon a unique innovation to save people from the trouble of finding spam and irrelevant results in their search process. It gives users the opportunity to find optimal search results based on reviews and recommendations by people.

Acknowledgment

SRISTI and the Honey Bee Network congratulate all the winners and compliments those even more who may not have been awarded but who have shared their ideas with us and the world at large through Techpedia.sristi.org platform. Without such a spirit of open innovation, we will not be able to create a vibrant spirit compatible with Indian dream to become an economically developed, compassionate and collaborative society. The Honey Bee Network wishes the winners all the strength in their future endeavors. I must thank all the colleagues who worked day and night to pursue GYTI review process and helped in timely announcement of awards. In particular, I must particularly mention Dr. Nirmal Sahay who guided the entire process and coordinated with various stakeholders most amiably. Other team members for GYTI include Dr. Debleena Bhattacharya, Dr. Chhavi Gupta, Sagar Panchal, Hiral Shastri, Prem Shah, Dhruvi Patel, Divisha Rajput, Dinesh Awasthi, Chetan Patel, Ramesh Patel, Tejal Dabhi, Bhumi, Dr Arun Kumar, Dr Parvin Prajapat etc. In addition, many volunteers have also helped in the process

including Harshvardhan Tiwari, Siddh Shah, Hardi Patel, Sunny Patel. I also thank our NIF colleagues Dr. Vipin Kumar, Mahesh Patel, Rakesh Maheshwari, Vinay, Tushar Garg, Pawan Kumar, Hardev Kumar, Gauri Paliwal etc. Dr Anamika R Dey, Parth, Sagar and Akshay, GIAN helped enormously in addition to all the team members at SRISTI.

We are grateful to Dr R A Mashelkar, FRS, Chairperson, NIF board and SRISTI Research advisory Committee for guiding this mission all these years. Support from faculty colleagues from IIM Ahmedabad, Ahmedabad University, PERD, NIPER, Gandhinagar, Nirma University, Gujarat Technological University and LJ group of colleges, L M College of Pharmacy, Gujarat University, NID, Ahmedabad, DAICT, Gandhinagar, IIT Gandhinagar, and many other institutions is gratefully acknowledged. IIT, Delhi, just as in previous years, helped this year too in third level review of all the entries, thanks to Prof Madhusudan Rao.

We received 2915 entries in 54 technology domains from 312 universities & institutes belonging to 34 states & Union Territories. With the help of team members and volunteers, entries were sent to the subject matter experts. Three rounds of evaluation of the shortlisted entries were undertaken by the experts at Delhi and Ahmedabad. The experts who participated in the evaluation were Prof Shashank Mehta(NID), Dr. Mahesh Chhabria (L M College of Pharmacy), Dr. G. P. Vadodaria (LDCE), Dr. Subhash Rajpurohit (Ahmedabad University), Prof. Pranab Mohalatra (IIT Ghandhinagar), Dr. Kiran Kalia (Director, NIPER-Ahmedabad), Prof. Neeta Srivastava, (IIT Delhi) Dr. Keyur Buch (CIMS Hospital), Dr. C J Shishoo (Former Director, PERD and L M College of Pharmacy, Ahmedabad), Prof. P V M Rao (IIT Delhi), Dr. Anil Wali (Director, FITT-IIT Delhi), Dr. Amit Kumar Dinda (AIIMS), Dr. Abhinav Sinha (National Institute of Malaria Research) Prof Pushpendra Singh (IIIT, New Delhi), Mr. Atul Bhargava (ST Microelectronics), Dr Rajini Kant Dixit (National Institute of Malaria Research), Prof Neetu Singh (IIT Delhi), Prof Vivekanandan Perumal (IIT Delhi), Rajamohan Varambally, Dr. Anuj Grover (ST Microelectronics), Dr. Sanjeev Saxena (ICAR), Prof J. Ram Kumar (IIT Kanpur), Dr.

Shirshendu Mukherjee (BIRAC& Wellcome Trust), Prof Sarita Ahlawat (IIT Delhi), Dr. S.K. Maulik (AIIMS), Prof. Suman Kapur (BITS Hyderabad), Prof. Rana P Singh(JNU), Dr. V N Shah(Zydus Hospital), Prof K. Ganapathy (Apollo Hospitals), Dr. Rakesh Rawal (Gujarat University) etc.

In addition, Dr Manish Diwan and Shilpy Kochar helped not only in review of the projects but all other aspects of this cooperation under the overall guidance of Dr Renu Swarup, MD BIRAC, DBT, New Delhi.

There are a lot of other anonymous reviewers who have helped us in review of thousands of entries from all over the country and some from abroad. We are highly grateful to them.

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Abhishek Narayan

Understanding the Design Principles of Protein Nanosensor to Combat Multidrug Resistant Enterobacteriaceae

Abhishek Narayan

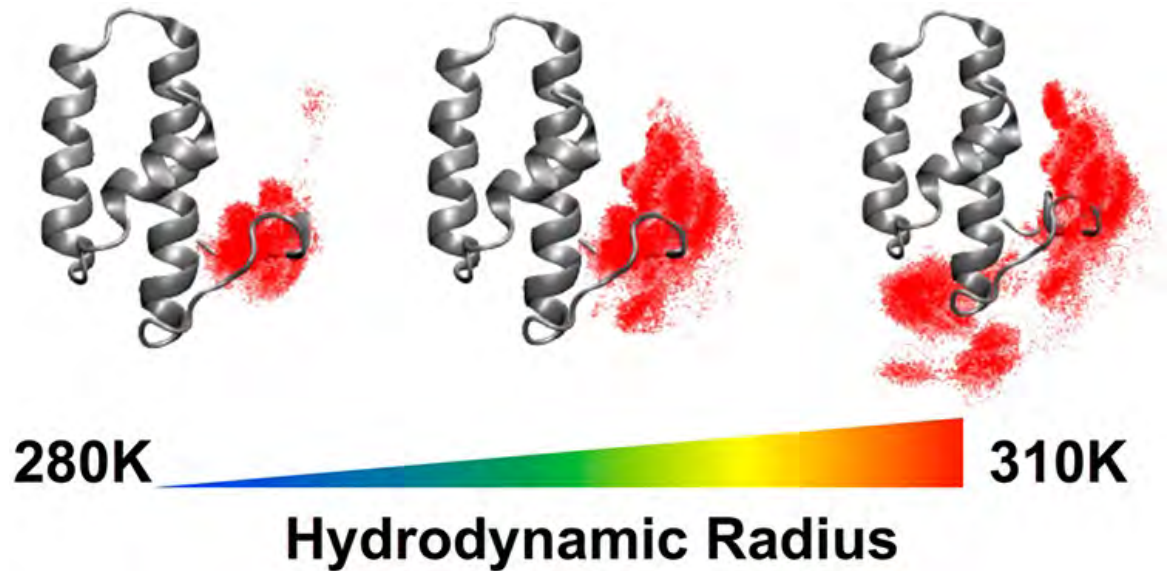
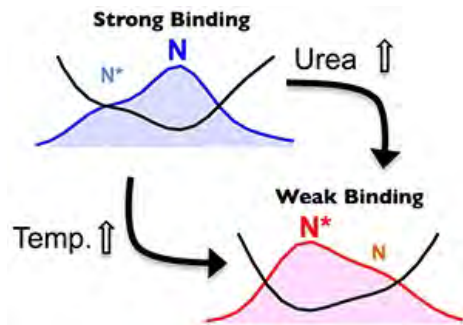
Indian Institute of Technology Madras

Guide :

Dr. Athi Narayanan N

Developing a treatment for common gastric disorders that affect humans is an active area of research. Enterobacteriaceae generally cause these disorders – the most recognizable among these is *E. coli*. While antibiotics are generally employed upon infection, a growing concern is the emergence of antibiotic resistance in bacteria – wherein they 'acquire' genes that can code for enzymes to break down the chemical antibiotics – will effectively reduce the impact of antibiotics and make the human population vulnerable. In this regard, it is necessary to understand how pathogenic genes are expressed in bacteria upon infection. As humans are warm-blooded, it has been proposed that the constant body temperature triggers the expression of toxic genes in bacteria. This raises questions on the molecular mechanism by which bacteria sense temperature. Natural candidates for sensory behavior in biological systems are proteins - small molecular machines (dimensions of ~ 10 Å) that could potentially change their conformation (i.e. the

relative arrangement of atoms) upon temperature changes. To tackle these questions, we studied a putative thermo-sensory protein Cnu, through numerous biophysical techniques, theoretical modeling and simulations. In our work, we consistently show that Cnu senses small temperature changes through modulation of a particular part of helical structure that increasingly samples various conformations with increasing temperature. Our work clearly points out that upon infection and at the body temperature of 37°C the structure of Cnu is partially melted that in turn eliminates binding to the partner protein and hence promotes toxic gene expression. To summarize, we explain the macroscopic bacterial infection phenomenon through specific changes in the interaction profiles at the microscopic molecular level, an area we believe that could potentially contribute to the development of new drugs to control bacterial infection.





Vikas Pandey



Pooja Singh



Saurabh Singh

Miniaturized Fluorescence adapter for Fluorescence Sputum Smear Microscopy using bright-field microscope

Vikas Pandey, Pooja Singh, Saurabh Singh
Indian Institute of Technology Delhi

Guide :
Dr. Ravikrishnan Elangovan

TB infection is one of the major healthcare problems in India. The bright-field sputum smear microscopy (SSM) is the most common method used for TB diagnosis in India, however SSM has poor sensitivity. Consequently, only 64% of total TB infected patients are being diagnosed and treated. Every single undiagnosed TB patient infects at least 10-15 healthy individuals, keeping the vicious disease cycle going. WHO has recommended LED-Fluorescence Microscopy with higher sensitivity for TB diagnosis in high TB burden countries like India. The adoption of LED-FM has been slow mainly due to high cost (approximately ~2lakhs INR after subsidy), additional infrastructure, training and maintenance of new fluorescence microscope. India has approximately 14000 RNTCP centers (each caters approximately 100,000 people), but only 2500 centers has LED-fluorescence microscopes. This diagnostic infrastructure gap between the actual requirement and availability is a major bottleneck.

At IIT Delhi, We have developed a unique

fluorescence microscopy technology, cTIRF:compact Total Internal Reflection Fluorescence". The cTIRF converts a simple bright-field microscope to fluorescence microscope without any hassle of tedious illumination mechanism, optical filters, and additional lens installation. This 3D-printed module is highly compact (~approx size of calculator), robust, cost-effective and allows rapid (lesser than 2mins) TB diagnosis without additional infrastructure, cost and training. While the sputum sample processing, smear preparation and auramine-O staining remains same as recommended by WHO. The clinical validation of cTIRF is running at 2 hospital sites. This affordable technology is a cost-effective way of upgrading the existing microscopes for fluorescence TB diagnosis. In alignment of Govt. of India mission to eradicate TB by 2025, the cTIRF can be a scalable solution for easy and rapid deployment across India.





Shibu Chameettachal



Dr. M S Sridhar

Decellularized Corneal Matrix (DCM) Based Injectable Hydrogel For Strengthening Cornea Matrix In Severe Corneal Keratoconus

Shibu Chameettachal, Dr. M S Sridhar
Indian Institute of Technology Hyderabad

Guide :
Dr. Falguni Pati

Keratoconus (KC) has been classically described as a non-inflammatory pathology, characterized by a conical shape of the cornea, as a result of thinning and protrusion and finally blindness. The etiopathogenesis is still under research and it may be the final manifestation of diverse pathologic processes. Keratoconus (KC) is considered the most common ectatic disorders of the cornea associated with corneal biomechanical instability. The existing treatment procedures are either risky or complicated surgical interventions. We propose an extracellular matrix based tissue engineering approach as an alternative treatment strategy by thickening the stromal area using a novel injectable decellularized caprine cornea matrix (DCM) hydrogel that would integrate with the existing thin stroma. Upon longer time period the filled area becomes transparent via remodelling with the cues from microenvironment. We envision that this

technique has a huge potential to replace current treatment strategies those are complex surgical procedures like ICRS, DALK, PK, Bowmans layer transplantation. and collagen UV crosslinking treatment which required highly skilled hands and make it risky and costly. We believe that this approach has the potential to change the clinical landscape by eliminating the current dependency on surgery and most importantly the success of this project will reduced the dependency for human cadaveric cornea for transplantation.

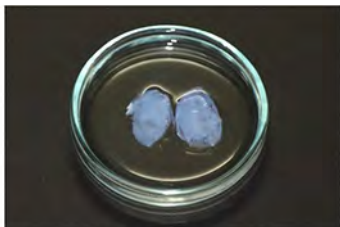
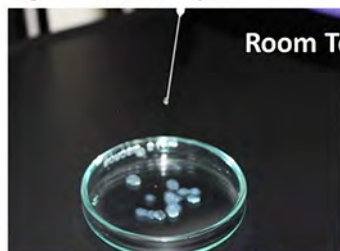


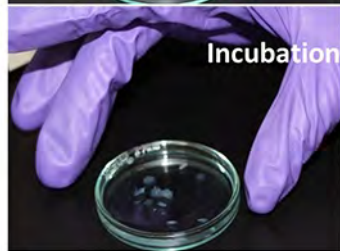
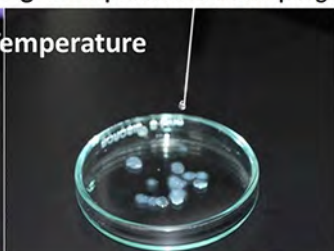
Fig. 1. Cadaveric Caprine Cornea



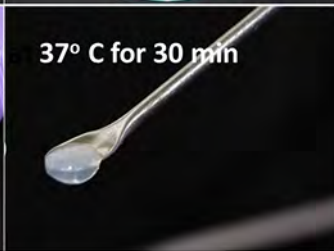
Fig. 2. Preparation of dECM pre gel



Room Temperature



Incubation



37° C for 30 min



Fig. 4. Injection of 100 µl of corneal hydrogel in to Intra lamellar pocket.

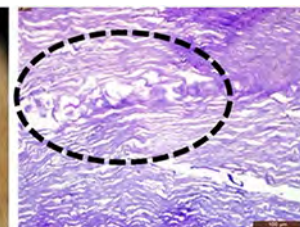


Fig. 5. Injected hydrogel in corneal stroma.



Trivikram Annamalai

Design of Low Cost Infrared Vein Detector

Trivikram Annamalai
Indian Institute of Technology Bombay

Guide :
Prof. Purba Joshi, Prof. B. K. Chakravarthy

A study states that for 16 out of every 100 patients it is difficult to spot veins and they have to undergo multiple venipunctures to find the correct vein - This problem is even more profound in cases of children, dark skinned, obese and elderly people which is painful and leads to rashes/marks on patient's skin.

The current products in market which address this issue are extremely expensive, not hygienic, complex to use and bulky. The proposed solution tries to solve the above mentioned issues- while also being ergonomic and aesthetically designed.

The device works based on NIR spectroscopy, where infrared waves are absorbed differently by oxygenated and de-oxygenated blood in the veins thereby appearing darker - this helps the doctors and nurses to locate the veins easily and conduct one successful venipuncture instead of multiple painful ones.

The designed device would bring affordable healthcare to the bottom of the pyramid and immensely benefit small clinics and hospitals, blood banks, blood test labs, etc. In delivering effective medical treatment.





Debasmita Mondal



Sourabh Agrawal

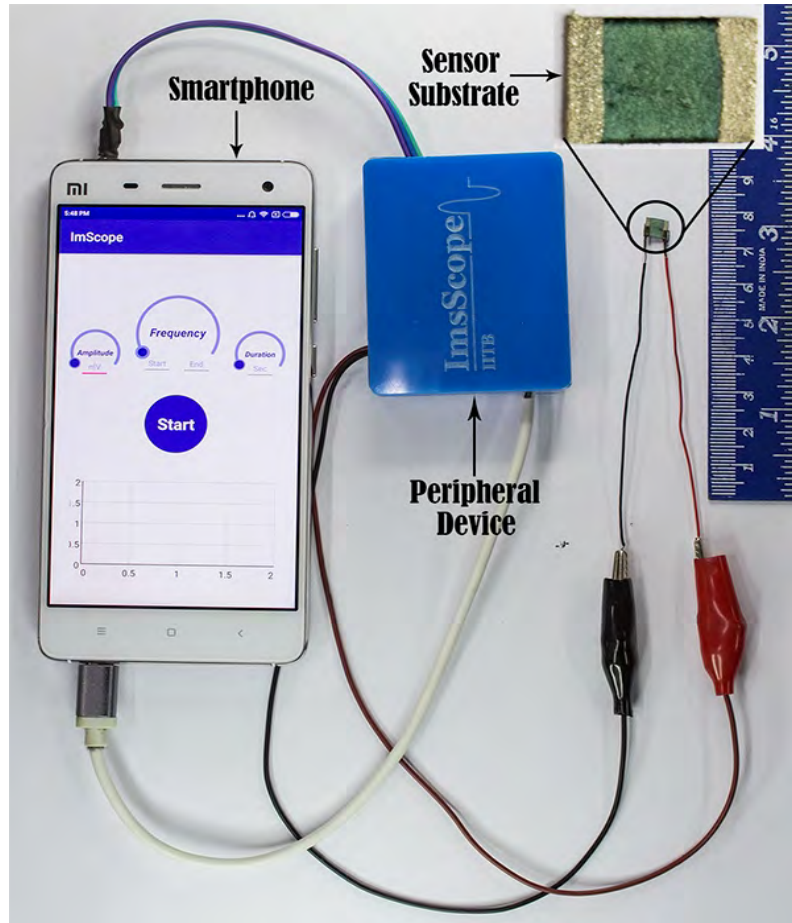
Smartphone-based impedimetric disposable biosensor for detection of cardiac biomarkers

Debasmita Mondal, Sourabh Agrawal
Indian Institute of Technology Bombay

Guide :
Dr. Soumyo Mukherji

A smartphone-enabled disposable, label-free, impedimetric biosensor to detect two common cardiac biomarkers, Myoglobin (Myo) and Myeloperoxidase (MPO) is developed. The device consists of a sensor and a module for interfacing with smartphone. The sensor, fabricated on Whatman filter paper, is coated with a conducting polymer, polyaniline (PAni) and immobilized with antibodies specific to each biomarker protein. Non-specific active regions of the sensor are blocked by treatment with bovine serum albumin. Electrodes for AC impedance measurement are deposited using conductive silver paste. Binding of target protein to specific antibody affects the dielectric constant between the electrodes, thus changing the impedance. Myo and MPO in buffer solution are detected from 100 ng/mL – 50 µg/mL within 100 Hz – 1 kHz. Detection limit obtained for these biomarkers spiked in human serum is 500 ng/mL. The developed biosensor

uses inexpensive materials and fabrication techniques, detects cardiac biomarkers in clinically relevant concentrations rapidly (~20 minutes), can be disposed in an environment friendly manner, thus making the sensor suitable for diagnostic applications. To make a handheld, portable point-of-care device, a plug and play module for smartphone is developed providing a cost and space effective solution. Prepared module acts as a peripheral to the phone and can be carried in pocket along with headphone. A low-power and low-cost potentiostat is designed in the peripheral which connects to the audio jack and gets power from the USB port of smartphone. Frequency range of the peripheral is limited to audio range (10 Hz - 10 kHz). Maximum duration each frequency signal can be generated is 5 Seconds. Onetime buying price of a single unit at research level is ~INR 1500 along with a minimal price for cartridge i.e., the sensor.





Divya Beri



Shweta Chaubey



Aparna Sudhakar

A Novel Strategy to Block Malaria Transmission

Divya Beri, Shweta Chaubey, Aparna Sudhakar
Indian Institute of Science, Bangalore

Guide :
Prof. Utpal Tatu

Malaria is one of the most prevalent infectious diseases in India. Malaria parasites have a complex life cycle with two forms in the human host; asexual forms that cause the clinical manifestations and sexual forms (gametocytes) which are transmissible forms of the parasite leading to its spread from a diseased host to a healthy host via the vector. Most drugs that are administered target only asexual forms and are in fact, reported to enhance the number of gametocytes; thus, creating a silent reservoir of parasites which potentiates further transmission. Recent reports have suggested an upsurge of asymptomatic malaria which does not manifest in clinical illness but represents individuals that can sustain transmission.

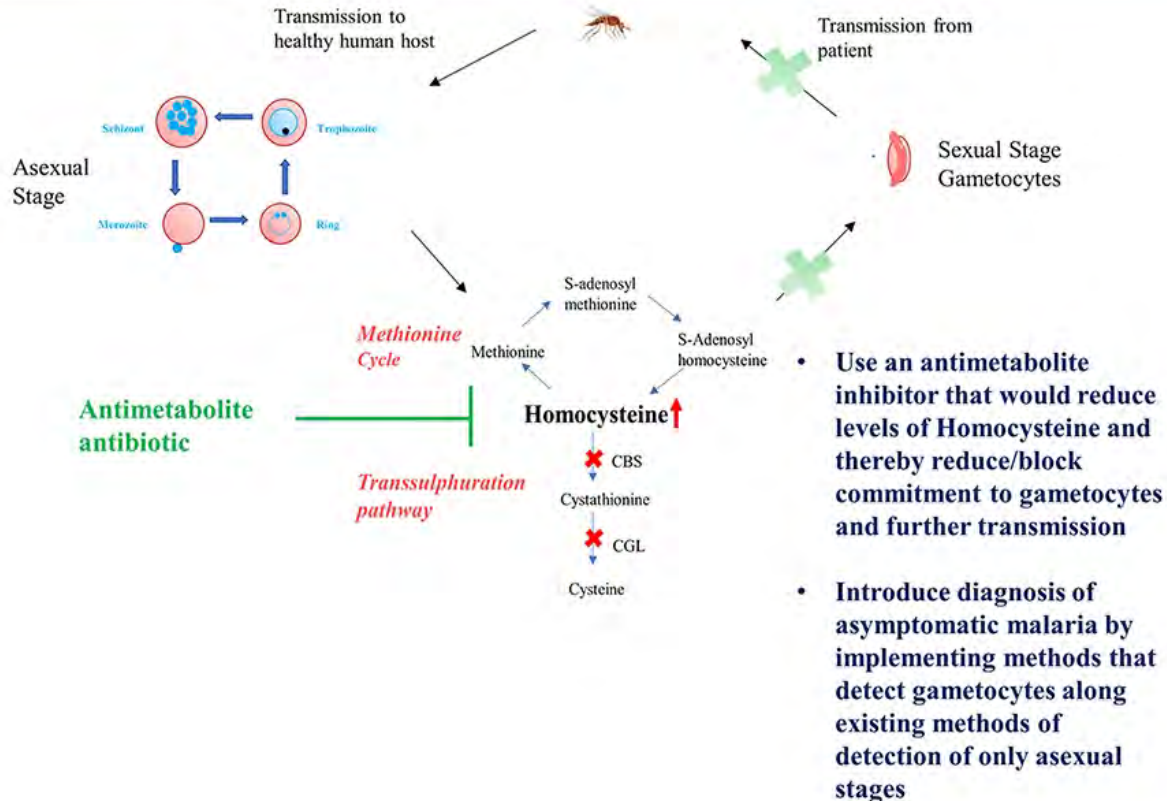
Due to very low number of transmissible gametocytes found in clinical cases/asymptomatic malaria, incapability of malaria rapid detection kits (RDT) to differentiate between asexual and sexual stages and induction of clinical gametocytes with most front-line antimalarial drugs, control and

elimination of malaria are nearly impossible.

Given the essentiality of this stage for parasite survival and propagation, our group demonstrated that redox stress created by the parasite's own growth is responsible for the commitment to gametocytes (Chaubey et al, Journal of Biological Chemistry, 2014). Our study, for the first time, shows a physiological metabolite homocysteine linked to gametocytogenesis in in vitro cultures as well as in the mouse model of cerebral malaria (Beri et al, Nature Scientific Reports. 2017).

We propose the application of this finding to develop transmission blocking molecules. Molecules targeting homocysteine may prove as attractive therapeutic interventions in blocking commitment to sexual stages. Its administration, along with currently marketed drugs against asexual stages, will ensure complete abrogation of the parasite.

Our solution: Break the cycle of transmission





Brince Paul K



Asisa Kumar Panigrahi

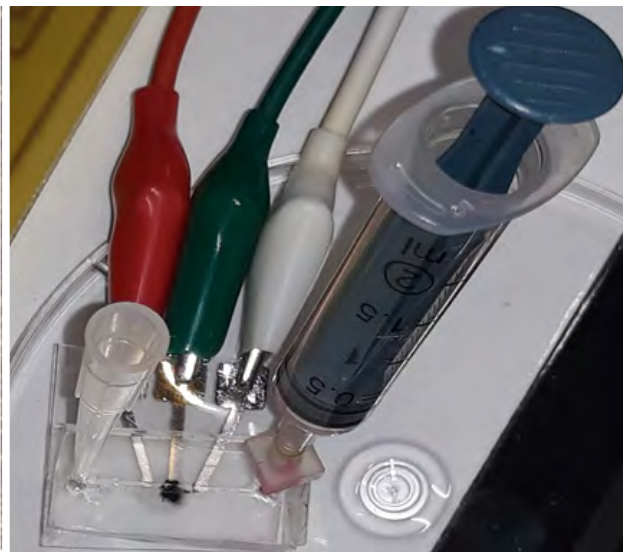
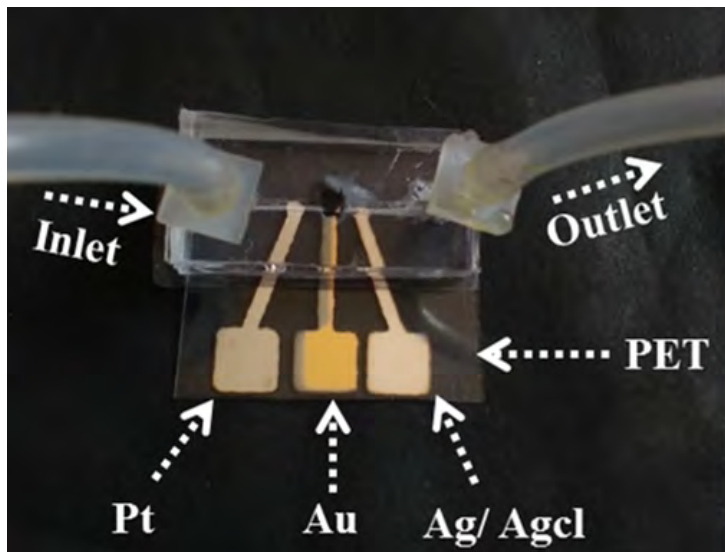
A Low-Cost Disposable Microfluidic Biochip for malaria diagnosis

Brince Paul K, Asisa Kumar Panigrahi
Indian Institute of Technology Hyderabad

Guide :
Prof. Shiv Govind Singh

Malaria is one of the leading life threatening infectious disease in underdeveloped and developing countries. According to the latest report (2016) from world health organization (WHO), there were 212 million cases of malaria and an estimated 429, 000 malaria deaths. Malaria is caused by protozoan of the genus Plasmodium spread by female Anopheles species mosquitoes. Among these, Plasmodium falciparum (P. falciparum) is the most severe form of malaria and interest is focused on the detection of Plasmodium-specific proteins. One of these, falciparum histidine-rich protein II (HRP II) based assays shows the better sensitivity and specificity compared to those of other proteins for the detection of P. falciparum. At present, there are several clinical methods to diagnosis malaria by detecting histidine-rich protein II. However, these techniques are time consuming, expensive, and require a trained technician. In the view of the above,

the development of a simple, cheap, and fully integrated point-of-care biochip is extremely required for early detection of malarial parasites and prevention of malarial epidemic. Here, we present the realization of a portable, flexible, and low cost biochip for quantitative malaria diagnostic testing at the point-of-care. The biochip incorporates a sensing platform integrated with a three-electrode system and microfluidics fabricated via low cost printing and tune transfer method. The sensing electrode consists of malarial specific antibody conjugated nanofibers. Upon recognizing the presence of even a trace of malaria's biomarkers in blood serum, the device registered a signal. It will be useful in rural areas where diagnostic facilities are not available readily. This fully integrated biochip offers a promising cost-effective approach for detection of several other infectious disease biomarkers for point-of-care diagnostics.





Kiran Kumar Amireddy

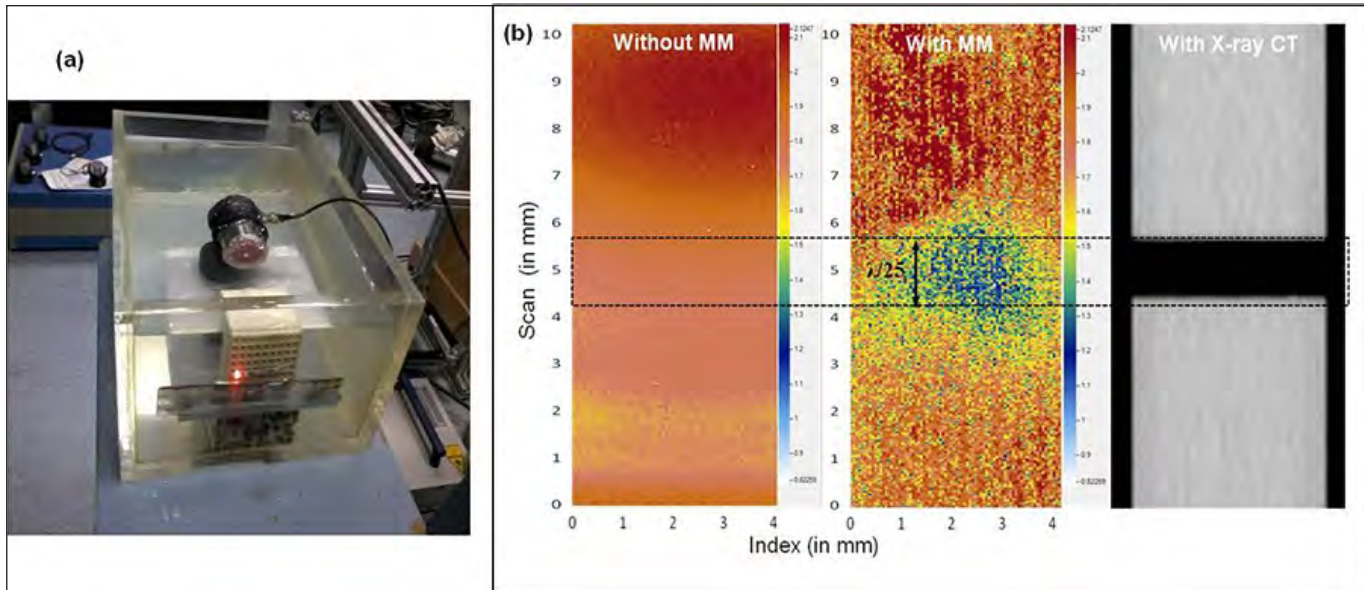
Super-Resolution Ultrasonic Imaging (SUI)

Kiran Kumar Amireddy
Indian Institute of Technology Madras

Guide :
Dr. Krishnan Balasubramaniam,
Dr. Prabhu Rajagopal

Ultrasonic Imaging (UI) is widely used for characterization of materials in industry and biomedical applications because it is affordable and does not have risk of radiation. However conventional UI systems suffer from poor resolution in the range of millimeters, due to the Rayleigh limit to half the operating wavelength. Electromagnetic (EM) methods such as X-ray computed Tomography (CT), Magnetic Resonance Imaging (MRI) etc., can yield resolution ranging to micrometers or nanometers, but these are expensive and carry a risk of radiation. Due to the limitations of UI, EM-based methods are often the only solution, which in parts of the world, are beyond the reach of healthcare providers and industrial inspectors. Improving the resolution of UI systems will make it possible to complement or replace X-ray CT systems used in medical diagnostics and characterization of industrial components.

The proposed project seeks to overcome the limitation of UI by addressing the classical diffraction limit in imaging using custom-designed holey metamaterial lenses. Using the principle of Fabry-Perot resonance, this metamaterial amplifies the evanescent waves in the structure (being imaged) to the far field. The project demonstrated SUI applications to sub-wavelength resolution, imaging down to a feature size of $\lambda/25$ and characterization of defects in components. The results have yielded some of the highest resolution capabilities achieved experimentally in the ultrasonic regime. This project also yielded a cost-effective method of making meta-lenses using plastic straw tubes sourced off-the-shelf.





Amit Girishkumar Mirani



Prashant Girish Upadhaya

NanoSpermviricide Gel : A Dual Acting Aid for Prevention of Unintended Pregnancy and Unprotected Sexual Intercourse Associated HIV

Amit Girishkumar Mirani, Prashant Girish Upadhaya

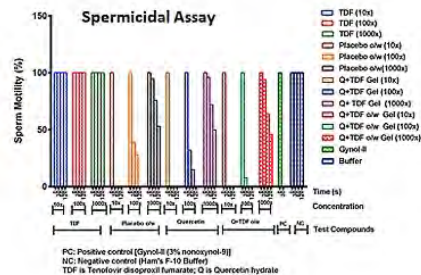
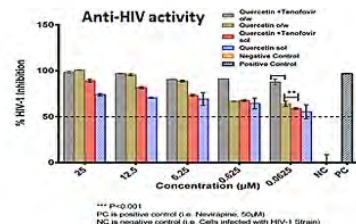
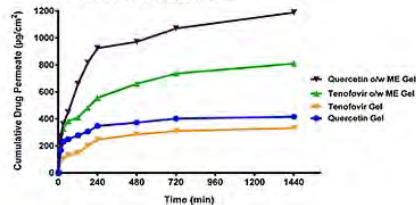
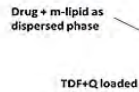
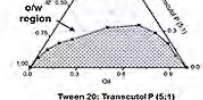
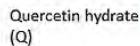
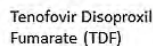
Institute of Chemical Technology, Mumbai

Guide :

Dr. Vandana B Patravale

Prevention of HIV infection and unintended pregnancy has become a worldwide priority to reduce the health burden in women. Currently, various physical and chemical barriers are available in the market to serve this purpose individually, however, none of the simultaneous intervention approaches exists in the market with very few under clinical investigation. We propose novel "NanoSpermViricide Gel" for simultaneous prevention of HIV-1 infection and unintended pregnancy. NanoSpermViricide Gel is a combination of HIV-1 inhibitor (Tenofovir disoproxil fumarate) with non-hormonal contraceptive (Quercetin) loaded in o/w microemulsion. Tenofovir disoproxil fumarate (TDF) curbs nucleotide reverse transcriptase enzyme while Quercetin downregulates p24 antigen production and HIV-1 entry inhibition. Additionally, Quercetin exerts both systemic and local contraceptive activity by decreasing the Ca²⁺ ATPase. The TDF and Quercetin was loaded in o/w microemulsion and was gelled using optimized concentration of Carbopol (1%

w/w) to form a NanoSpermViricide gel with globule size in the range of 20-50nm. The developed gel exhibited slow release profile (Coitus independent behaviour), thereby improving the consumer compliance. The in vitro anti-HIV activity assessed using β -galactosidase assay indicated 6times increase in anti-HIV activity of TDF + Quercetin loaded o/w microemulsion (IC₅₀ 0.0052 μ M) as compared to Quercetin loaded o/w microemulsion (IC₅₀ 0.030 μ M). Similarly, the in vitro spermicidal activity revealed that the 100x dilution of combination TDF + Quercetin o/w microemulsion based gel exhibited 10 times increase in inhibition of sperm motility as compared to conventional quercetin and combination gel formulation. The results ensure the enhanced efficacy by dual mechanism of action of developed NanoSpermViricide Gel to cater to the increasing social burden instigated due to HIV infection and unintended pregnancies, especially in developing nations.



NanoSpermViricide Gel



Ekdeep Singh Lubana

SNAP - A RAW images' based setup that can calculate nutrient concentration in leaves

Ekdeep Singh Lubana

Indian Institute of Technology Bombay

Guide :

Prof. Dr. Maryam Shojaei Baghini

Since long, efforts have been made for determining the concentration of nutrients in soil, which, thereafter, help in the calculation of required fertilizer content. However, the conventional methods incorporating chemical methodologies for soil testing have humongous limitations – finite number of samples can be tested in a given period of time (around 1000 samples per month); the amount of time required for the analysis can render the analysis obsolete; and, many-a-times, the analysis never reaches the farmer. All these issues put a stigma in a farmer's mind, because of which he refrains from getting a soil analysis and uses a heuristic approach of 50kgs of fertilizer per hectare. Such a methodology leads to acidification of soil, hampering the possible yield for the farmer. Due to over-fertilization, India faces an average ratio of 24:1 for N:P, whilst the ideal ratio is 4:1.

Hence, our team has come up with SNAP, a

handheld, patented device based on the principles of “Multispectral-Imaging” to capture images of a leaf at specific wavelengths, which have been optimally scrutinized and calculated for the specific purpose of determination of nitrogen concentration in a leaf. In a controlled environment (a minimal reflection apparatus with precisely-located illumination sources for constant geometry), modified GIS-based spectral parameters are correlated with leaf-nutrient content. We have expanded to further magnesium and potassium, and are currently concentrating on expansion to 6 more vital nutrients.

SNAP helps tackle the aforementioned delay in the chemical analysis solution - all the while maintaining high levels of accuracy - by delivering a cost-effective, affordable technology that the farmer can use himself – hence making the farmer self-reliant.



Final prototype



Place the leaf



Cover it with apparatus



Click an image



Pallabi Das



Kasturi Sarmah

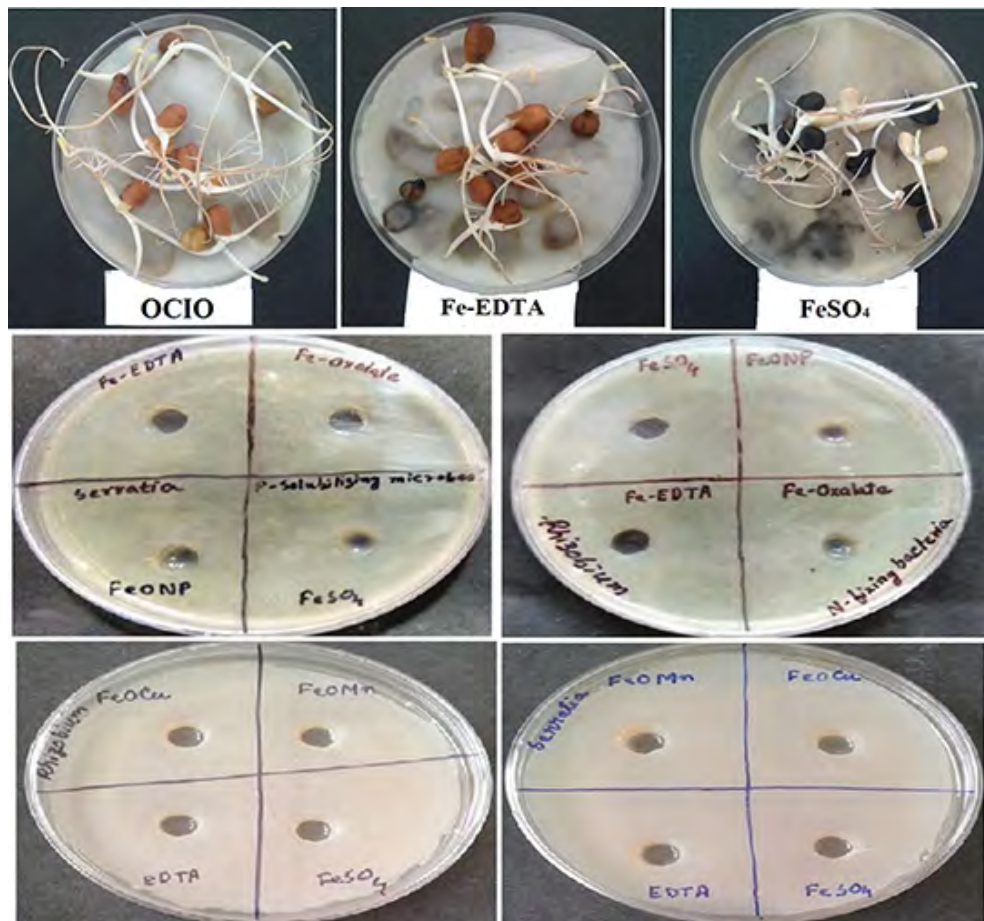
Nano based soil conditioner for agricultural application

Pallabi Das, Kasturi Sarmah
Tezpur University, Assam

Guide :
Dr. Sanjay Pratihara, Dr. Satya Sundar Bhattacharya

Available forms of iron, copper, and manganese in soil are scarce especially in arid regions where the soil pH varies from neutral to alkaline range, leading to acute deficiency of these micronutrients. Crop production in such soils is severely hindered. Iron salts such as ferrous sulphate has routinely been used to treat Fe deficient soil that greatly affects phosphorous availability and results in soil acidification in the long run. We developed easy, novel, and large-scale synthetic routes (1.5 Kg to 15 Kg in a single batch) to manufacture iron(oxalate) capped metal oxide [Fe(ox)-Fe₃O₄ (OCIO), Fe(ox)Fe-MnOx (OCIMn), and Fe(ox)Fe-CuOx (OCICu)] nanomaterials that are wonderful soil conditioners for increasing micronutrient availability to plants with least toxicity (Patent application no. 201631010727). Their Moderate (10 ppm) exposure improved seed germination and they were harmless to beneficial soil bacteria.

We also recorded negligible oxidative stress in plants up to 50 ppm exposure levels of the nanomaterials. OCIO, OCICu, and OCIMn balance the soil pH; sustain Fe, Cu, and Mn availability without increasing soil acidity thereby promoting release of NPK through benefitting soil microbial health. These nanomaterials corrected micronutrient deficiency in soil and significantly augmented tomato production in farmer's field by upregulation of vital genes responsible for root growth, photosynthesis, and N-assimilation (RSL4, MATE8, Ferredoxin, GS2, GOGAT, and NR). The crop yield was 2.3-3.4 folds greater in OCIO with 10 folds lower dose (2 kg/ha) than Fe-EDTA and FeSO₄ (20 kg/ha). Moreover, the quality and storage longevity of the produce was remarkably superior in plants treated with the synthesized materials than conventionally used micronutrient salts (FeSO₄, MnSO₄, and CuSO₄).





Anandarup Mukherjee



Arijit Roy



Sanku Kumar Roy

Batteryless IoT Sensing Node

Anandarup Mukherjee, Arijit Roy, Sanku Kumar Roy

Indian Institute of Technology Kharagpur

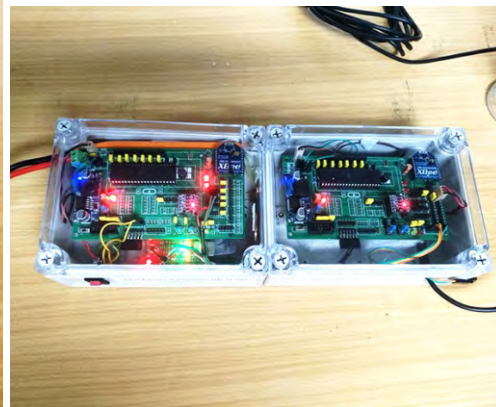
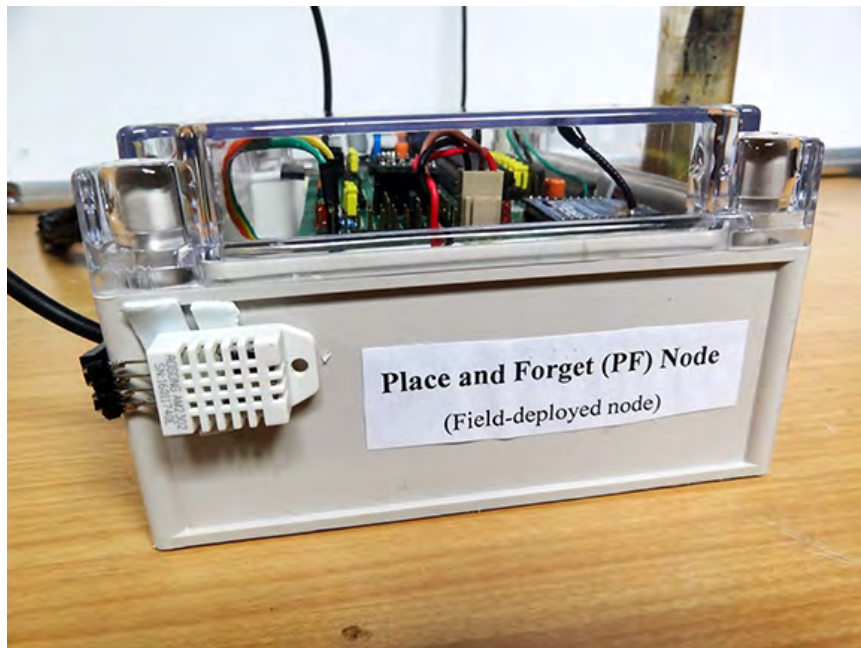
Guide :

Prof. Sudip Misra

Being a primarily agrarian nation, India still has a large chunk of its population earning their livelihood through agriculture or its associated practices. However, the recent climatic changes are disrupting the time-tested and age-old agricultural practices, which were mainly intuition based or seasonal. Despite the availability of scientific means of agricultural practices in India, they are not practiced at their full potential due to prohibitive initial costs or high maintenance costs. In our proposed innovation, we specifically are focusing on sensor nodes which are used for monitoring the agricultural field parameters. We have developed a battery-less sensor node which is designed to be placed in the field, without any chance of getting their power supplies replenished. We believe that reducing certain essential components in a sensor-based system, such as the battery, the net cost of each sensor nodes comes down, which in

turn makes it more affordable to the masses. As purchasing the almost maintenance-free sensor node is a one-time investment for the farmer, the benefits of the purchase in terms of increased water savings, higher yield, and power savings, far outweigh the initial costs. The only recurring cost to be borne by the farmers is the basic cellular data connectivity for the mobile charger and aggregator node, and minimal subscription charges for using the server-based analytics. Additionally, this approach not only increases the functional lifetime of sensor nodes beyond the typical 1-2 years mark but also makes it much cheaper in the long run. Being a pick-and-place solution, it can be easily operated and handled by people with no prior technical know-how, especially in the rural areas.

Link: <https://youtu.be/1IMcryb-cfY>





Ravi Prakash

Design and development of Phase Change Material (PCM) based Milking cum Cooling Pail

Ravi Prakash

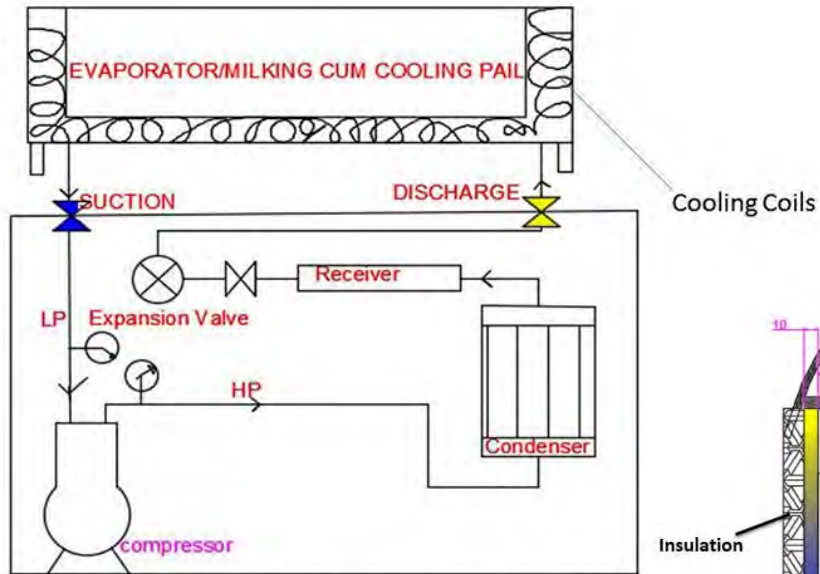
National Dairy Research Institute, Bangalore

Guide :

Dr. Menon Rekha Ravindra, Dr. M. Manjunatha

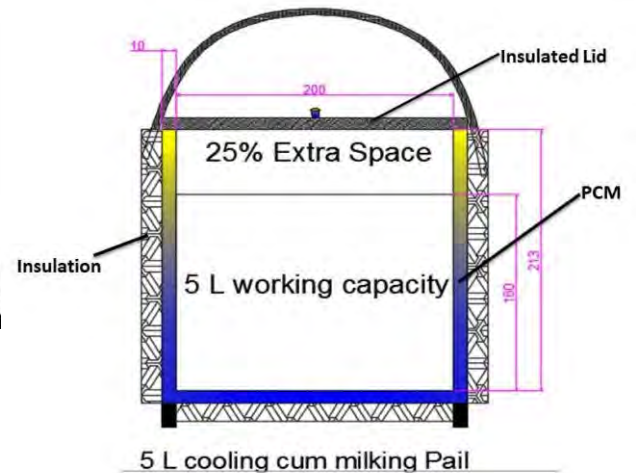
It is imperative to immediately cool milk from its drawing temperature (37°C) to below the critical temperature (10°C) in order to preserve the safety and quality of milk and its derived products. In developed and large-scale commercial dairy enterprise, this critical step in post-production processing of milk is achieved by integrating the milking machine with chilling unit accessorised with suitable piping and storage tanks. However, in a country like India where most of the dairy farmers belong to a class of millions of scattered small scale producers (0.5 - 10 L per head), such sophistications are neither pragmatic nor economical at the field level. This project aims at developing a system/device that could instantly cool small volumes of milk at the on-farm level preferably simultaneous to the milking to minimize the time gap between milk production and milk cooling below critical limit, even if the farmer has only one animal.

Considering the gap between demand and supply of electricity in rural areas, the suitable nanofluid based phase change material with enhanced cooling energy storage capacity was primarily designed, evaluated and to be filled into the double jacketed space of an insulated milking cum cooling pail accessorised with a charger (a hermetically sealed well-matched refrigeration unit). The operation, handling and maintenance of the pail is farmer-friendly, sealed and resembles as daily used milking pail. This technology is envisaged to have very high socio-economic utility; by helping millions of small scale milk producers/dairy farmers in developing countries like India in maintaining quality of milk and milk products, and contributing to the overall economy of the country.



HERMETICALLY SEALED CHARGER ASSEMBLY OF THE COOLING CUM I

Cooling Coils





Rohit Shivaji Pawar



Swati Suhas Vyas

Point of Care Nano Diagnostic Kit for Brucellosis

Rohit Shivaji Pawar, Swati Suhas Vyas
Institute of Chemical Technology, Mumbai

Guide :
Dr. Vandana B. Patravale

Brucellosis, a neglected global zoonotic infectious disease is transmitted to humans through consumption of unpasteurized dairy products and direct contact with afflicted animals. Presence of bacteria such as *Brucella* spp. in dairy products is an immense risk to public health.

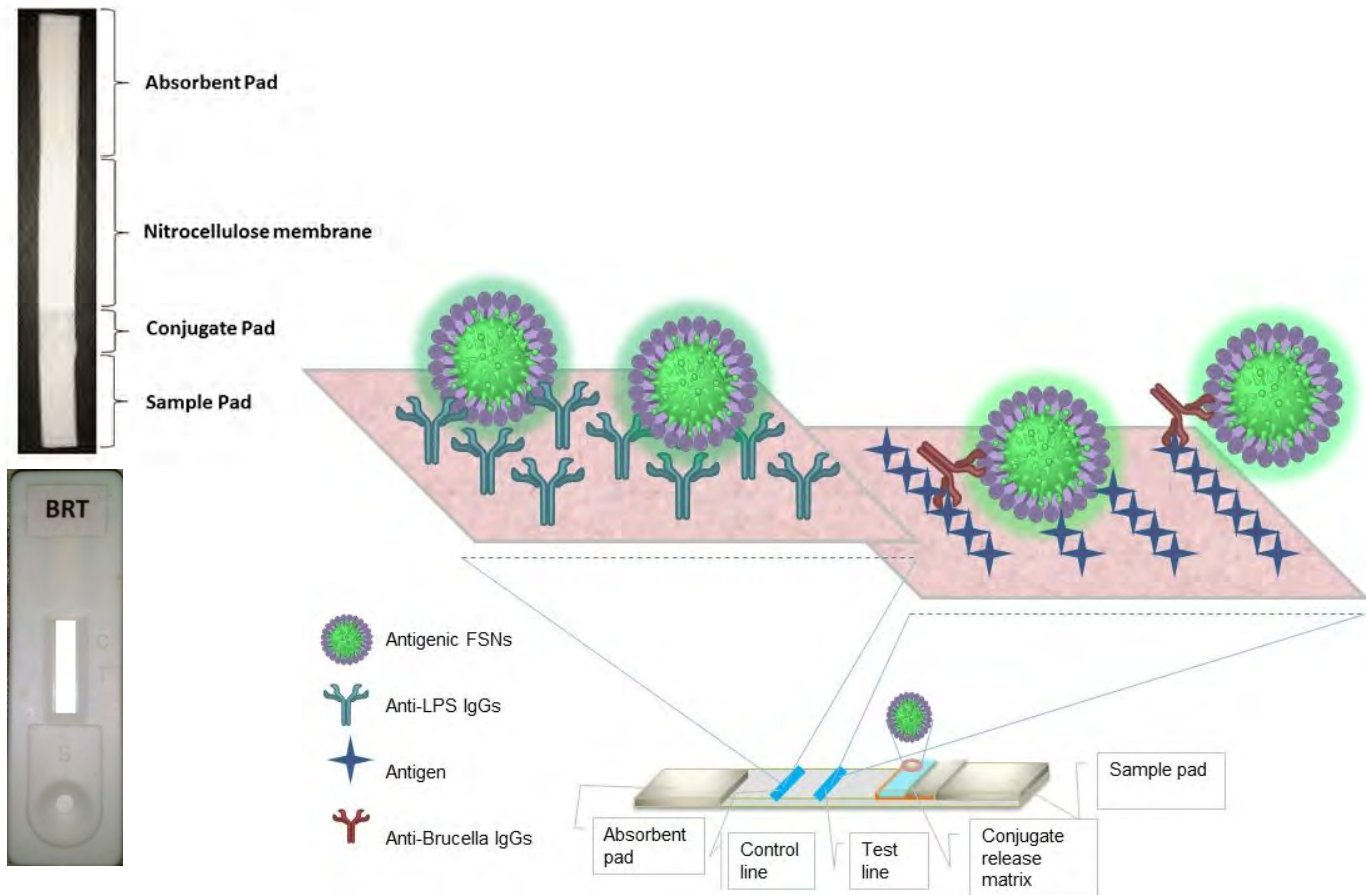
The innovation herein describes the development of immunochromatographic diagnostic kit (ICDT) based on fluorescence silica nanosensors that serves as a promising nanodiagnostic approach for detection of intact *Brucella* antibodies in non-serological samples eliminating painful blood collection procedures. Point of care immunoassays are rapid as they can quickly screen various samples in relatively shorter duration, are sensitive, specific, offer great advantage in accurate and fast diagnosis of infectious diseases. We have fabricated a point of care rapid diagnostic assay that employs fluorescent, micellar silica nanosensors conjugated with lipopolysaccharides (Indian patent application 3183/MUM/2013) capable of specifically detecting

Brucella IgG antibodies in non-serological samples of afflicted animal (milk, urine, saliva) and human samples (urine, saliva). The developed kit holds its industrial application in agricultural, biotechnological and pharmaceutical arena.

We have successfully fabricated and evaluated the aforementioned kit. The developed ICDT provides a rapid, reliable, point-of-care, accurate and reproducible results in accordance with PCR and ELISA results with high sensitivity and specificity.

Additionally, well defined antigenic components and surface biomarkers of various disease causing microbes can be broadly incorporated within the purview of this technology for accurate and rapid detection of suspected bovine pathological conditions, and can largely enable rapid field testing that can be implemented in farms and food Industry.

Since the developed technology is novel, cost effective yet scalable; it fits “Make In India” initiative to foster innovation, enhance skill development, create intellectual property and generate revenue.





Ramesh Kumar



Swathy Ravindran

Roll Pure - Rolling Water Purifier

Ramesh Kumar, Swathy Ravindran
Indian Institute of Technology, Madras

Guide :
Prof. Thalappil Pradeep

In rural India, people, mostly women and kids, still carry water on their head or shoulder from available local water bodies, sometimes even carrying non-potable water. According to a survey carried out in 2012 by National Sample Survey Office (NSSO), about 54% of women from rural areas travel between 200 meters to 5 kilometers, average 20 minutes a day and additional 15 minutes to fetch water, amounting to 27 days of wages per annum for an individual. According to NSSO statistics, less than 10% of rural Indian household has the facility to treat water at home before its end use. This whole process results in physical fatigue of women and waterborne diseases such as diarrhea, anemia and child mortality hence many resulting post-affects. Roll Pure - Rolling water purifier provides solution for the overhead transportation of nonpotable. A user (women) can fill 40 liters of

raw water from any water source (i.e. river, canal, pond, municipal hand-pump or tap etc.) and roll it to home, with minimum time required for transportation without any physical fatigue. To make fed water potable, a 1) hand-operable pump and 2) modular geo-genic contaminant specific cartridge is used. Modular geo-genic contaminant specific cartridge has 1) biocidal material, 1000 times biocidal then silver nanoparticles to kill bacterial and viral contaminants and 2) nano-composite material to remove soluble chemical contaminants. To get chemical and biological contaminant-free water with high output flow rate, a pressure differential is generated using bellows pump. Roll Pure can provide chemical and biological contaminant free water to India's rural BoP with minimal transportation effort and without any power.





Neeta Ganesh Wagle



Priti Prabhakar Yewale

A multipurpose low cost biological air purifier

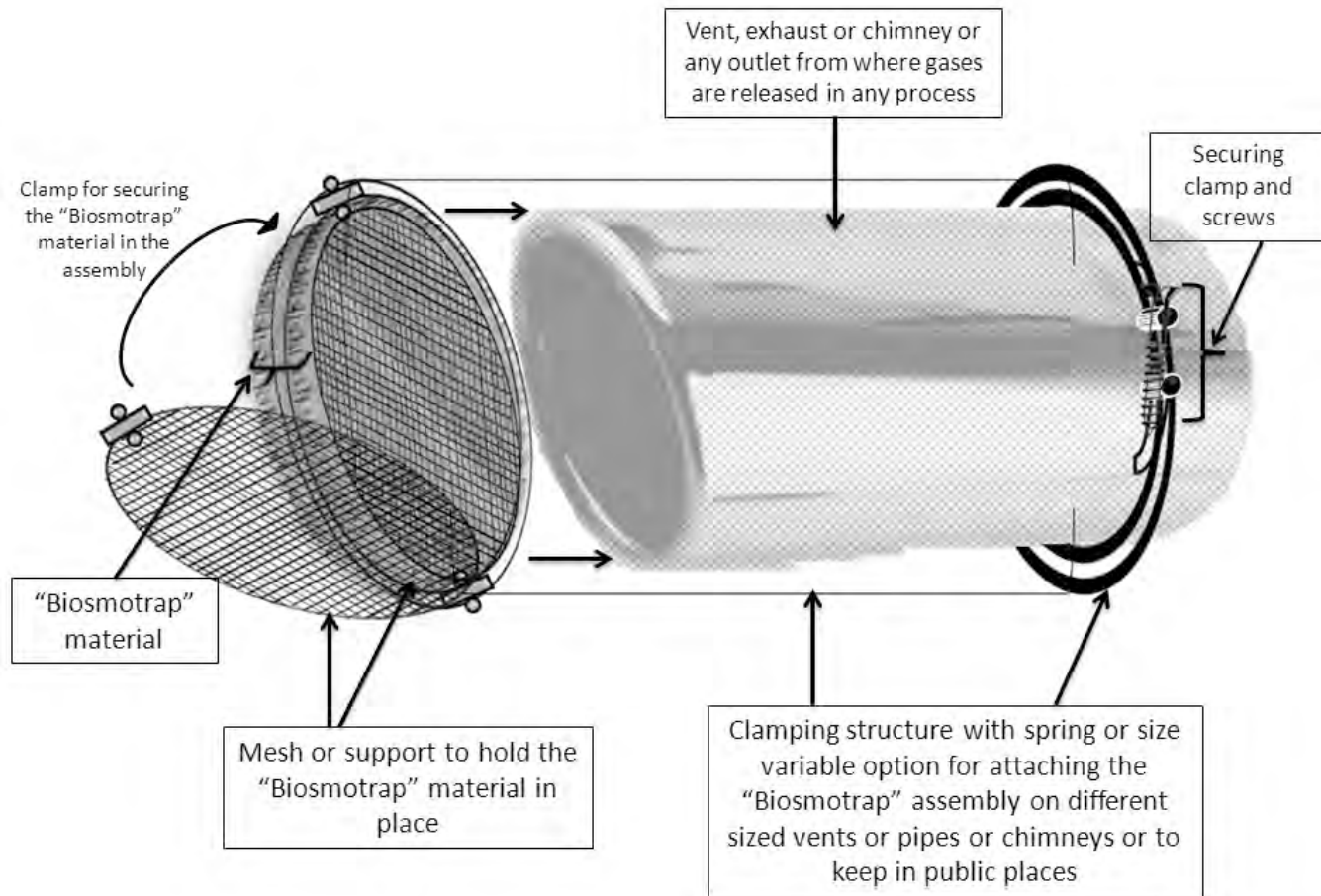
Neeta Ganesh Wagle, Priti Prabhakar Yewale
Dr. D.Y. Patil Vidyapeeth, Pune

Guide :
Dr. Neelu Nawani

In recent years, air pollution has become a major threat to survival of mankind. Looking at the current problem, biological air purifier would deliver a smart solution to circumvent the problem of indoor and outdoor air pollution caused due to motor vehicles, occupational exposure, cigarette smoke and industrial emissions in particular and will also focus on utility of the air purifier in reducing exposure of public to air pollutants.

The team has designed and fabricated a prototype of biological air purifier- "Biosmotrap" comprising of compact carriage assembly with replaceable adsorbent packed in biodegradable pouches or wrappers by means of support meshes and clamping structures and further attached to vents, exhaust or any outlet from where gases are released in any process. The microbial biomass and/or natural biomaterials were employed in the form of solid porous material as an adsorbent.

The adsorbent is configured to adsorb air pollutants like smoke, aerosols, particulate matter, flue gases, soot or other air pollutants. The shelf life of adsorbent depends on the concentration of air pollutants from the source point. It reduces the levels of organic as well as inorganic pollutants from the air. The onetime cost of carriage assembly is incurred with each biological air purifier. It can be reused for longer durations until it breaks or needs repair. Also, with the use of recyclable adsorbent material the cost per air purifier is lowered by making it affordable to everyone. This lowers the overall cost of maintenance when compared to conventional air purification technologies and increases its utility by encouraging public at large to use such devices. The fabricated prototype is easy to operate, cost-effective, recyclable and environmental friendly.





Shelaka Gupta



Md. Imteyaz Alam



Tuhin S. Khan

An Alternative Technology to Produce Biomass-Based Food Grade Flavors, Fuels and Value Added Chemicals

Shelaka Gupta, Md. Imteyaz Alam, Tuhin S. Khan, Ejaz Ahmad, Fatima Jalid

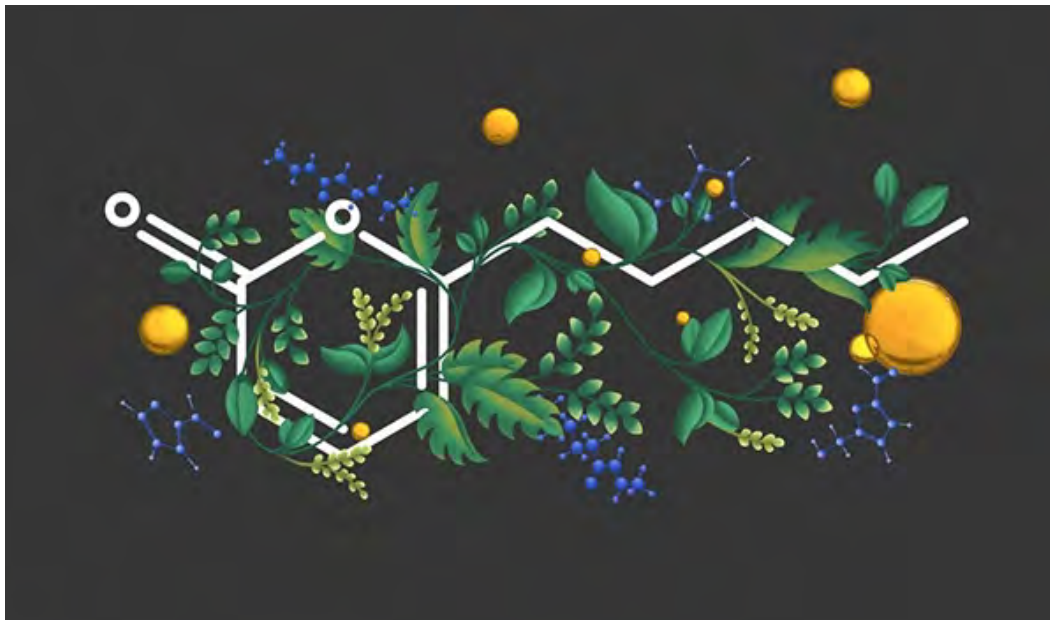
Indian Institute of Technology Delhi

Guide :

Prof. M. Ali Haider

State-of-the-art technologies applied today to convert biomass into high value fuels and chemicals are based on multi-step catalytic transformation steps, which are difficult to commercialize. Here, as an alternative, a technology (TNEW) based on integrated bio and chemo-catalytic reactions is developed, to carry out the desired conversion of biomass in fewer steps, giving higher product yield. In TNEW, 6-amyl-alpha-pyrone (6PP) is identified as a potential biomass-derived platform chemical. 6PP is produced from the fermentation of waste biomass using *Trichoderma* species and catalytically converted into 2-nonene-4-one, hydric alcohol, δ -decalactone (DDL) etc., under relatively mild processing conditions. While DDL and 2-nonene-4-one showed direct applications as food flavor and aroma, other products may be used as precursors for polymers, pharmaceuticals and hydrocarbon fuels. Three Indian patent

applications related to the commercial development have been filed. Socially, the simplistic nature of our technology is expected to have a wider impact on rural economy and environment. For example, at present large volume of waste lignocellulosic biomass is burnt in the national capital region of India, creating air pollution at alarming levels. Farmers burning such valuable biomass may choose to utilize TNEW and ferment the waste biomass directly to produce 6PP which can be subsequently converted to produce high value chemicals. To the best of our knowledge, this is the first time in our country a novel biomass-derived platform chemical is introduced which is different from the top-12 chemicals proposed by the US Department of Energy. This will add into the portfolio of a futuristic bio-refinery, providing a renewable and sustainable solution.



Ejaz Ahmad



Fatima Jalid



Bikash Ranjan Tiwari



Md. Tabish Noori

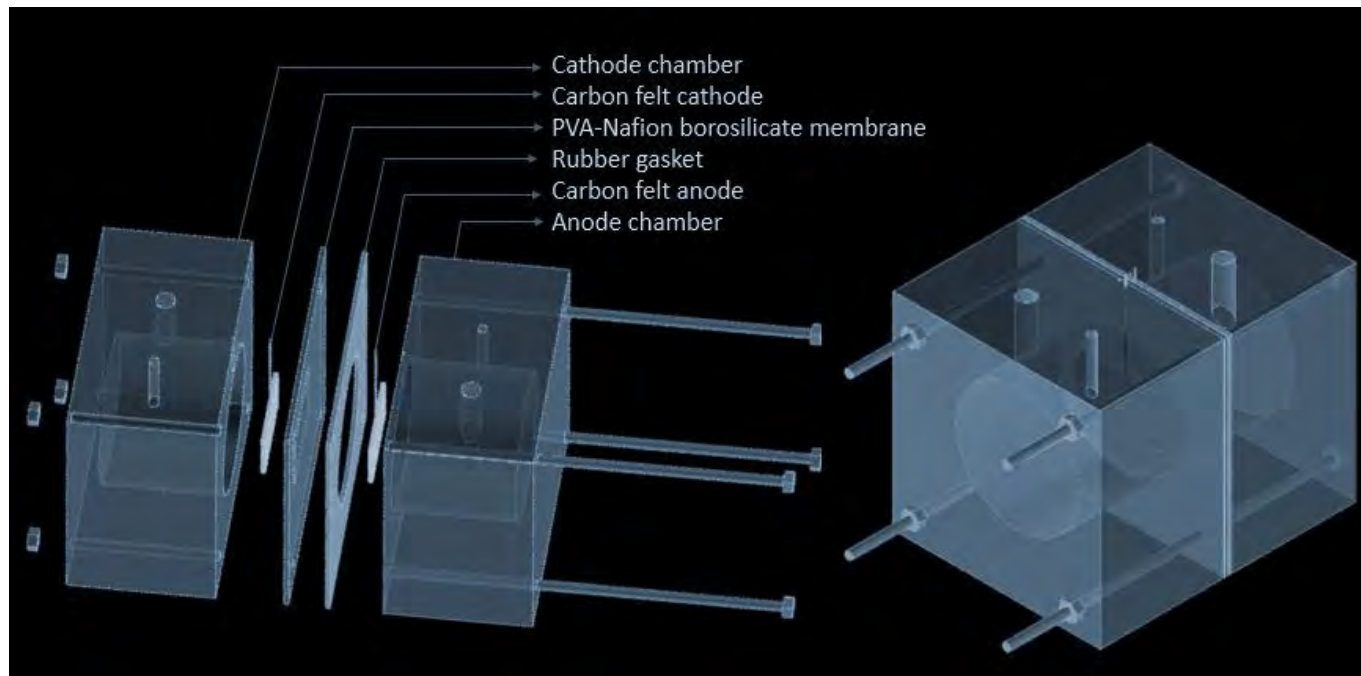
A Novel low cost Polyvinyl alcohol-Nafion-Borosilicate membrane separator for microbial fuel cell treating distillery wastewater

Bikash Ranjan Tiwari, Md. Tabish Noori
Indian Institute of Technology Kharagpur

Guide :
Prof. Makarand Madhao Ghangrekar

Microbial fuel cell (MFC) are bioelectrochemical systems which convert the organic matter present in the wastewater to electricity with the aid of biocatalytic activity of a specific group of microorganism i.e. electrogens. MFCs presents a promising solution to both waste removal as well energy generation simultaneously. The high manufacturing cost of MFC is a major hurdle in the path of field scale application. The membrane cost (\$1600/m²) alone accounts for around 35% of total MFC capital cost. Hence, development of low cost membranes can ease the path for real world application of MFCs. In the present study, a composite membrane was developed from borosilicate glass incorporated with polyvinyl alcohol (PVA)-Nafion matrix. While utilizing acetate based synthetic wastewater, MFC with PVA-Nafion-Borosilicate membrane exhibited maximum power density of 6.8 Wm⁻³ and it was comparable with MFC using commercially

available Nafion 117 (7.1 Wm⁻³) membrane separator. Moreover, the method of preparation is simple and cost of the novel membrane is 11-folds lower than commercially available Nafion 117. The study was further extended by utilizing the MFC with the newly developed membrane for distillery wastewater treatment. effluent generated from distilleries are characterized by their high COD and BOD content and acidic pH which can cause serious environmental problems if not properly treated. The MFC was capable of efficiently degrading organic matter present in distillery wastewater in the range of 54.5 - 64.25% along with generating a maximum power density of 4.3 Wm⁻³. This study demonstrates a novel, low cost, easily synthesizable membrane which was successfully used for treatment of distillery wastewater treatment in MFCs.





Amit Kumar Baghel



Shashank Satish Kulkarni

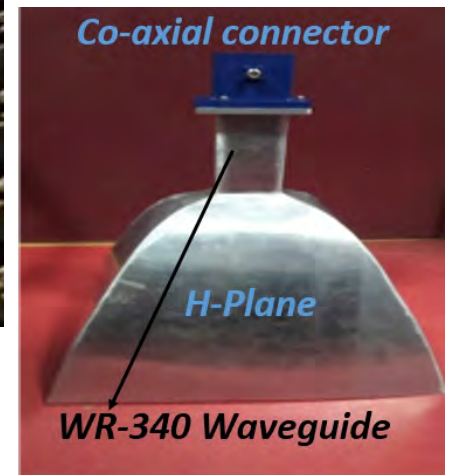
Feasibility Study of Wireless Power Transfer Using Metamaterial

Amit Kumar Baghel, Shashank Satish Kulkarni
Indian Institute of Technology Guwahati

Guide :
Dr. Sisir Kumar Nayak, Prof. D. Senthil Kumar

Wireless power transfer (WPT) is the method to transfer power from the source to load without cables or wires started way back in 1903 by Dr. Nicolas Tesla. Nowadays this technique is being used in many applications such as biomedical transplants, UAVs, mobile chargers, electric vehicle charging, antennas etc. But the major problem with the WPT is the decrease in the efficiency as the distance is increased. In near field, the strength of the field varies inversely as the square of distance and cube of distance for far field. One of the novel ways by which we can increase the intensity of field, thus power transfer is with the help of metamaterial. They are manually engineered with negative refractive index and help in beam focusing. It can act as a superlens. My innovation is about increasing the efficiency of far-field WPT using metamaterial. The metamaterial pattern is made on the 1.6 mm thick double-sided FR4 sheet (dielectric constant

0.02) having 0.017 mm thick copper plating on both side of the sheet. A total of 40 arrays having 8 unit cell in each is placed at an optimized distance from the aperture of the proposed horn antenna (Tx antenna). The electric field at the distance of 6 m is measured using the D-dot sensor. The receiver antenna is 2x2 patch antenna having RF to DC conversion schottky diode and matching circuit. To charge the batteries of the cellphone (2900 mAh, 3.8 V), the zener diode with RC filter is placed after the matching circuit. An increase in twice the electric field, thus the received power is seen with the proposed antenna and metamaterial.





Girish Chandra Verma

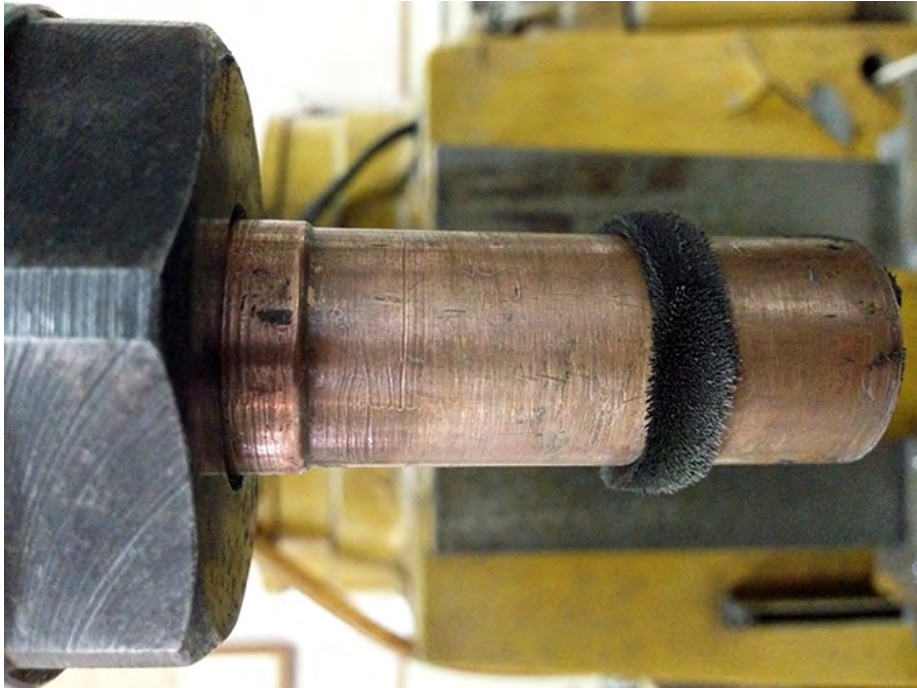
Magnetic tool for nano finishing the holes, vertical and horizontal surfaces

Girish Chandra Verma
Indian Institute of Technology Delhi

Guide :
Prof. Pulak Mohan Pandey

The developed tool is based on MAF principle for polishing holes, blind holes, grooves and vertical surfaces. The tool developed in the present work consists of five main components, which are two cylindrical magnets (having magnetic flux density of 0.452 T), a mild steel piece, a copper casing, and an upper head made of mild steel. In the developed tool the magnets were arranged in such a way that, similar pole of both the magnets faces each other. Due to this the magnetic lines of force from both the magnets get directed to radial direction. Using this concept of similar pole facing each other; a high magnetic flux density 0.8 T is achieved around the circumferential area of mild steel piece. The developed tool also produces variable magnetic flux density so that material of different hardness can be finished. For obtaining a variable magnetic flux density, the gap between the upper magnet and ferromagnetic piece is altered with the help of nut and bolt arrangement

provided on the upper piece of copper casing and upper head. The size of the developed tool can also be modified by using different sizes of magnets and casing, which can be used to finish hole of different sizes. Experimentation on SS304 stainless steel pipe (with initial surface roughness of 541 nm) at an optimized condition resulted in a surface finish of 56 nm. The obtained SEM (scanning electron microscopy) images of finished and unfinished surface have showed that all the scratch marks were removed and finished surface was obtained.





Avinash Prabhune

Window Solar Cooker

Avinash Prabhune

Indian Institute of Technology Bombay

Guide :

Prof. B K Chakravarthy

The LPG price hikes every month triggered the thought on Solar Energy which could be a clean and abundant source of energy. There are many types of solar cookers available in the market, but they are not that efficient. Each one has its own pros and cons. In a rapidly urbanizing India, the user segment this product is targeted towards are the people who live in high rise buildings because they don't have space to use solar cooker and the old solar cookers fail to match their fast-paced life style. For using present type of solar cookers, the users need to have open space where they will get continuous sun light and the users need to track the sun all day. All these usability issues are the reason why urban users are not willing to consider this as an alternative to conventional cooking methods. This new kind of solar Oven will be mountable in the window or wall like a window AC, while facing towards south where sun is available all year round. Thus the accessibility

becomes very easy from inside the house itself and the users need not go out. The cylindrical form provides uniform sunlight all day long. The 'Dabba' perception about the box-type of solar cooker has been broken by this new design. The efficiency has been improved and the time taken for cooking is drastically reduced, as compared to any other kind of solar cooker.





Dr. Sinnu Susan Thomas

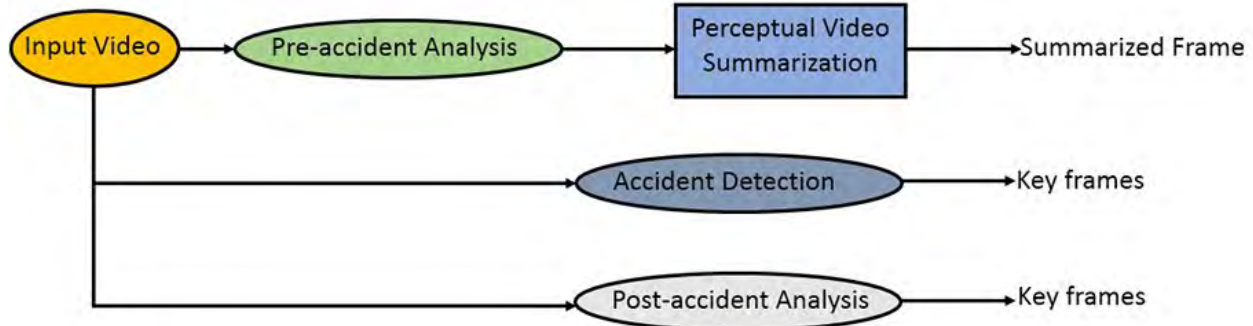
Road Accident Detection using Perceptual Attributes of Video

Dr. Sinnu Susan Thomas,
Indian Institute of Technology Kanpur

Guide :
Prof. Sumana Gupta, Prof. K S Venkatesh

According to Annual Global Road Crash Statistics, nearly 1.3 million people die in road crashes every year, on average 3,287 deaths a day. Road accident detection and vehicle behavior analysis is of great interest to the research community in intelligent transportation systems. Surveillance cameras are ubiquitous on the roads and capture videos round the clock. The enormous data collected by cameras may be time consuming and laborious to scrutinize the occurrence of an accident scenario present in the videos. There is a need to reduce the redundant nature of video so that its contents become succinct using video summarization techniques. The project presents perceptual video summarization techniques to enrich the speed of visualizing the accident content from a stack of videos. The problem of vehicle analysis is formulated as an optimization problem. The results establish the versatility of the proposed summarization model. This model is

formulated using cost function based on the change in the appearance of perceptual features such as motion, color, shape, and size. A selective minimization of the cost function leads to an appropriate video summarization of the event. The experiments were conducted for different types of collision such as head-on collision, rear-end collision, single-vehicle collision and intersection collision and summarized the events prior, during, and subsequent to the accidents. The reduction ratio achieved is small and true positive detection is higher compared to the conventional methods. The model used for this project can be used for various surveillance purposes.





Abhik Saha

Origgon - A Social Search Engine

Abhik Saha

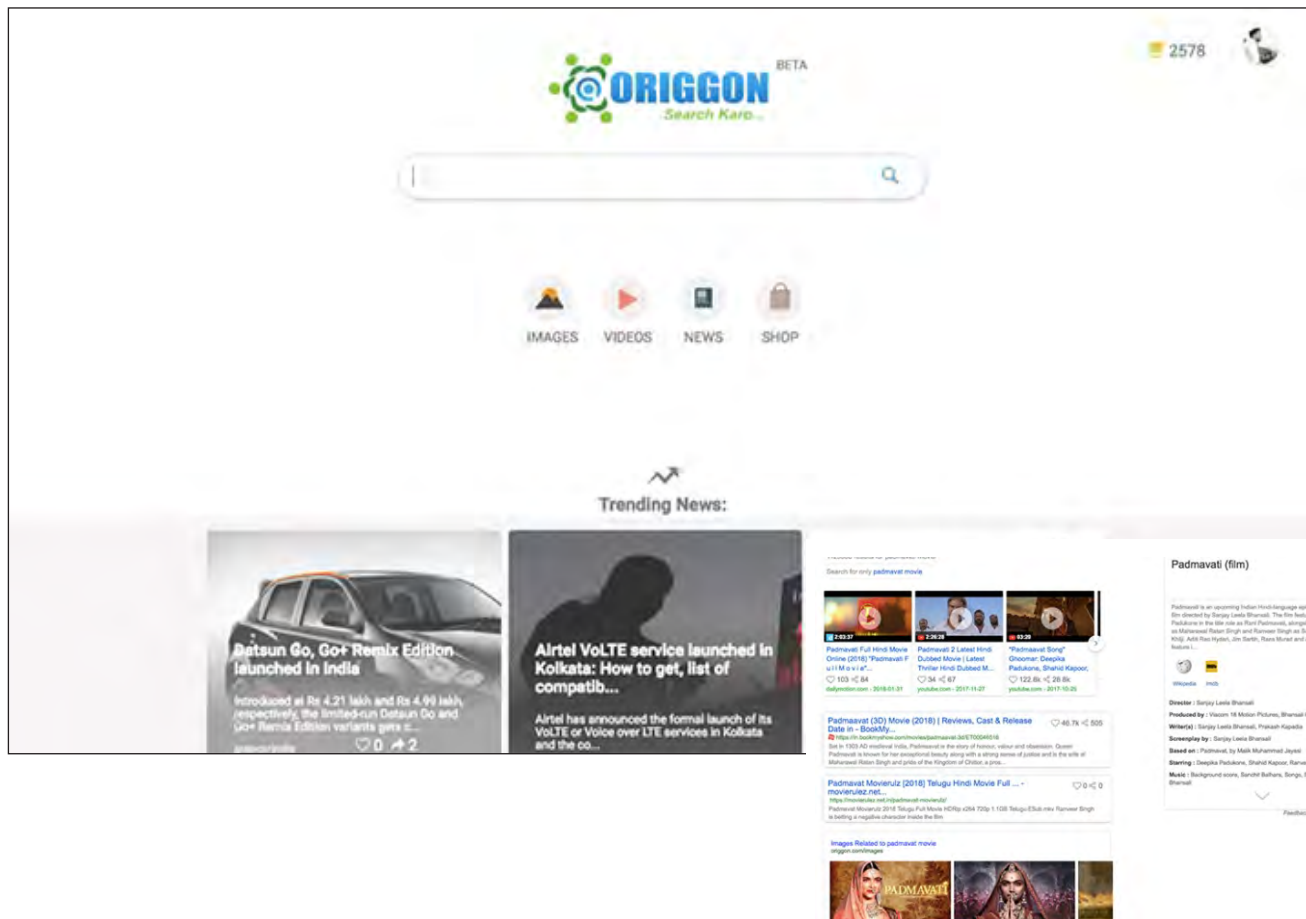
Don Bosco High School, Assam

Origgon.com is world's first of its kind social search engine made by 15 year old boy, Abhik Saha. Origgon is a unique innovation to save people from the trouble of finding spam and irrelevant results in their search process. Origgon is a baby step towards our honourable Prime Minister's vision of "Make in India". It gives users the opportunity to find optimal search results based on reviews and recommendations by people. In the space where AI has evolved so far, it's still not accurate to meet our needs. Every people have their own personalised space and needs set.

The job of social search is to full fill that need for every individual, the need might be fulfilled based on more personalised set from one's social media data, one's friends circle and all other social stuffs. Origgon, a social search engine where search results will not be based on SEO but by votes of people all over the world. We people are sharing

lot of valuable content in the web, let that be picture or text or a emoji or a news article or a meme anything. We share because we believe the content is worth it or at-least for yourself it is important. Taking those recommendation, those likes, those little things the billion people shares every day, to personalise and recommend the results.

Link: www.origgon.com





Aarushi Sharma



Shikha Chawla

3D bioprinted skin scar model for drug and cosmetic testing

Shikha Chawla, Aarushi Sharma
Indian Institute of Technology Delhi

Guide :
Dr. Sourabh Ghosh

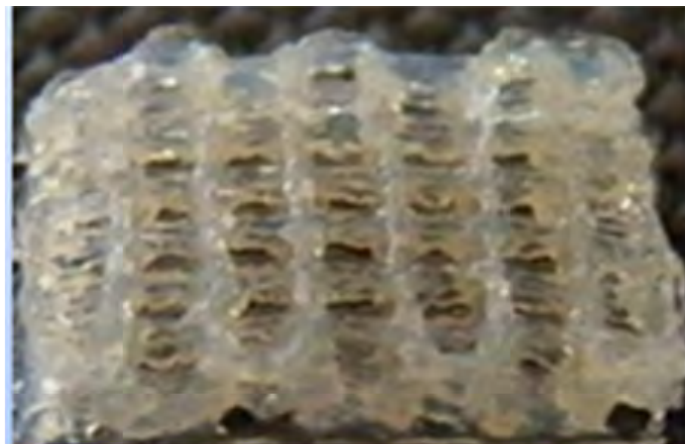
Current anti-scar cosmetic products or medicines are not effective enough due to poor understanding of scar pathogenesis. Results of pre-clinical trials on animals do not always extrapolated to humans. Moreover, pharmaceutical companies are facing a major jolt due to European Union ban on animal testing of finished cosmetic products/ingredients (European Union Council Directive 76/768/EEC). International Cooperation on Cosmetics Regulation is strongly encouraging development of alternatives for drug testing on animals due to ethical concern, to reduce or eliminate the use of animal models. Hence, there is an urgent need for a human cell-based in vitro engineered tissue models to screen drugs/cosmetics for the prevention of scar.

Since past 50 years, many international researchers/industries tried to develop tissue engineered skin for transplantation. But tissue

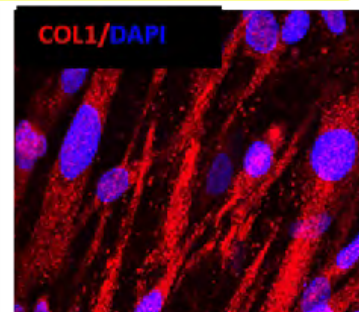
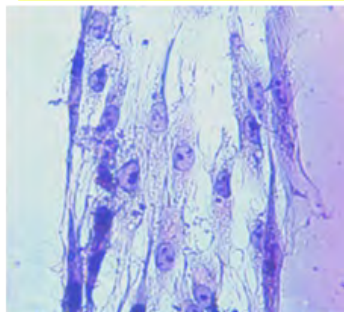
engineered skin received limited success in human clinical trials. Uniqueness of our approach is to develop a relatively simpler, human cell-based in vitro tissue engineered skin model that could 1) be used for rapid screening of anti-scar drugs/cosmetics and 2) help to extend our understanding of the cellular signaling pathways. Our model could recapitulate several hallmarks of scar tissue: (1) fibroblasts to myofibroblasts transition and expression of α -SMA; 2) contraction; 3) excessive collagen and reduced elastin secretion; 4) fibrotic ECM protein expression (SPARC and Tenascin); 5) low MMP secretion and 6) involvement of TGF- β /SMAD and Wnt/ β -catenin pathways. To the best of our knowledge, no such in vitro models have been reported, hence it is getting major attention of national/international level news media and pharmaceutical companies.



3D Bioprinter



3D Bioprinted scar model





Probir Kumar Sarkar



Aniruddha Adhikari



Animesh Halder

A Non-contact Optical Device for Online Multiplexed Monitoring of Diseases of Military Importance in Fragile and Conflict-Affected Settings

Probir Kumar Sarkar, Aniruddha Adhikari, Animesh Halder, Soumendra Singh

S.N.Bose National Centre for Basic Sciences

Guide :

Prof (Dr). Samir Kumar Pal

Jaundice, Anaemia and Hypoxia, the three intimately interrelated health problems in military services particularly in fragile and conflict-affected settings take care of significant preventable casualties. These trio also proved to be the major cause for neonatal and maternal mortality in developing world. On the other hand, conventional gold-standard detection strategy through invasive blood sampling has several drawbacks for neonates and is redundant in fragile and conflict-affected settings. Thus a low cost and robust strategy for diagnosis of these diseases in all adverse conditions is of outmost importance to countries like India where huge number of military personnel are deployed in adverse geographical conditions along the border area and where under-5 mortality rate is alarmingly high.

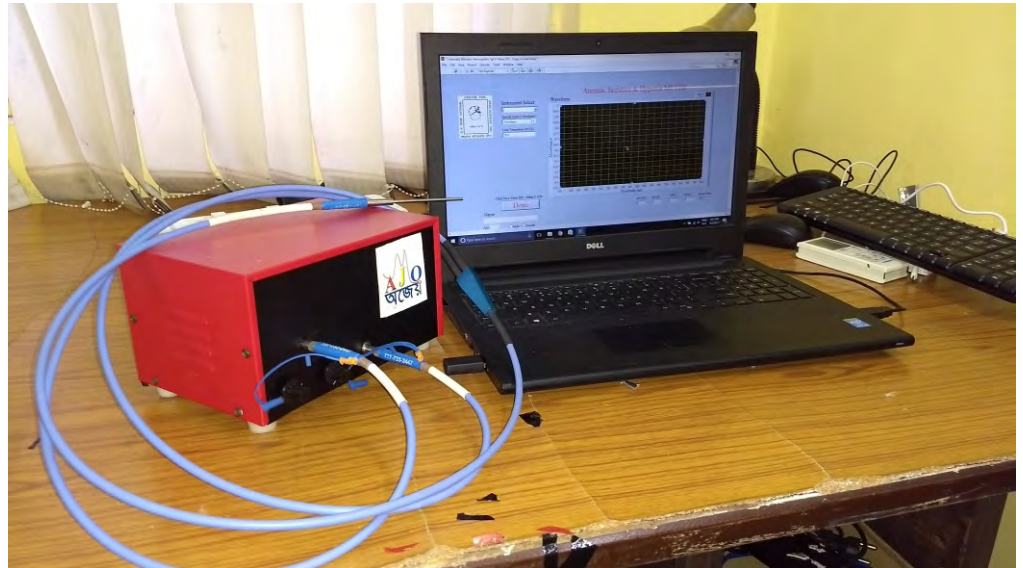
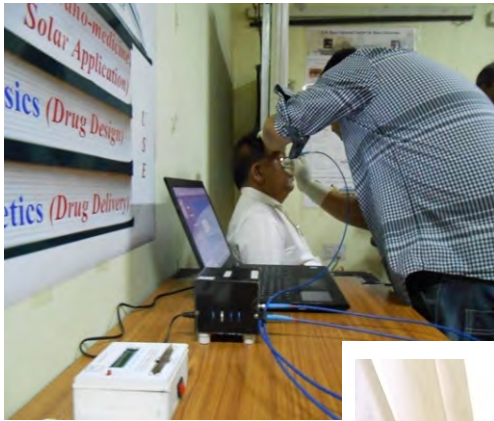
We, developed prototype of a noninvasive, noncontact, affordable, easy-to-use, point-of-care reflectance spectroscopy based device for measuring all three parameters at one go based on the spectral signature of bilirubin, hemoglobin and

oxygen saturation from the vascular bed lying under conjunctiva (white portion) of eye. As conjunctiva is white independent of race, age or skin color, the device is useful to all. The indigenously developed software makes the device compatible to e-healthcare with possibility of online monitoring through cloud computing.

Thus, this strategy will be extremely helpful in critical/low resource conditions like battle field and high altitude border regions for regular routine health check-up of army people who always devoted their life to protect the nation. The innovative non-contact, low-cost technique is expected to have importance in monitoring jaundice, anemia and hypoxia in developing / underdeveloped countries, where the inexpensive diagnosis with non-experts manpower is obligatory.



Soumendra Singh





Rakesh Kumar Raigar



Danie Shajie A

Performance Evaluation and Process Optimization for Production of Ready-to-Eat Therapeutic Food Paste in Pilot Scale Unit

Rakesh Kumar Raigar, Danie Shajie A
Indian Institute of Technology Kharagpur

Guide :
Dr. H N Mishra

Severe Acute Malnutrition (SAM) is an important cause of morbidity and mortality in children below five years of age in India, where 8.1 million children are estimated to suffer from SAM. To combat this stumbling block, an indigenously developed ready-to-eat therapeutic food (RTE-TF) is the need of the hour, catering the prerequisite of energy dense and nutrient rich ready-to-eat product containing defined calorie and essential nutrients which would be storage compatible, culturally acceptable; easy to administer; control and deliver at low cost for SAM children. A GMP/GHP compliance PLC controlled pilot scale unit has been commissioned in the Agricultural and Food Engineering Department at IIT Kharagpur aligning with the Make in India vision in treating SAM at community level with financial support from Department of Biotechnology, Government of India, New Delhi for the production of RTE-TF. Five RTE-TF formulations were developed using locally produced raw

material and fortified with micronutrients. A peanut based formulation was processed for the performance evaluation and optimization of major equipment installed in the pilot scale unit. The material and system parameters for primary processing (batch operations) like roasting, deskinning, grinding etc. and PLC based continuous processing (viz. grinding, mixing & homogenizing) were optimized along with the standardization of PLC based clean-in-place (CIP) sanitization system. Physico-chemical, safety and nutritional characterization of the RTE-TF produced in the pilot scale unit was done and complied as per the norms defined by World Health Organization for SAM. The pilot scale process will reinforce the liability for sustainable production of RTE-TF paste which would aid in management of SAM in children in our country.

Project ID: 12467

PERFORMANCE EVALUATION AND PROCESS OPTIMIZATION FOR PRODUCTION OF READY-TO-EAT THERAPEUTIC FOOD PASTE IN PILOT SCALE UNIT

Rakesh Kumar Raigar*, Danie Shajie A and Hari Niwas Mishra
Agricultural & Food Engineering Department, IIT Kharagpur



Fig 1: RTE Food Paste Manufacturing unit.



Pilot scale Ready-To-Eat (RTE) Therapeutic Food Paste

* Representational Images

For more details: please visit https://www.youtube.com/watch?v=dT1oWZZBY_U&t=84s



L Ponoop Prasad Patro



Abhishek Kumar



Narendar Kolimi

3D-NuS: A Web Server for Automated Modeling and Visualization of Non-Canonical 3-Dimensional Nucleic Acid Structures

L Ponoop Prasad Patro, Abhishek Kumar, Narendar Kolimi

Indian Institute of Technology Hyderabad

Guide :

Dr. Thenmalarchelvi Rathinavelan

The inherent conformational flexibility of nucleic acids (DNA, RNA etc.) facilitate the formation of a range of conformations such as duplex, triplex, quadruplex etc., which play crucial roles in biological processes such as mismatch repair, replication, recombination, transcription, translation, gene regulations etc. These unconventional base pairing and structural conformations on DNA/RNA structures at different sequence contexts also induce abruptions in normal cell function which can lead to deformities and diseases (cancer, fragile X syndrome, etc.). To understand the role of these unusual nucleic acid structures in aforementioned biological phenomena and diseases, structural details at atomic level is indispensable. But, experimental methods (such as X-RAY crystallography, NMR etc.) are not always successful in determining structural details and are very expensive. Further, structural insights about nucleic acid triplexes, which are generally not tractable to structure determination by X-ray crystallography or NMR techniques, are essential to establish their biological function(s). A web server,

namely 3D-NuS (<http://iith.ac.in/3dnus/>), has been developed to generate energy minimized models of 80 different types of triplexes, 64 types of G-quadruplexes, left handed ZDNA/RNA duplexes, RNA-DNA hybrid duplex along with inter- and intra-molecular DNA or RNA duplexes comprising a variety of mismatches and their chimeric forms for any user defined sequence and length. It also generates an ensemble of conformations corresponding to the modeled structure. These structures may serve as good starting models for docking proteins & small molecules with nucleic acids, NMR structure determination, cryo-electron microscope modeling, DNA/RNA nanotechnology applications and molecular dynamics simulation studies. The operational milestones that would be accomplished in future include generation of aforementioned structures with modified nucleic acids such as PNA and LNA, intra-molecular triplexes, complex duplexes and models with user defined structural parameters.

1' DNA & RNA Molecules

Insert your desired DNA/RNA sequence (with/without mismatches) in the upper given boxes. The visualization of the major sequences will be considered as mentioned in the left hand side of the box. Click Submit to generate the 3D-NuS molecule and information about the molecule positions.

3D-NuS displays the flow of nucleotides and 3D-structure. You can also view the generated 3D molecule in the 3D interactive viewer or get structural and statistical data using other molecular visualizers. The hydrogen bonding schemes for DNA duplex is shown in **Figure 1** for DNA duplex. Thymine (T) and Guanine (G).

Let's build the molecule of your choice...

2' Click on the button to generate DNA models

Select any of the following form of DNA duplex.

Ideal Model
Sequence specific Model

Customized DNA: Input DNA sequence.
[Note: Molecules can also be generated without mismatches in the input sequence.]

Insert Sequence 5'---3':
Insert Sequence 3'---5':

Parameters to be considered: NMR
X-RAY

3' Sequence specific DNA

Interactive view is provided below

Length of the DNA: 6.
Parameters considered from the model: 1000.

Base-pair mismatches:
G...T mismatch: residue numbers 2 and 10
Mismatch base pairs are colored in cyan in 3D model viewer.

4 G-Quadruplex

Interactive view is provided below

Length of the G-quadruplex: 20.
Quadruplex type: CDDC.
(Quadruplex class: CDDC).

Note: All strands are represented with different colors in 3D model viewer.

3D-NuS

Advanced Modeling & Visualization of 3D Nucleic Acid Structures

1

2

Select appropriate type of quadruplex from undergiven options.

Quadruplex class [strand orientation]:
Monomer all anti-parallel stands (Q1)
Monomer all anti-parallel stands (Q1)
Monomer all anti-parallel stands (Q1)
Monomer all anti-parallel stands (Q1)

3

Select appropriate type of quadruplex from undergiven options.

Quadruplex class [strand orientation]:
Monomer all anti-parallel stands (Q1)
Monomer all anti-parallel stands (Q1)
Monomer all anti-parallel stands (Q1)
Monomer all anti-parallel stands (Q1)

4

Select appropriate type of quadruplex from undergiven options.

Quadruplex class [strand orientation]:
Monomer all anti-parallel stands (Q1)
Monomer all anti-parallel stands (Q1)
Monomer all anti-parallel stands (Q1)
Monomer all anti-parallel stands (Q1)

Submit



Narayan Lal Gurjar



Shashi Pratap Shekhawat



Ankit Jain

Eco-Friendly Water Retention Natural Polymer

Narayan Lal Gurjar, Shashi Pratap Singh Shekhawat, Ankit Jain

College of Technology and Engineering, Udaipur

Guide :

Dr. Shailendra Mohan Mathur

As we know our country is agricultural depending economy and big part of our economy is depends on the agriculture. But production in agriculture is proportional to water availability. In India 266 districts, in 11 states declared drought affected. The average food grain production between 2010-2011 and 2014-2015 is 255.59 million tons, while in 2015-2016, it is estimated to be at 253.16 million tones. More than 70% districts drought affected in 8 states. The data shows scarcity and unavailability of water causes too many losses. So we tried to create something helpful to retain water for long time, and in this trying we are successful to create a polymer named “Eco-Friendly Water Retention Natural Polymer”. Keeping in mind all the conditions of our country and our farmers we designed this product at low cost with much more efficiency. This polymer is working on properties of SAP. SAP have properties to absorb water of quantities of

their own weight. It has more capacity to store water for long time. On testing of our product we found it may retain water for 4 to 6 weeks that means crops irrigated at intervals of 2 to 4 days are now can be irrigated at 7 to 8 days with less water consumption. Therefore, finally farmers can get more crop production in low water consumption. Our natural polymer is designed by use of waste material like banana peels and peepal barks with gel. As all the ingredient used are biodegradable, so our designed product is also biodegradable and completely pollution free i.e. it is easily mixed with soil and does not create any problem in the future.





Tania Dutta

New generation periscope fruit picking device

Tania Dutta

Birla Institute of Technology & Science, Pilani, Hyderabad

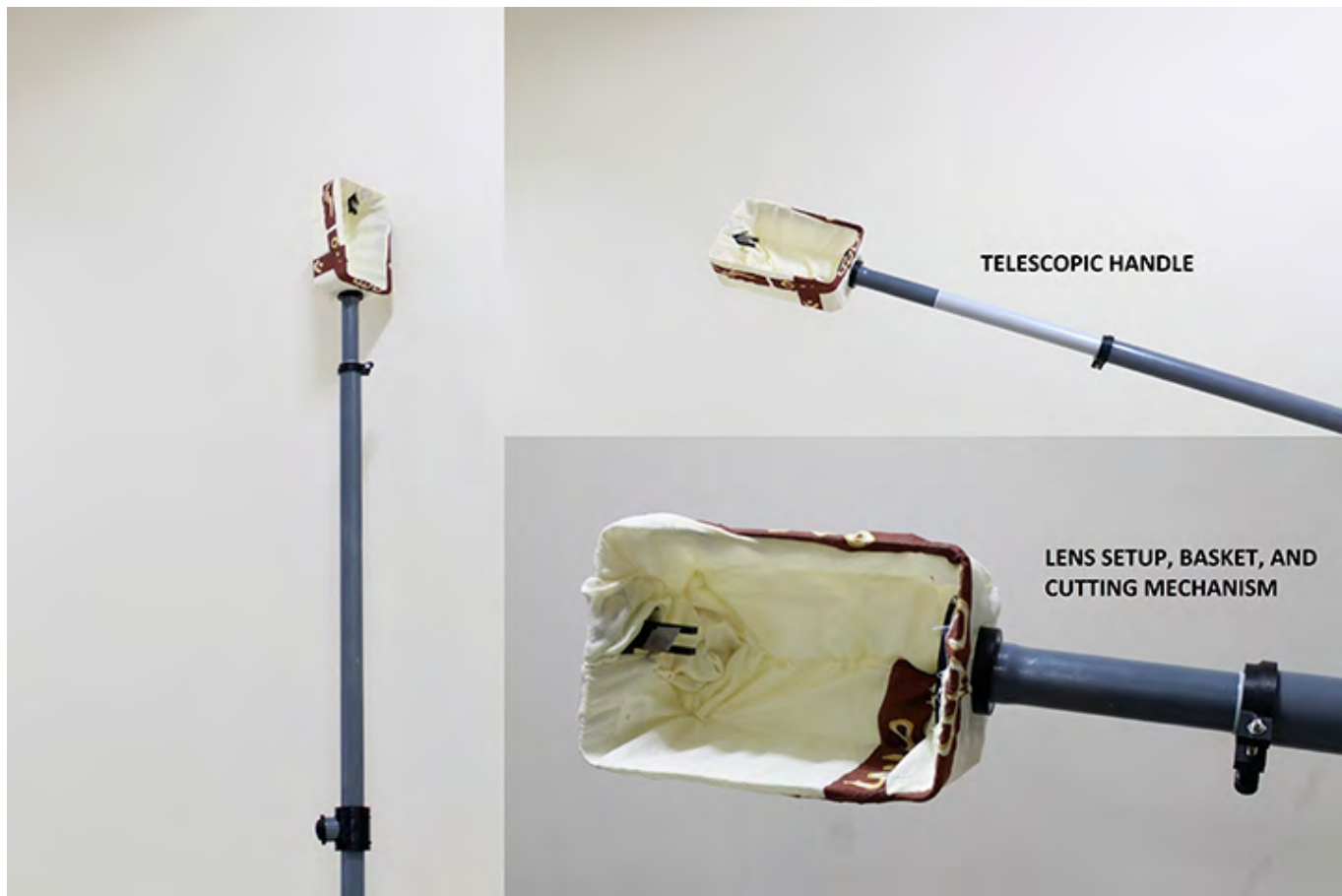
Guide :

Dr. P Yogeeswari

The estimated extent of annual post harvest losses are: Fruits, about 30 per cent valued at Rs 13,600 crores and for vegetables about 30 per cent valued at Rs 14,100 crores. The most probable cause for the losses encountered is the untimely harvesting before proper maturation and the harvesting of damaged fruits along with the good ones and storing them together. The post harvest losses can be minimised to a great extent if the harvesters can see the condition of the fruits on the trees before picking them.

Thus, I have come up with a design optimised modified tool structure. We have incorporated the idea of a periscope inside a fruit picker in such a way that it gives a complete view of the fruit so that the harvesters can decide if the fruit has ripened or not and pick accordingly. The device also has a focusing and zooming lens set-up for a better image at the end. The rod in the device are placed in a telescopic fashion. This allows flexible

height adjustment of the rod according to the fruit height on the tree. The design is simple, convenient to use, does not require much technological knowledge, very cheap, easy to manufacture and provides a great loss minimisation in the long run. This product is mainly targeted to help the poor farmers who are still used to with the traditional old methodologies and equipments and have not yet been exposed to the highly advanced technical automated robotic machineries on which current researches are going on abroad.





Khyati Jagdish Rathod



Jaymin Kanubhai Jadav

Nano-biosensor And Methods For Detecting Potassium Ion Concentration

Jaymin Kanubhai Jadav, Khyati Jagdish Rathod
Junagadh Agricultural University, Junagadh

Guide :
Dr. B. A. Golakiya

The invention's outcome will help in determination of potassium deficiency from the standing crop even if the plant is not showing any visible deficiency symptoms. Potassium deficiency levels can be determined at any stage and which will help to prevent its further progress. If on determination, the plant potassium content, is found close to the threshold deficit level or deficient; potash fertilizer which is a readily available form of potassium can be applied to the field crops to recover them from the deficiency and prevent the overall yield losses.

The invention belongs to electrochemical analysis of activity of ions in sample via a potentiometric sensor. This makes it a field portable and a unique class of biosensors that may be very useful in agricultural fields. The sensor is based upon screen printable technology, where a screen printed electrochemical cell is modified using a biomimetic component say; valinomycin- an

antibiotic, one of the most potent potassium (K^+) ion carrier to function as ion selective electrode. For measuring ion activity in the mentioned plant sap samples, the Ion-Selective Electrodes (ISE) are without any competition.

The present research is aimed to solve the problem of detection of potassium deficiency prior as Hidden Hunger i.e. early detection to the actual morphological/visible symptoms appears in the crop plants. If the plant potassium deficiency can be determined before the symptoms, then preventive measures can be taken recover the plant health such applying potassium based fertilizer. This will also control the unnecessary usage of fertilizers, improve soil health and reduce water and atmospheric pollution ultimately reducing the cost or expenses of farming.



Biosensor device with display unit, Screen Printed Electrode connector clip, zero setting knob



Sample drop placed on the sensing area of Ion-Selective Screen Printed Electrode.



Nagarjuna Neella



Vaishakh Kedambaimoole

Development of Smart Wearable Body Warmers Using Graphene Coated Conductive Fabrics

Nagarjuna Neella, Vaishakh Kedambaimoole,
Indian Institute of Science, Bangalore

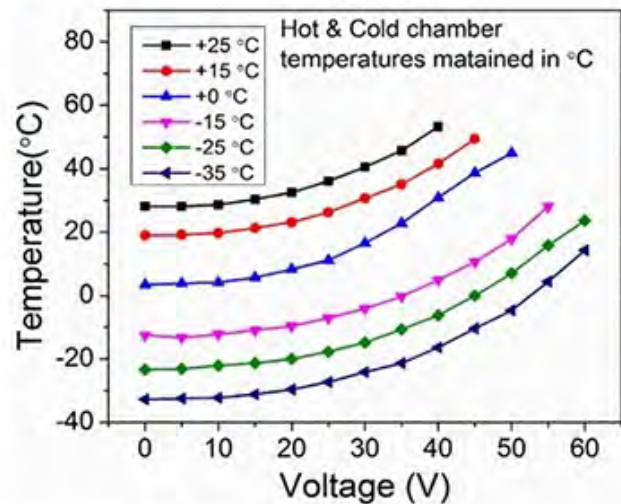
Guide :

Prof. K. Rajanna, Prof. M. M. Nayak, Prof. N. S. Dinesh

Body warmers are generally used to combat cold weather conditions across the globe. Also, they find use in biomedical i.e. electrotherapy treatments, medical blankets for patients to maintain their body temperatures and military worn jackets for soldiers in the defense forces. Moreover, some of the flexible beds employ air cushion which serves as good heat insulator to retain heat but they do not function as body warmer. Additionally, blankets/jackets made up of pure woolens/pashmina from cashmere, caprinae family animal's fiber may prove to be good body warmer, but quite expensive and hence not affordable for middle class person/common man. Also, no control of warming is available with such garments. Warmers presently available in the market consists of fine wires/films made of metal alloys, ITO and Ga doped Zinc Oxide woven to form high resistances and consumes higher power than proposed RGO.

Today's rapid growth and progress of work in the area of wearable miniaturized electronic devices

using nanoscience and engineering concepts have led to the new generation of device technology. Nanomaterials used in elements designed for creating flexible electronics/electrical and fabrics/garments due to their unique properties i.e. large SA/V and dimensionality. Commercial heaters have disadvantages: complicated fabrication and monotonous which leads to special machinery, opacity, heavy and rigidity, intolerance to acid/base, fragile, lower heating efficiency and also bulky, expensive, limited flexibility. So, looking for innovative devices with effective body warming functionality, compatible/flexibility, lower energy consumption & manufacturing costs. Presently developed/invented RGO based cloth fabrication is straight forward either by dipping/pouring solution onto the cloth and curing it suitably. Therefore, our aim is to overcome the above-mentioned drawbacks, wherein the invention provides heating device formed into required shapes, corrosion free, flexible and biocompatible.



Experimental testing set up of RGO nanosheets Cotton Cloth based Heating Element maintained at different ambient temperatures and tested results.



Saka Naveena



Panchakarla Priyanka



Murikipudi Bindu Madhavi

Buzzing Band For Hearing and Speech Impaired

Saka Naveena, Panchakarla Sevya Naga Priyanka, Khande Dhana Lakshmi , Murikipudi Bindu Madhavi
Shri Vishnu Engineering College for Women, Andhra Pradesh

Guide : Prof. Ravuri Viswanadham, Prof. K. Padma Vasai

Communication is part and parcel in every man's day to day life. But it causes several difficulties for a person who is hearing impaired or speech impaired. Even though sign language replaces general talks for them, it fails to draw the attention of the person who is distant from the speaker. This situation causes lack of interaction among the hearing impaired students and the teacher.

To overcome the problem faced by students in classroom and enable him to engage with teacher or with distant student a device that supports mass communication is needed. So to suit this requirement, the proposed solution is a device called "BUZZING BAND".

The key feature of this device is to provide one to many communications (between teacher and all students in class) in addition to one to one communication". In order to achieve the above said communications RF Technology is preferred.

Communication from one device to another is easily achieved by using RF technology. The input to the buzzing band is given with the help of a button. The button is connected to the Arduino nano to which an RF transmitter is interfaced. On the receiver's side there will be an RF receiver which is interfaced with arduino along with a single digit display and a micro vibrator motor. The future innovation uses programming techniques so that signal is sent to various transceivers with a small time delay between each transmission to a single transceiver.

Link:

<https://youtu.be/jzYkxaMv5xU>



Khande Dhana Lakshmi





Group photo



Group photo

Brain wave nerve excitation for physically disabled

Sarath S, Shilpa M Biju, Shilpa P Prasad, Midhun Raj, Sachin S, Nandha Kiran, Hridhya Jolly K
SCMS - School of Engineering and Technology, Kerala

Guide :
Dr Sunil Jacob

Paralysis is a problem that has been plaguing the general population ever since mankind has evolved. It is a disheartening sight to see the plight of these differently abled people not being able to bring in as much productivity as the normal population out in the real world. Of the total world population, over 29% suffer from paralyzes due to stroke or some other reasons.

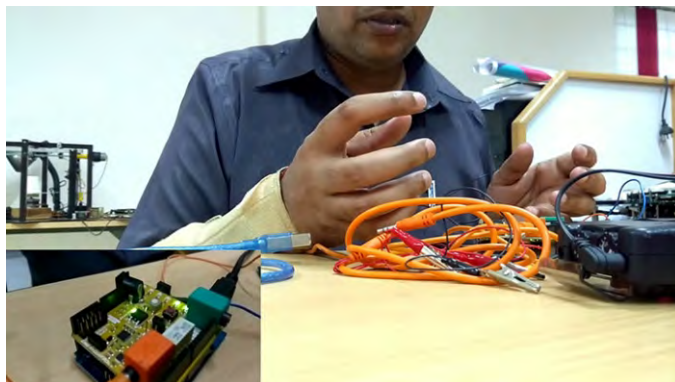
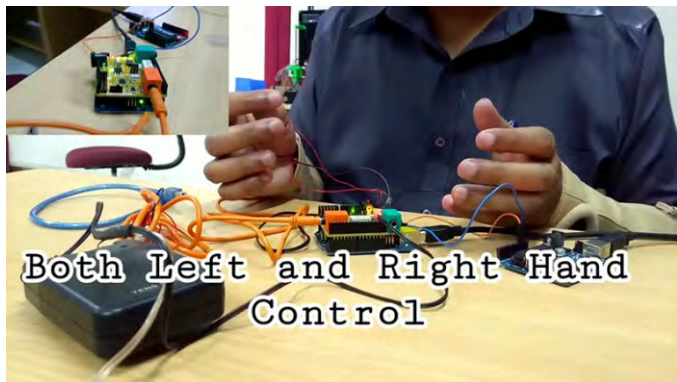
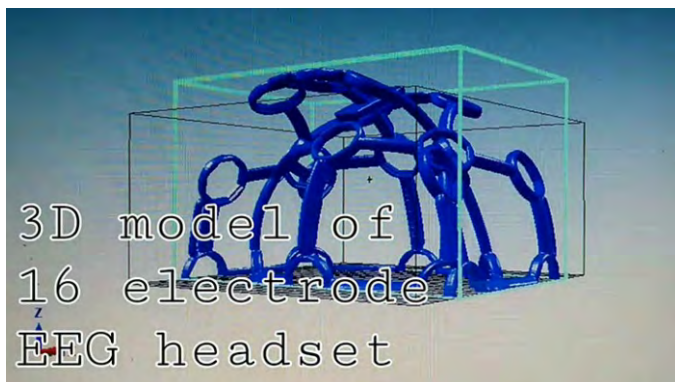
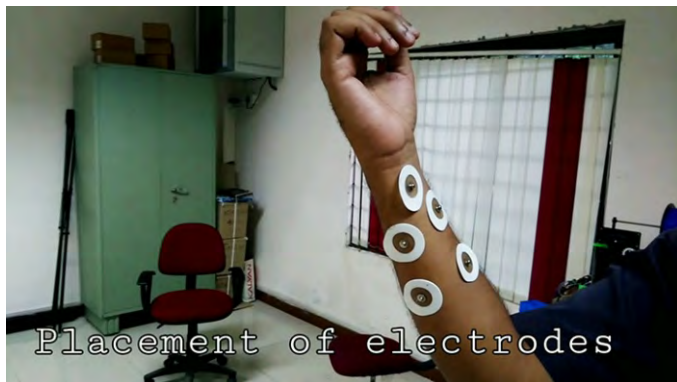
Paralysed person has a clot in the brain cells that blocks the signal transmission from brain to muscle. To solve this problem we introduce the Brain to Muscle Interface for Paralyzed (BMIP) technique. The BMIP will act as a direct interface between brain and muscle by bypassing the clotting between them. This interface helps brain to control the muscle movements according to his thinking and concentration.

The wearable glove that is attached to the controlling person contains the EMG electrodes which tap the excitation produced due to the

corresponding movement and it is then converted into an EMG signal .We use TENS (Transcutaneous Electrical Nerve Stimulation) device that provides electrical stimulation for excitation. The headset contains 16 EEG electrodes in total (14 live electrodes & 2 reference electrodes). These electrodes are placed in contact to the necessary nerve excitation points in head. Arduino is used as an interface between the spiker shield, TENS device and the hand gloves.

The person controls the movements by thought and it's an efficient way of helping the paralyzed to do their real time activities.

Link: <https://youtu.be/t7iYi822lGM>





Abantika Pal



Anupam Banerjee

A Computational Alternative to Analyze and Understand Ebola Virus Pathogenesis in Human

Abantika Pal, Anupam Banerjee
Indian Institute of Technology Kharagpur

Guide :
Dr. Pralay Mitra

Zaire ebolavirus (EBOV), one of the most pathogenic species of Ebolavirus, is a significant threat to the human community according to the World Health Organization Ebola Situation Report. Several efforts have been made to design vaccines and therapeutic drugs without much success owing to the limited binding site residue information of human protein interacting with the viral protein (VP) molecules. Such limitations stem largely from the highly infectious nature of the virus that requires specialized personnel and biosafety Level 4 laboratories to perform wet lab experiments. Although critical interactions involving the VPs and the human proteins responsible for innate/adaptive immune responses are discovered, specific binding information between such pairs is still unknown in most cases. Therefore, we proposed a protein interaction and protein design based computational alternative to identify critical residues crucial for the human protein-VP interactions. The computational framework used an existing protein design

algorithm ensuring evolutionarily and energetically favorable mutations on interface residues of a participating protein in a protein complex. The VP24-KPNA5 (karyopherin alpha proteins 5) interaction is an experimentally well-studied phenomenon concerning EBOV pathogenesis and was therefore chosen to establish the efficacy of the proposed method. The critical residues identified in the VP24-KPNA5 interface by the proposed method were in excellent agreement with the previously reported experimental findings. Additionally, the mutations of the critical residues affected the overall stability of the complex because of a sharp decrease in both the number of hydrogen bonds and possible charge-charge interactions. Therefore, we propose that the computational framework could be extended to destabilize similar host-pathogen (like Human proteins interacting with Ebola:VP35) interactions, the critical interacting residues of which are to date unexplored.

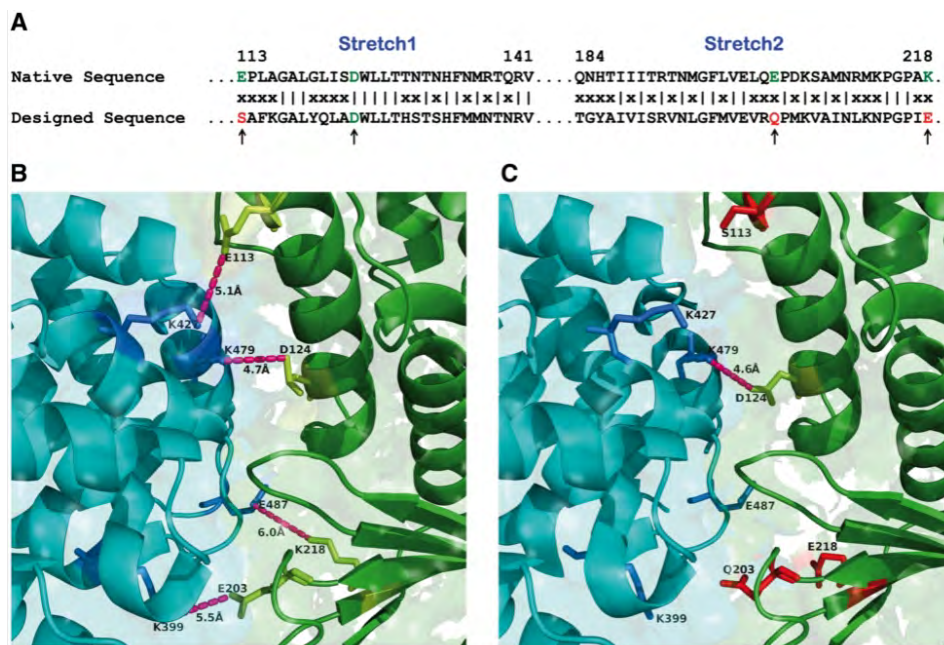


Figure (A) A sequence alignment of Stretch1 and Stretch2 of VP24 (PDB ID: 4U2X, Chain A) showing the difference between the native and designed sequence, where ‘x’ indicates positions where amino acids were mutated. (B) Possible charge-charge interactions [shown by arrows in (A)] at the native VP24-KPNA5 complex (PDB ID: 4U2X_AD) binding site. (C) Only possible charge-charge interaction remains between D124 of the designed VP24 and K479 of KPNA5 at the same binding site. Mutated residues (E113S, E203Q, K218E) are color coded as red in (A) as well in (C).
Ref:- doi:10.1093/bfpg/elx034



Sarang Nerkar



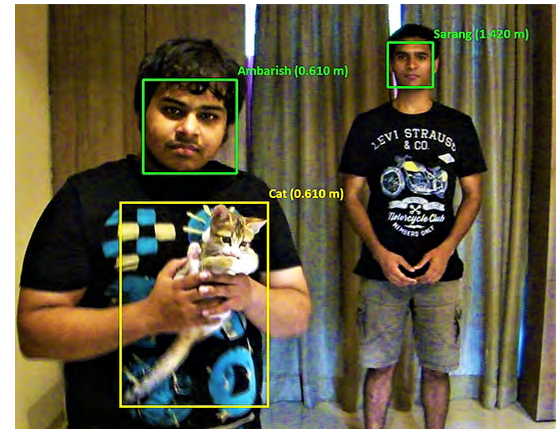
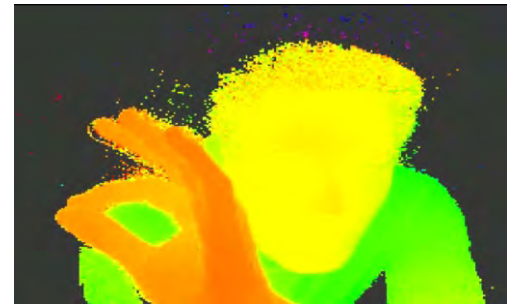
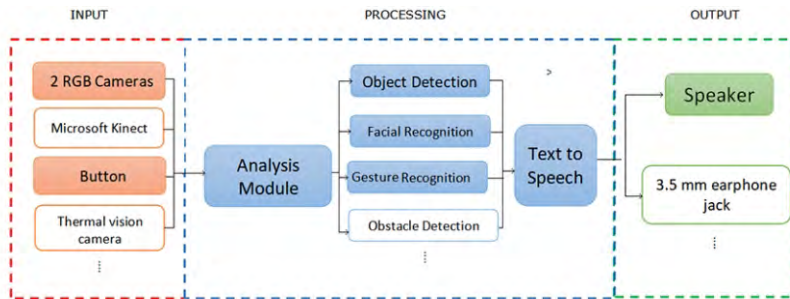
Ambarish Gurjar

Open Source Augmented Reality Wearable Smart Assist Device for Blind

Sarang Nerkar, Ambarish Gurjar
University of Toronto

Guide :
Dr. Steve Mann

We present an open source augmented reality wearable device that provides the ability of smart vision to the blind. The device uses facial and object recognition for a smart analysis of the space around the blind person. It uses depth sensing to find out the distances between the user and detected people and objects. Text to speech techniques are used to inform the blind person about the smart analysis of the space around them. The device uses gesture recognition to trigger the audio output in order to prevent the device from being a distraction rather than an aid. The device is implemented as an open source platform to encourage open innovation in the field of assistive technologies.





Barnopriyo Barua



Kaustubh Mani



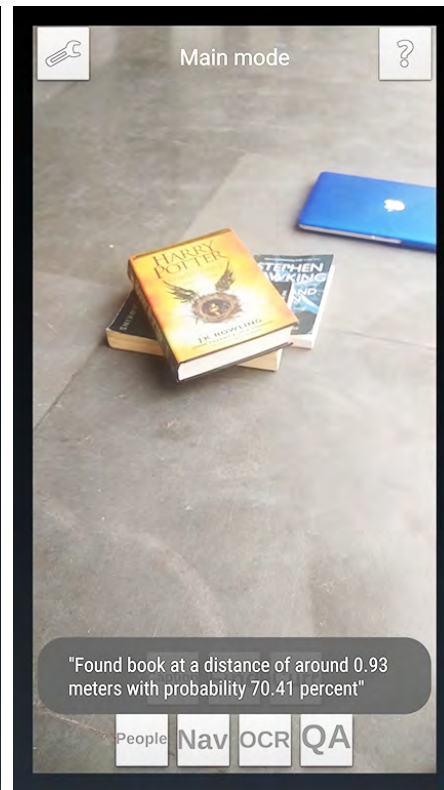
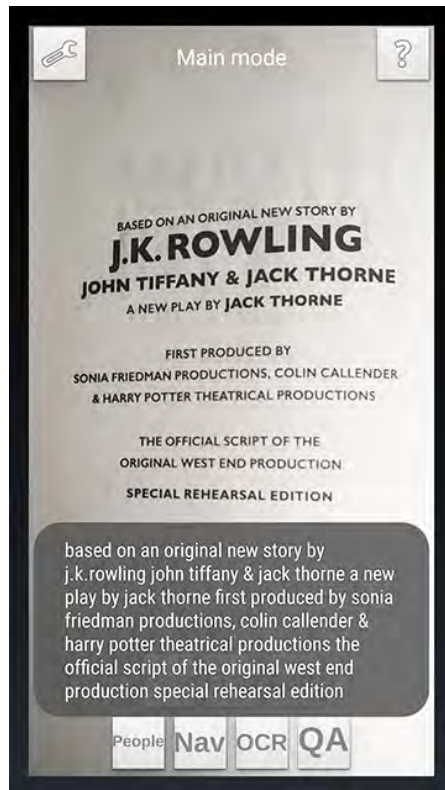
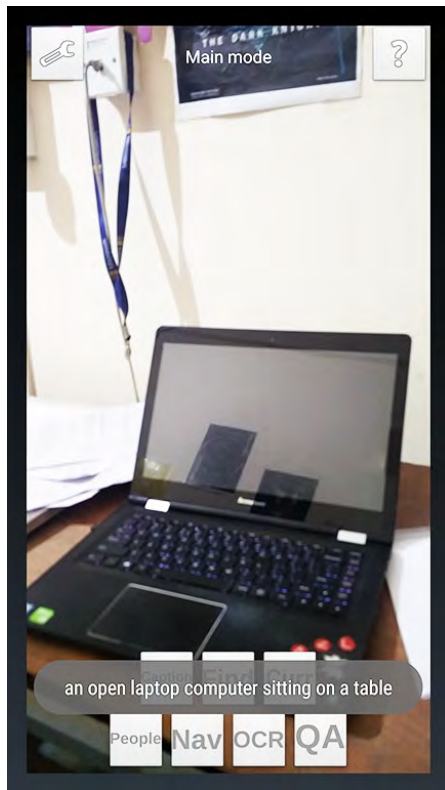
Divyansh Gupta

WhiteCane: A Virtual Assistant for the Visually Impaired

Barnopriyo Barua, Kaustubh Mani, Divyansh Gupta
Indian Institute of Technology Kharagpur

We are using various artificial intelligence techniques to simulate a digital assistant that uses the smartphone camera to help visually challenged users in various day to day tasks. The app will take a spoken query as an input from the user. This query will be converted from speech to text and will then be categorized into one of the many functions like Screen Description, Currency Recognition, OCR, Facial Recognition, Visual Question Answering, Object Localization etc. using the latest state-of-the-art Computer Vision and Natural Language Understanding techniques. This query, along with an image captured by the camera will be passed as an input to the appropriate computer vision model based on the intent predicted in the previous step. The result will then be spoken back to the user by our application, by using android's text-to-speech functionality. Until now, assistive technologies in this field were usually in the form of standalone

hardware devices, which turned out to be prohibitively expensive for most users. The advent of cheap smartphones allows us to use the camera to help users in day to day tasks like currency recognition, face identification, reading, etc. all through an easy to use voice based interface.





L. R. Ravindranath



S. Abilash Varan



M. Logesh

Ionic movement based desalinator

L. R. Ravindranath, S. Abilash Varan, M. Logesh, S. Arvinth
Pondicherry University

Guide :
Dr. S. Anbumalar

Nowadays, mostly coastal areas are in the shortage of drinking water. The areas up to 10 kms from the sea shore are affected by the sea water intrusion and getting high saline groundwater. This is the major issue in our nation in the supply of drinking water to the people and the inability to supply water to the process industries. This leads to the public health issues, damage of economic development etc.. There is a technology called reverse osmosis to reduce salinity, this technology is at the high cost of installation of equipment and RO membrane filters. The yield is also very low.

In our proposed method, the filter membrane is replaced by electric polarized electrodes. The principle involved in this proposed system is electrolytic ionic movement towards the opposite charges of the electrodes. The working concept of the system is the water flows, as the water fed into system through a pipe line which is split into two

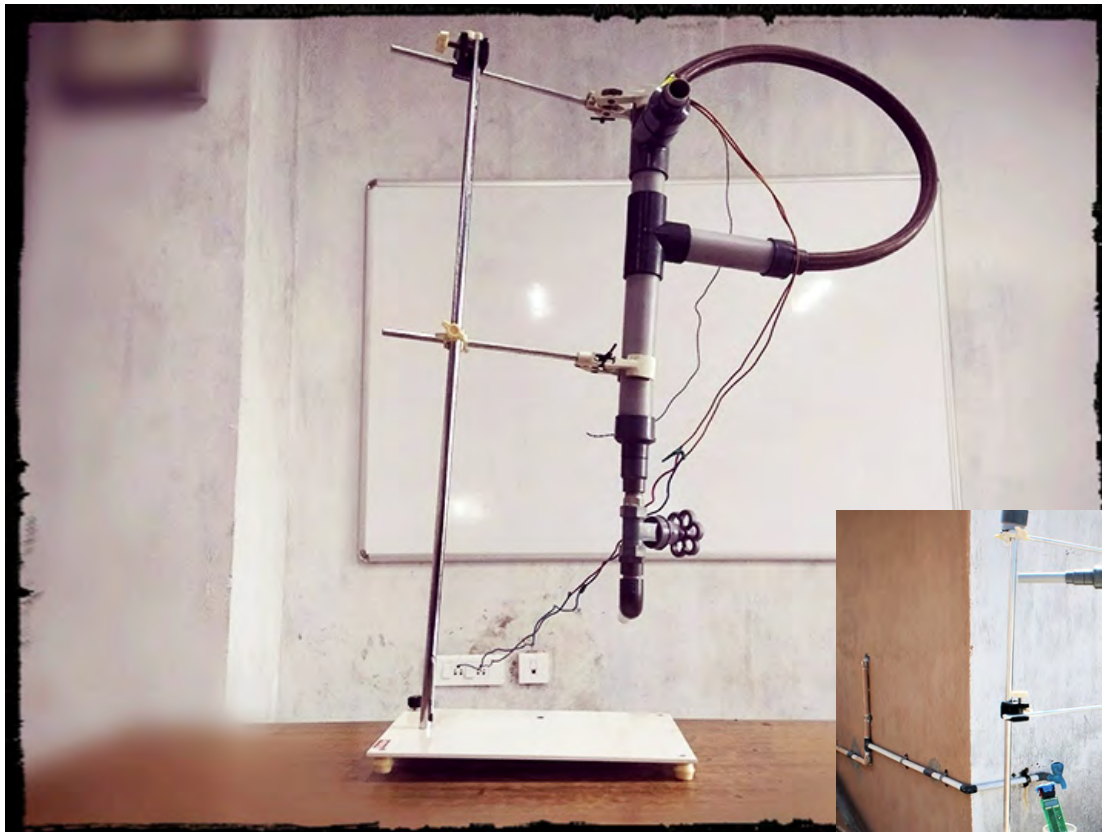
directions, upward and downward flow. The salts coming from feed water flow are diverted into downward flow using the concept of electrolytic ionic movement to the opposite charges of the electrode, which are fixed in downward water flow pipeline part. The downward flow water with ions of salts is drained as reject by utilizing the gravitational force. The upward flow left free from the ions of the salts, this outlet is collected as product.

Link:

<https://www.youtube.com/watch?v=nsigKZITpOY> | <https://www.youtube.com/watch?v=6moDT6tccw>



S. Arvinth





Narayani Bhatia



Shridu Verma

Rapid Cervical Cancer Detection using Neuromorphic Hardware

Narayani Bhatia, Shridu Verma
Indian Institute of Technology Delhi

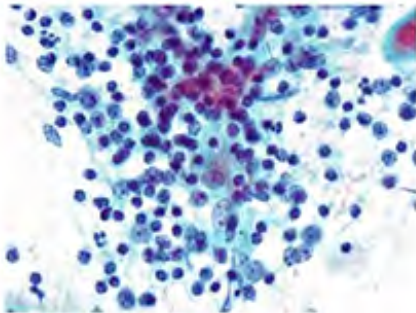
Guide :
Dr. Manan Suri

In a vast country like India, trained cytologists are constrained by paucity of time and outreach and manual screening of slides leads to slow detection of disease. This is inadequate, because overburdening of human resources leads to dangerously inaccurate diagnosis, and is not time and cost effective. Our solution is an intelligent cervical cancer diagnostic support system which is a first-in-the-series of experiments to follow. Our aim is to develop low-cost, fast and power-efficient healthcare diagnostic techniques so that no disease goes undetected.

consuming huge amounts of power and employing cloud based services, our custom hardware solution is based on true artificial intelligence resulting in drastic reductions in screening times, enhanced decision-making ability and lower operational costs. It is independent of the magnification at which the pap smear images may be viewed, and is invariant to staining variations that may arise due to laboratory testing procedures in medical labs.

We train our neuromorphic hardware solution, which is inspired by the parallelism of the brain to mimic brain-like functionality, on existing datasets of classified slide images and use a machine-learning algorithm implemented on hardware for classification. In a scenario where 99% of the solutions are software-centric,

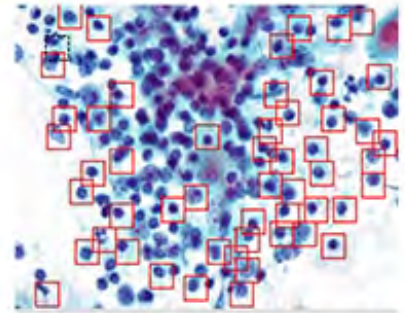
Neuromorphic Hardware for Healthcare Applications : Cervical Cancer



Raw Cell Image

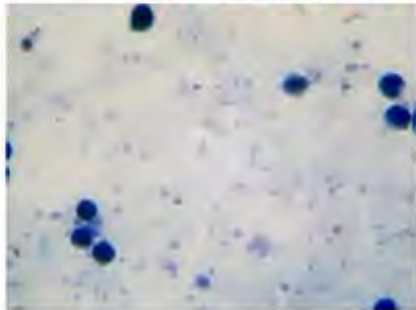


Processed Image

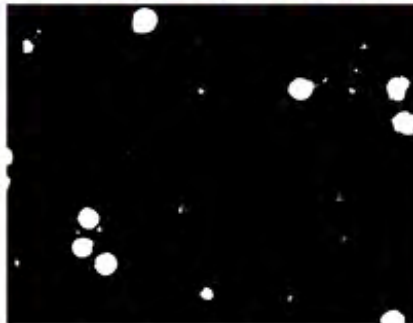


Detected Normal Nuclei

Neuromorphic Hardware for Healthcare Applications : Malaria

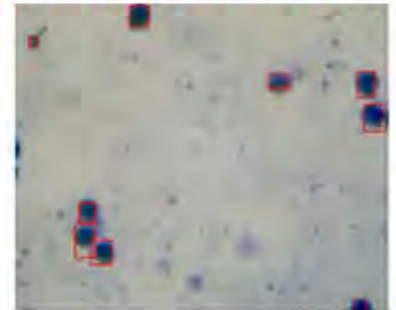


Raw Smear



Processed Image

© N. Bhatia, S. Verma, M.Suri – IIT Delhi



Detected Parasite



Amresh Kumar Singh



Ikhlaq Hussain

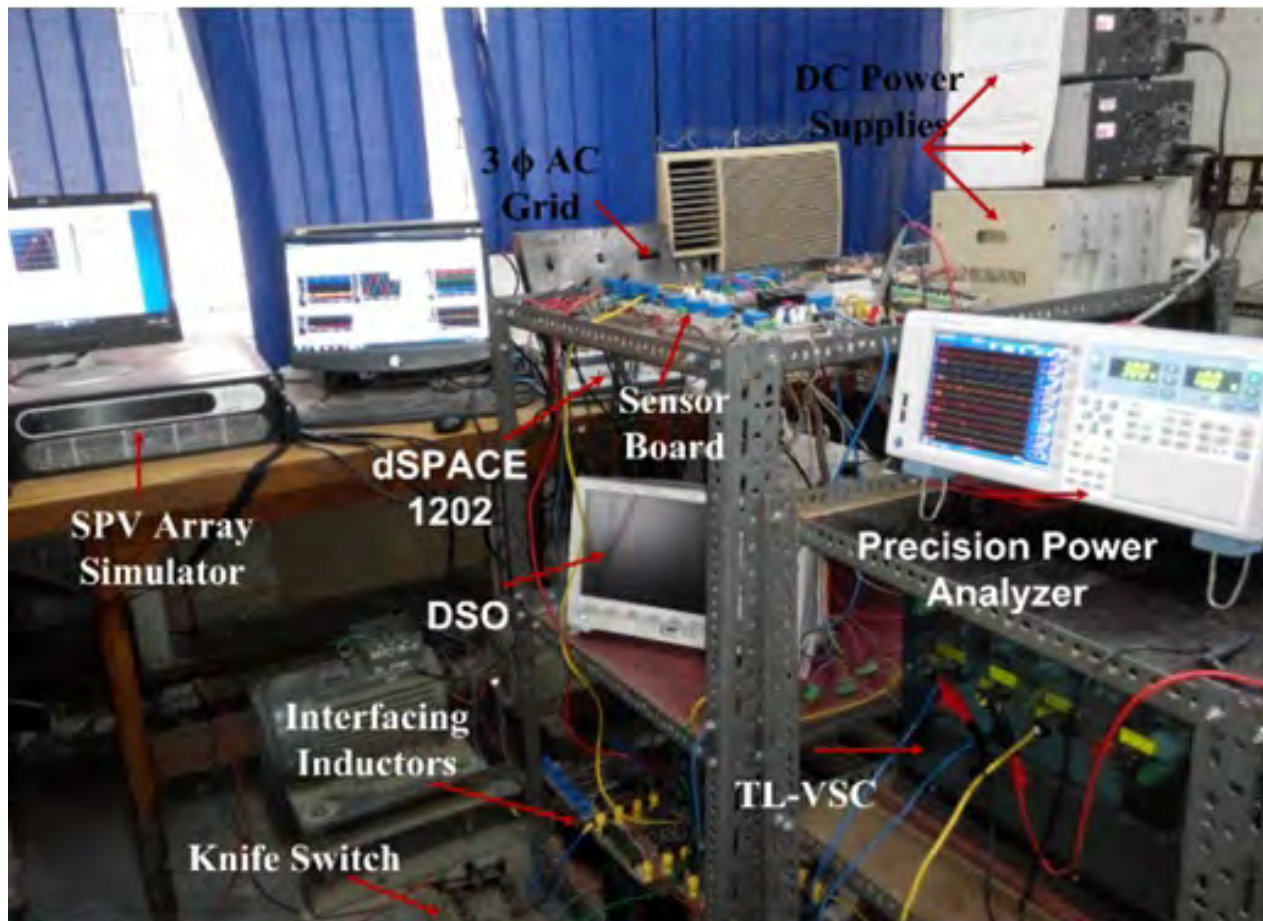
Design and Development of Intelligent and Robust Grid Integrated Solar PV System with Improved Power Quality for Roof Top Applications Especially For Abnormal Indian Distribution Feeder

Amresh Kumar Singh, Ikhlaq Hussain
Indian Institute of Technology Delhi

Guide :
Prof. Bhim Singh

This work deals with a novel, intelligent and robust control approach for a three phase grid connected solar PV (Photovoltaic) system, which is based on FZA-NLMF (Fast Zero Attracting-Normalized Least Mean Fourth) algorithm and few other robust control techniques. Simultaneously, improvement of traditional maximum power point technique (MPPT) is done here, which enhance the tracking performance of conventional MPPT approach. Moreover, this investigation has done for both single stage as well as double stage solar PV system interfaced with local distribution feeder. These control algorithms achieve the objective of mitigation of power quality issues such as harmonics reduction and power factor correction together with extraction of peak power generated by the PV array. The system uses a PV array, a VSC (Voltage Source Converter), linear and nonlinear loads. Here, VSC is connected to a PV array to transfer

the active power to the three phase load and the grid. The dependency on tuning of proportional-integral (PI) controller is reduced because of feed-forward term of the PV power. Due to this, the system dynamic response is improved, which makes the system quite robust. The system goals are to mitigate power quality problems and to provide current conditioning while operating in coherence with a weak distribution grid like abnormal Indian distribution feeder, which has poor quality of power, in terms of voltage distortions with imbalances. MATLAB/ Simulink is used to develop the model of the proposed system. The validation of proposed control is done at varying linear and nonlinear loads and under different environmental conditions on a prototype developed in the laboratory.





Mahipal



Hasan Ahmed Faisal

Cerium Impregnated Activated Carbon Composite as a Filtering Material for Fluoride Removal from Groundwater

Mahipal, Hasan Ahmed Faisal
Indian Institute of Technology Patna

Guide :
Dr. Trishikhi Raychoudhury

Groundwater Contamination with fluoride (F-) is a major concern due to its chronic behavior on human health. In India, specific region of Rajasthan, Gujarat, Telangana and Andhra Pradesh are severely affected by F-contamination. To address this issue, there is a need to investigate for cost effective, efficient and environmental friendly technology focused primarily on F-removal from groundwater. There are only a few studies available that focus on removal of F- from natural groundwater. Therefore, to address this issue, several groundwater samples were collected from the Nagaur district of Rajasthan and with an objective to remove F- from the groundwater samples using a novel composite (AC-Ce). In this study, cerium metal was impregnated within granular activated carbon (AC-Ce) to increase its adsorption capacity. The study suggests impregnation of Ce in AC has enhanced the fluoride sorption efficiency

significantly (0.27 mg/g to 2.9 mg/g). Sorption of F- and along with ion-exchange between nitrate and F- are attributed to high F- removal by the AC-Ce composite. The performance of the composite within a 1-D fixed bed column was studied to investigate the suitability of applying the composite in a filter. Effects of co-ions are also evaluated on fluoride removal by the composite. The result suggests, AC-Ce composite in fixed bed filter media can treat up to 722 ml of 10 mg/l F-contaminated water. However, performance of composite reduces significantly in natural groundwater. This is due to presence of phosphate and bicarbonate ions competing with F- for active sites on the composite. Suitable pretreatment method should be adopted for addressing this problem.



(a)

Skeletal fluorosis



Teeth mottling

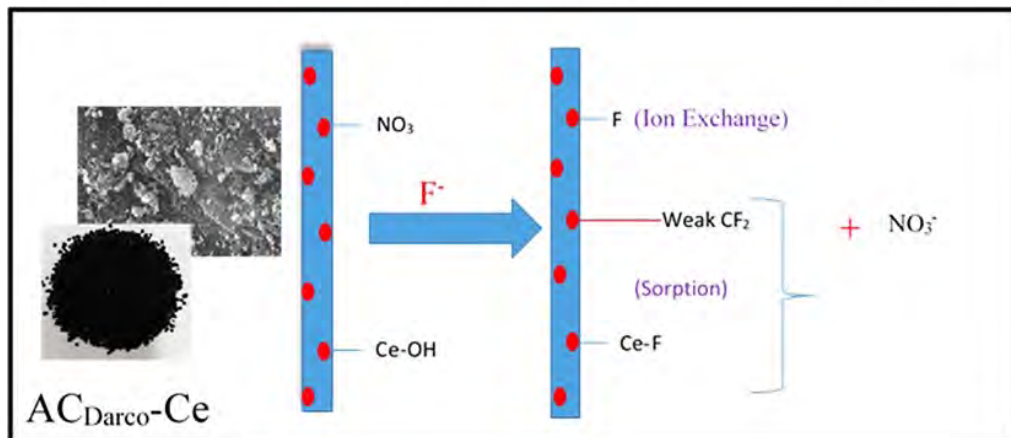


(b)

Arthritis (joint pain)

(Source of information – NDTV)

Health effects of excessive fluoride concentration in drinking water





Anand Kumar K. S.



Gurupadappa Motagi



Ravindran R.

Loco pilot vision enhancement system: TRINETRA (Third Eye) for Indian Railways

Anand Kumar K. S., Gurupadappa Motagi, Ravindran R.

Indian Institute of Technology BHU, Varanasi

Guide :

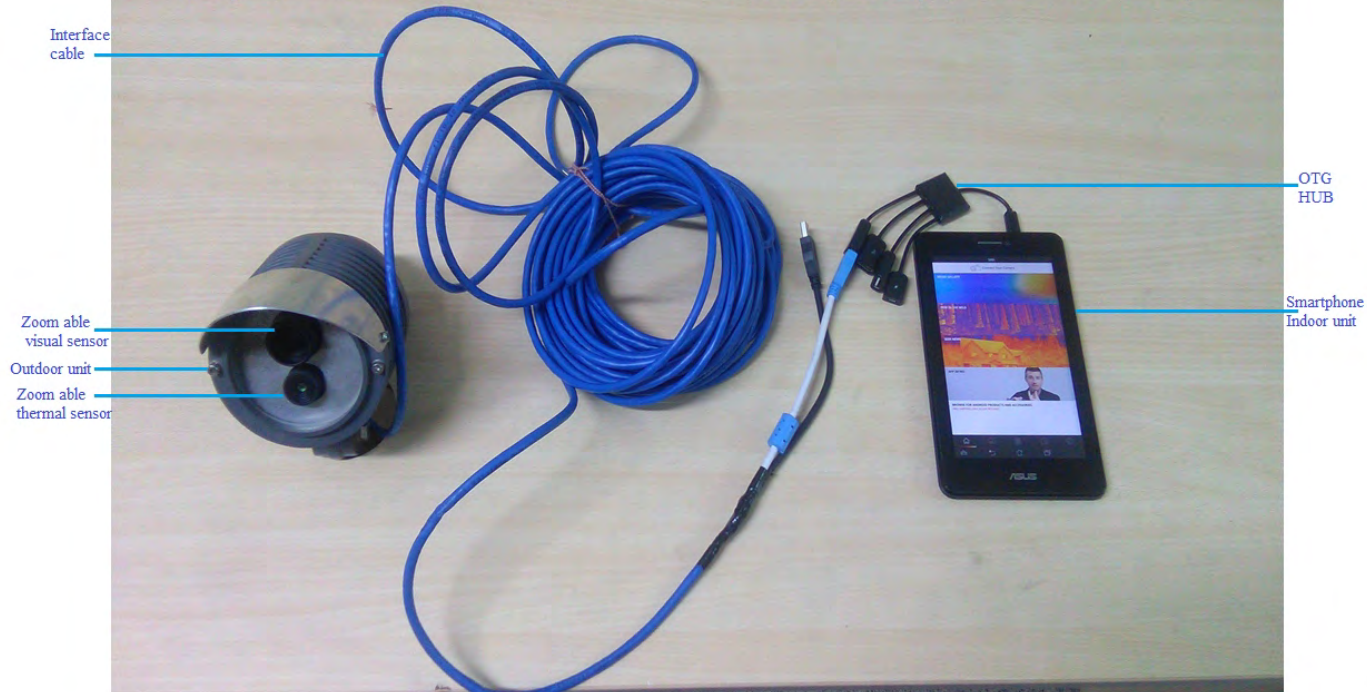
Prof. (Dr.) R. K. Saket

Indian Railway provides the most important mode of public transport in India. It is the most commonly used and cost effective long distance transport system of the country. Indian Railways is also helping Indian economy in many ways like by providing fast and reliable transport medium for various needy articles across the country. The railways are suffering revenue losses due to cancellation or late running of passenger trains as a result of foggy weather conditions especially in the northern India fog-prone regions. In last five years the Indian railways has lost in excess of Indian rupees 1.5 lakh crores due to cancellation of trains, and delay in running trains. Considering its importance, this project work TRINETRA – the third eye to prevent railway accidents in India, has been researched and dedicated to Bharat Ratna Madan Mohan Malaviya Chair at IIT-BHU for railway research. It marks the centenary celebrations of Banaras Hindu University.

TRINETRA is expanded as “Technological Research and Invention for National Empowerment of Trains to Reduce Accidents”. In Hindi, the word TRINETRA means ‘Third Eye’.

Equipped with zoom able visual and thermal sensor TRINETRA will be fixed on the front portion of the engine (Loco-motive). It will effectively catch a long range view of the track and present it live on a mini screen (smart phone) fixed at the loco pilot's cabin. They can see the long range of the track on screen. The sensor and screen will be interfaced through OTG or Wi-Fi. TRINETRA an indigenous camera system is an outcome of our efforts to address the current operational visibility issues faced by the loco pilots during odd weather conditions especially fog & rain.

Loco pilot vision enhancement system: TRINETRA (third eye) for Indian Railways





Ritika Singh

Katha-Exploration of narrative approach in furniture design

Ritika Singh
Indian Institute of Technology Kanpur

Guide :
Dr. Koumudi Patil

Katha aims to foster creative problem solving, causal thinking and articulate communication skills in children through a narrative play-learning aid. This play-aid is a responsible and sustainable product, designed for manufacturing by craftspeople (Banarasi wooden toymakers) in an additional effort to integrate the neglected craft sector with a contemporary educational need for creative pedagogies.

Katha attempts to link the lacunae in our education system with the needs of our craft sector. Therefore, the board game has been designed for manufacturability in the craft sector and not through a machine. The turned characters as well as the wooden board and painted motifs can be made best by hand. The size of the pegs, threading, and form of characters have been decided based on the turning device used by the Banarasi wooden toymakers. Thus, this is design for craft manufacturability. The idea

is not to mass produce but create limited editions of high value.

Katha consists of multiple narrative trajectories that can be constructed into myriad stories that encourage the child's critical abilities to juxtapose the causal connections into a coherent whole. It encourages the lateral thinking hat of the child and emboldens him to create his own path rather than follow a prefixed trajectory. It also playfully introduces the child to our cultural heritage hidden deep in our ethics.





Vimal C

TULO - An Automated Mandibular Advancement Device for the Treatment of Obstructive Sleep Apnea.

Vimal C

Indian Institute of Technology Kanpur

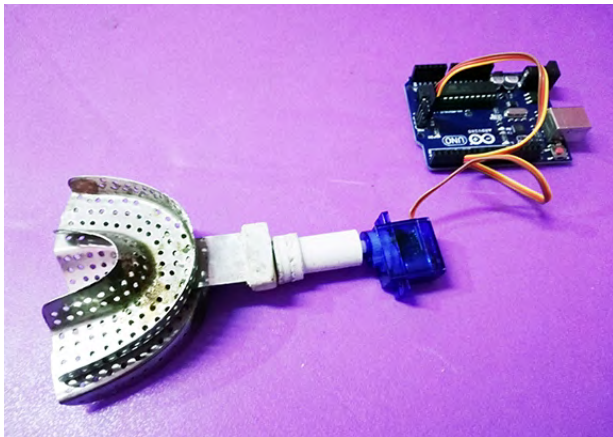
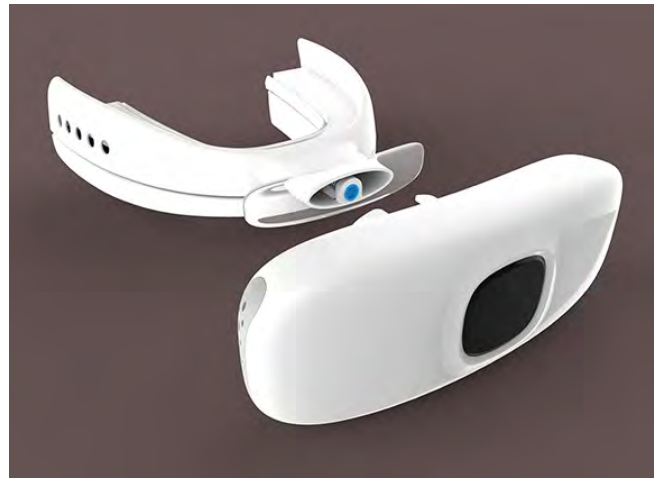
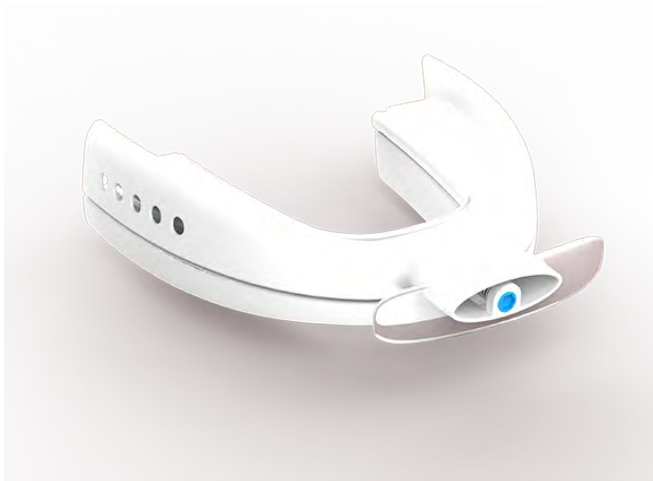
Guide :

Prof. Dr. J. Ramkumar

Obstructive sleep apnea is a sleeping disorder that affects about five percent of adults. Sleep apnea is a condition in which the airway in your throat collapses when you sleep, so the muscles relax. If this collapse is constant, it causes apnea or simply said absence of breath. If the collapse is not constant, usually causes snoring.

The long term consequences of having obstructive sleep apnea are high blood pressure, sleepiness, headaches and risk of heart attack or stroke. Mandibular advancement devices have mouth guard that is fitted to both top and bottom teeth and joined together in a way that bottom teeth are in front of the top teeth. Pushing the bottom jaw forward opens up and supports the airway, so there is less chance to collapse. Mandibular advancement devices are the oral appliance used to treat snoring and obstructive sleep apnea. These devices protrude the mandible and induce changes in the anterior position of the

tongue, soft palate, lateral pharyngeal walls, and mandible, resulting in improved airway patency. Evidence suggests that MAD improves snoring and OSA. Extent of advancement in MAD enhance efficacy in reducing upper airway obstruction events but it also increases temporomandibular joint pain, myofascial pain, occlusal changes and anxiety and stress of the patient. Usage of a MAD device however requires some precision adjustment and frequent visit with the physician thus induces a lot of ambiguity to the user. Hence we have developed an automated MAD device in two specific advancement platforms. One is a time dependent mandibular advancement while the other is advancement of the mandible with respect to oxygen desaturation levels in the body through a wearable band.





Kashif Islam Khan Sherwani

Augmentative Rehabilitation of SCI and Stroke Patients

Kashif Islam Khan Sherwani
CSIR, Chandigarh

Guide :
Dr. Neelesh Kumar

According to World Health Organisation, 15 percent of world's population have some sort of disability. But only 7 percent of the world's population has access to physical medicine and rehabilitation. Lack of quality physiotherapists and awareness about specialized rehabilitation care makes this situation worse and that too is limited to tier 2 cities in India. Spinal Cord Injury, Cerebral Palsy, Parkinson's disease are few chronic diseases that require continuous rehabilitation, but the patients are not able to visit rehabilitation clinic regularly because of distance and/or cost issues. Because of this reason patients' start losing interest. If still, they try to visit the therapist, it becomes very monotonous of doing same traditional exercises and does not get any motivation and feedback to track their daily progress. The solution for the above problem is the augmentative rehabilitation that includes virtual reality therapy system that stimulates

training of neuromotor movements, houses a wide array of abilities, delivers a simple way for physicians to track usage, and could be used at home and primary health centers. VR technologies offer new space for human exploration, understanding, and support by providing patients a safe environment in which they can interact and develop a goal and task-oriented activities within functional-virtual environments, especially when they find themselves in situations of cognitive, behavioural or motor disabilities. The solutions built from these technologies reduce patient's limitations of activity and participation by promoting the recovery of functional motor abilities stemming the emerging philosophy of rehabilitation. .





Pallab Basuri



Depanjan Sarkar

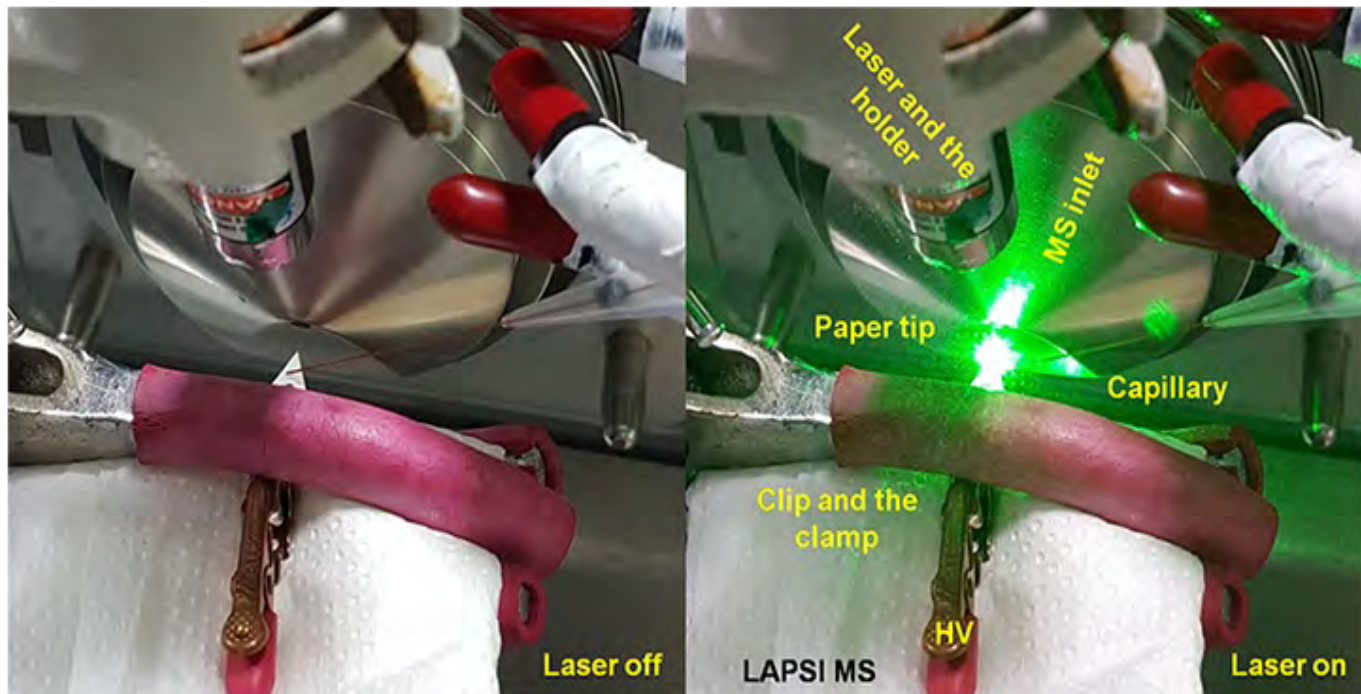
Detection of hydrocarbons by Laser Assisted Paper Spray Ionization Mass Spectrometry (LAPSI MS)

Pallab Basuri, Depanjan Sarkar
Indian Institute of Technology Madras

Guide :
Prof. Thalappil Pradeep

We have introduced a new ambient ionization technique named 'Laser Assisted Paper Spray Ionization Mass Spectrometry' (LAPSI MS). In LAPSI MS, a 532 nm \leq 10 mW pen torch laser pointer was shown to a triangular paper along with high voltage to enhance the paper spray ionization. The analyte solution was continuously pushed through a fused silica capillary, using a syringe pump, at a preferred infusion rate. LAPSI MS promises enhanced ionization with high signal intensity of polycyclic aromatic hydrocarbons (PAHs), which are normally not ionizable with other mass spectrometric techniques. LAPSI MS works both in positive and negative modes of ionization. A clear enhancement of signal intensity was visualized in the total ion chromatogram for an analyte in presence of the laser. We speculate that the mechanism of ionization is field assisted photoionization. The field-induced distortion of

the potential well can be large in paper spray as the fibers constituting the paper are separated at tens of nanometers apart and consequently the analyte molecules are subjected to very large electric fields. LAPSI MS can be used for monitoring in situ photo-assisted reactions like, the decarboxylation of mercaptobenzoic acid in presence of gold and silver nanoparticles and dehydrogenation reaction of 2,3-dihydro-1H-isoindole, for example. As an application we have shown that the paraffin oil which is usually non ionizable by paper spray or by electrospray ionization can be efficiently detected using this technique. As a real life application, such impurities like mineral oils were detected in commercially available coconut oil.





Ajay Kumar Maddineni

An indigenous technology for development of cost-effective and energy-efficient engine intake air filters

Ajay Kumar Maddineni
Indian Institute of Technology Delhi

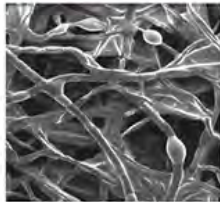
Guide :
Dr. Dipayan Das

In automobiles, the packing space in vehicular under-hood is shrinking day-by-day at a faster rate with the evolving engine technology. This limits the filtration area available for engine air filters, which causes an increase in local velocity of the airborne particles approaching to the filter media. As a result, the particles acquire higher kinetic energy that facilitates them to bounce back from filter surface, re-entrain into air stream, and finally penetrate through the filter media. This ultimately results in higher particle penetration and lower engine life. In the current innovation, an indigenous and cost-effective solution is provided to the above-mentioned problems associated with the engine intake air filters. A compact engine intake air filter system is designed for motorcycles and the same is analyzed for air flow and particle filtration behaviors. The air filter system consists of a fibrous filter media, which, upon optimal

impingement of viscous liquid, exhibits enhanced filtration performance by inhibiting particle bounce and re-entrainment. Further, because of the presence of the viscous films, a large number of dust particles get accumulated onto the air filters. Also, the dust particles are deposited quite uniformly onto the surface of chemically-treated air filters, unlike the untreated air filters where the dust particles form dendritic structures. As a result, the pressure-drop and service life of chemically-treated air filters are found to be superior to untreated ones. Consequently, the air filters developed in this work are likely to offer increased service life by 1.5-1.8 times, decreased fuel consumption by 20 litre and reduced CO₂ emission by 50 kg per motorcycle for a ride of 12000 km before replacement of the filters.



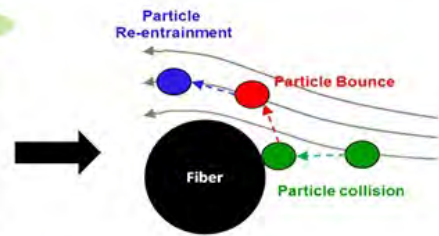
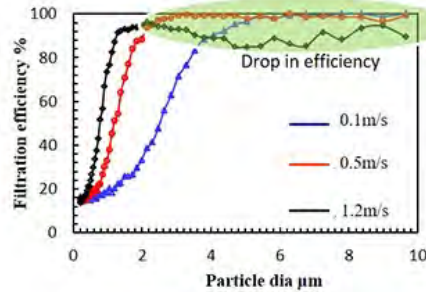
3D virtual fibrous filter media



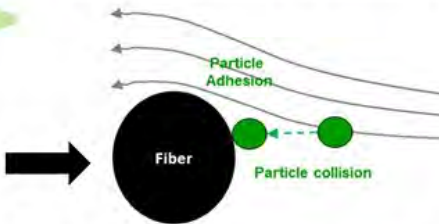
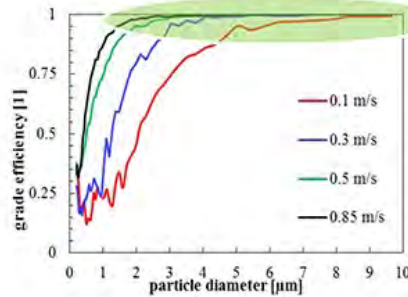
Treated filter media



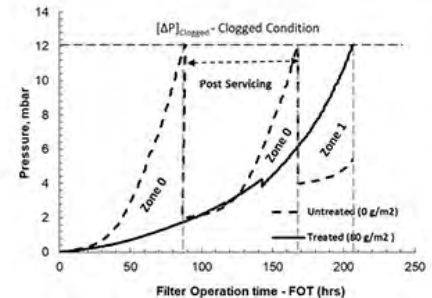
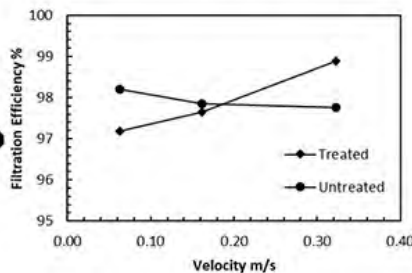
Pleated Air filter prototype



Scheme of particle bounce and re-entrainment



Improved adhesion between fiber and particle





Biswabandhu Jana



Rakesh Biswas



Pallab Nath

Smartphone based portable low-cost continuous wave Doppler Ultrasound system

Biswabandhu Jana, Rakesh Biswas, Pallab Nath
Indian Institute of Technology Kharagpur

Guide :
Prof. Swapna Banerjee, Dr. Goutam Saha

The Peripheral arterial disease is an important cause of morbidity and affected almost 202 million people worldwide in 2010. A high end medical diagnostic system in rural healthcare units is not available due to its high cost. So, an attempt has been made to design a portable, low cost, smartphone based, continuous wave Doppler Ultrasound System for common people.

The designed Ultrasound system consists of three major blocks, viz., Analog Front End (AFE), Signal Processing Block (SPB), and User Interface Block (UIB). In AFE, a pencil probe of 8 MHz is positioned on the artery to receive the backscattered signal and a tuned RF amplifier followed by an envelope detector is used to extract the Doppler shifted signal. The de-modulated signal is digitized for sending to the SBP module. The SBP is a Microblaze soft core processor based embedded system where processing is performed in an FPGA. The UIB displays spectrogram in real time and transfers to mobile through Bluetooth. Next, a smartphone

application has been developed for further analysis. Android application removes the noise from the spectrogram and extracts clinically important blood flow features. A machine learning algorithm has been implemented in the smartphone for identifying the normal and abnormal condition.

UNIQUE FEATURES

- Diagnosis of arterial diseases by assessing the inconsistent blood flow in the peripheral arteries.
- Detection of the exact zone of aortic obstruction.
- Determine the normal and abnormal condition in an automated way.
- The blood flow image can be sent to the doctors.
- Abnormalities in an arterial system can be diagnosed by changing only transducer probe.
- Detect Korotkoff sound for blood pressure measurement.





Srilekha Pilla



Jyothi Chinta



Dr. M. Mohan Varma

SIT: Smell Your Health

Srilekha Pilla, Jyothi Chinta, Dr. M. Mohan Varma
Shri Vishnu Engineering College for Women, Andhra Pradesh

Guide :
Dr. Pushpa Kotipalli

A neurological disorder is a disease that involves the brain and nervous system. There are many types of neurological disorders, including Alzheimer's disease, epilepsy, multiple sclerosis, Parkinson's disease, and migraines. The World Health Organization reports that there are millions of people around the world suffer from neurological disorders. Around 24 million people suffer from Alzheimer's disease and 326 million people suffer from migraines. Similarly, there are around 70 out of 10,000 people suffering with Parkinson's disease in India. People met with accidents may get neurological disorders which may not be identified immediately. Detection in the early stage is very important to stop the progress of all these neurological disorders. Olfactory dysfunction is the early stage symptom to many of the neurological disorders. Here olfactory dysfunction refers to partial or complete smell loss. If a person notices symptoms

like frequent headaches, blurry vision, fatigue, numbness in the legs or arms, physical imbalance, muscle weakness, slurred speech or tremors, he needs to take Smell Identification Test (SIT). If the person fails in the SIT, he should seek immediate help of professional medical practitioner. Existing SITs are not user friendly. We propose user friendly SIT. Mechanical setup of the tester is designed in such a way that oil bottles used with SIT can be accessed easily. The person under test has to identify the smell of the scent from the oil bottle. Answer booklet is provided in their preferred language. Depending on the number of correct answers, the person's smell identification capability can be assessed which in turn helps in early detection of neurological disorders. Our current innovation is user friendly in terms of operation, language, size, portability, and cost.





Archit Agarwal

On Board Diagnostic Data Analysis System - OBDAS

Archit Agarwal

University of Petroleum and Energy Studies, Dehradun

Guide :

Dr. Rajesh Singh, Anita Gehlot

OBDAS is a complete Automotive Electronics Solution that can be plug-in to any vehicle irrespective of the manufacture. Now through OBDAS vehicle's valuable information is on cloud that is accessible to different communities that can make value out of it. It is capable fetch real time data about car with more than 200 parameters through more than 25 ECUS. It process data with developed algorithms and convert into the valuable information. Then analyzed and upload information to the secure cloud server of the dedicated end-user's vehicle. OBDAS is divided into two parts one is OBDAS BlackBox under the steering wheel which fetch, process and upload vehicle information to the cloud server and other is OBDAS Notifier over the dashboard which notifies in real time about the car performance to the end-users

OBDAS making values to different communities

Segment 1

Car owner

- End user alerted in real Time about their car Diagnostic and overall performance through OBDAS

Notifier

- Notifies emergency services as soon as accident is detected with more than 95% accuracy based upon airbags and other parameters

Segment 2

Automobiles companies

- These companies can analyze and improve their manufactured car better than before by tracking their customer performance through OBDAS
- They can now provide real time service to their customer about car the maintenance
- OBDAS give the availability for customization with respect to parameters.

Auto-Insurance Companies

- Now, These companies can get telematics about history of their customer car
- Capable to have accurate decision with respect to insurance policies based upon their customer car history
- Can improve their business financially.





Anu Rachel Thomas



Kaviyarasan R



Praveen Rosario A

NOWAH (No Waste at Household) Technology - A novel, sustainable, smart and complete treatment technology for both faecal sludge and organic waste management

Anu Rachel Thomas, Kaviyarasan R, Arya V, Praveen Rosario A
Indian Institute of Technology Madras

Guide :
Prof. Ligy Philip

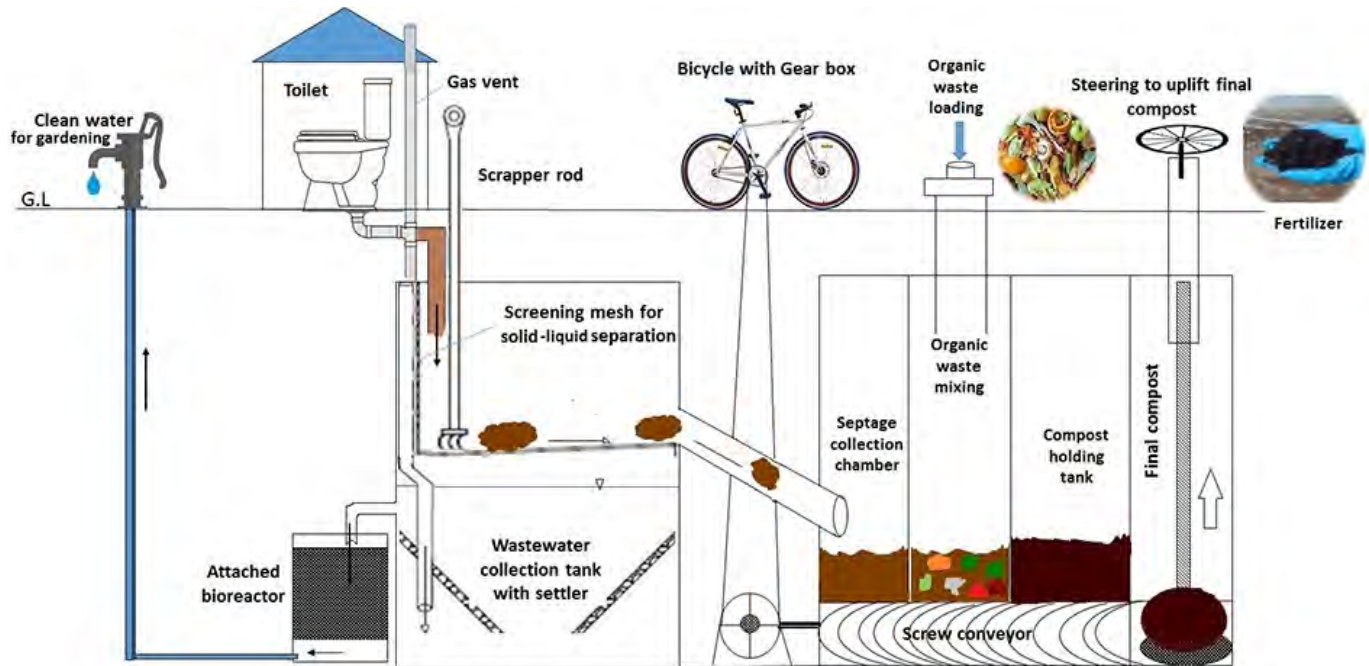
Providing environmentally safe sanitation to the world's second most populated nation is a challenging task. In India, the total sanitation coverage is 50% and in that only 12% have a piped sewerage connection. Majority of the households depends mainly on on-site wastewater treatment systems like septic tanks as their sole sanitation. Untreated septage disposal creates environmental degradation which mainly includes potential greenhouse gas emissions, percolation of emerging contaminants triggering water body contamination and also causes serious health threats as it contains millions of pathogens. In this context, our team has developed "NOWAH (No Waste at Household)" Technology - A novel, sustainable, smart and complete treatment technology for both faecal sludge and organic waste management.

In this treatment system, fecal sludge containing both liquid and solid parts is separated initially at the separating chamber. Further the liquid effluent is biologically treated in an attached bioreactor (ABR)

and the treated water can then be recycled for gardening. The dewatered solids will be conveyed to a composting chamber, where it will be co-composted with organic waste from household. The final compost can then be used as a plant fertilizer. All these units are linked to one another and are underground concrete structures. The proper functioning of this system can be easily made using a cycle with gear mechanism fixed above ground. Thus, the proposed "NOWAH" technology aims at treating the faecal matter at the source where it is generated together with resource recovery in a sustainable and hygienic way. It is a closed loop system with zero power requirement. NOWAH technology can be easily adopted in any household and can even be scaled up for small communities.



Arya V





Indrasis Das



Dipak A. Jadhav

Bioelectric toilet: A novel approach for treatment of human waste and generating onsite electricity for lighting toilets

Indrasis Das, Dipak A. Jadhav
Indian Institute of Technology Kharagpur

Guide :
Dr. Makarand Madhao Ghangrekar

Improper sanitation facilities in India are causing serious health hazards and lead to water contamination. Different types of onsite sanitation practices adopted in rural areas viz. aqua privy, pit privy, bore hole latrine, dug well latrine, septic tank etc. Among them, septic tank is most commonly used sanitation facilities in rural areas. But this can only remove chemical oxygen demand (COD) of about 30 to 40% from sewage and remaining organic matter along with pathogenic microorganisms left to the environment to pollute the water bodies. The concept of 'Bioelectric Toilet' is based on Microbial fuel cell (MFC) technology which gives improved treatment to black water and sludge settled in the septic tank and generates bioelectricity. Odour problems associated with the septic tank minimizes due to anaerobic oxidation of ammonia and sulfide to nitrogen and elemental sulphur, respectively. Recently, a field

scale 1500 L capacity multi-chamber multiple electrodes type (5 air cathode MFC and 1 aqueous cathode MFC) bioelectric toilet installed and put under operation in IIT Kharagpur campus since last six months. More than 95 percent COD (Chemical oxygen demand) removal efficiency was achieved and sustainable electrical energy production observed from this reactor which can illuminate toilet and toilet premises at night. Hypochlorite dosing is done as catholyte in the final cathode chamber of aqueous cathode MFC which reduces pathogenic contamination. Treated water can be reused and recycled for flushing purpose which decreases the fresh water consumption and makes it suitable for water scarcity areas.



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 knowledge holders, ensuring that whatever is done with their knowledge is shared with them in local language, and iv) if any profit or income is generated using their knowledge, a fair and just share should go back to the people. It has been promoting creativity and green grassroots genius in over 75 countries. It has facilitated documentation of over 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 likeminded 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

HONEY BEE NETWORK

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 -TUF 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

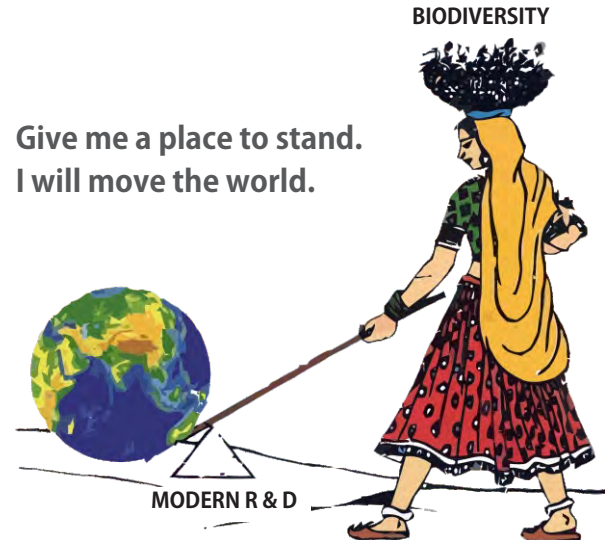
Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI), which means creation, was born in 1993, essentially to support the activities of the Honey Bee Network to recognise, respect and reward creativity at the grassroots. The objectives were: systematic documentation, 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 AASTIik in support of innovators and their innovations. SRISTI created the Honey Bee database of innovations, and supports the publication of the Network's newsletter in nine languages. These are: English (Honeybee), Gujarati (Loksarvani), Hindi (Sujh Bujh, Aas Paas Ki), Tamil (Nam Vazhi Velanmai), Kannada (Hittalagida), Telugu (Palle Srujana), Malayalam (Ini Karshakan Samsarikkatte), Oriya (Aama Akha Pakha) and Marathi (Mrudgandh).

SRISTI is now focusing in more concerted ways on hitherto neglected domains like women's knowledge systems, value

addition through a Sadbhav-SRISTI-Sanshodhan, 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

SRISTI

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.



SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions, 1993) is a developmental voluntary organization, set up to strengthen the Honey Bee Network of grassroots innovation engaged in conserving biodiversity and developing sustainable solutions to local problems.

Grassroots Innovation Augmentation Network [GIAN]

One of the major reasons why grassroots innovations are not able to scale up in many regions and sectors is lack of handholding support for reducing their transaction cost in leveraging linkages with investors and entrepreneurs. The grassroots innovators cannot often make or present a business plan, nor can they construct scenarios under different assumptions of demand subject to availability of varying capacity for fabrication, manufacturing or development of other products and services. GIAN was set up in 1997 as a follow up of ICCIG (International Conference on Creativity and Innovations at Grassroots) held at IIMA in collaboration with Society for Research and Initiatives for Sustainable Technologies and Institutions [SRISTI] and Honey Bee Network.

The golden triangle for rewarding creativity thus became the purpose of GIAN [Fig 1]. The reduction in ex-ante and ex-post transaction cost of innovators, investors and entrepreneurs was to be achieved by several operating principles: Never to ask innovators to come to office, instead provide them support at their doorstep; and organize financial, intellectual property, product and business development and dissemination support. With a small team and limited funds, GIAN has achieved an admirable track record. So much so that it shared the best incubator award with IIT Madras at the hands of the

then President, Dr. A.P.J.Abdul Kalam by Department of Science and Technology, 2003. GIAN worked in close collaboration with SRISTI which scouted various innovations for incubation purposes. In fact, the model of GIAN was scaled up in 2000 in the form of National Innovation Foundation [NIF].

GIAN has an independent board and a small team of professionals trying to experiment with new models of incubation, innovation and inculcation of experimental ethic at different levels in society.

Genesis

Being a pioneer is not easy. One has much higher expectations from pioneers. There is no template to copy from and much of learning takes place by doing.

The GIAN was set up in collaboration with Gujarat Government, IIMA and SRISTI besides volunteers of Honey Bee Network as a follow up of ICCIG (International Conference on Creativity and Innovations at Grassroots) held at IIMA. Its only assets were: the commitment of state government to support grassroots innovations from the state to become entrepreneur, access to SRISTI's Honey Bee Network Database of innovations

Grassroots Innovation Augmentation Network [GIAN]

by common people and guidance and support by faculty and support of students from IIMA.

Having got the best Incubator award in 2002? At the hands of then President, Dr A P J Abdul Kalam, jointly with IIT Madras, it made a point. India's first grassroots innovation incubator was a viable pathway to reduce transaction cost of innovators, investors and entrepreneurs. The golden triangle (see fig one) for rewarding creativity, now well known, summarizes the purpose of GIAN, handholding a grassroots innovator in her journey to become a social and/or economic entrepreneur. With passage of time, GIAN has expanded its scope work. It now works with women's groups, tribal communities, students of ITIs and polytechnics particularly women polytechnics besides farmers and workers. It works in all sectors of human survival and adds value to people's knowledge in collaboration with other HBN institutions such as SRISTI and NIF. It has an independent board having three additional chief secretaries of agriculture, Industry and rural development departments, independent industry representatives, faculty, IIMA, Director, EDI and Director, IIMA and NID are permanent invitees.

Mission

GIAN aims at sustaining the spirit of innovation, encouraging

experimentation and nurturing creativity at grassroots level of knowledge rich economically poor people, students, mechanics, workers, young start-ups by contributing to the creation of a knowledge network. This Network empowers the innovators, stems the erosion of traditional knowledge systems, recognises and augments contemporary innovations, and facilitates diffusion of grassroots green innovations through commercial as well as non-commercial public, private and voluntary channels

Objectives

To identify socially, economically and ecologically viable innovations from Honey Bee data base which are amenable for scaling up, prototype development, diffusion with or without further value addition.

To participate in the process of value addition being done by other research organizations in grassroots innovation so that eventual scaling up can be achieved effectively.

To mobilize resources from regional, national and international private, public and other organizations and high net-worth individuals to strengthen the ecosystem of grassroots innovations.

Grassroots Innovation Augmentation Network [GIAN]

To undertake market research, project development, provide design, IP related and entrepreneurial support and help in protection of their intellectual property protection.

To influence policy at micro and macro level to make it more responsive to the needs and expectations of green innovators so that society becomes more inventive and accommodative of local knowledge systems, innovations and practices.

To publicize innovations and products through exhibitions, Shodhyatras, media and workshops.

To organize entrepreneurial development workshops in collaboration with expert institutions for the innovators

To trigger a rural development process that provides an alternative model of poverty alleviation in a fair, just and dignified manner through local resources, knowledge or otherwise

How can you support GIAN?

Besides CSR and other kinds of funding support, GIAN will appreciate professionals on short term sabbatical, internship,

apprenticeship with innovators or incubators; remote mentoring support, exposure for its staff, infrastructural support, mobile food and nutrition labs for women, community innovation lab, sponsorship for summer and winter schools for inclusive innovation to address the unmet social needs, shodhyatras, etc. GIAN also wishes to join hands with SRISTI in online courses in different languages on how to invent and innovate. GIAN wishes to organize mobile exhibition, also build a stationary centre for inclusive innovations; public books, collaborate in bringing out Honey Bee newsletter started 28 years ago, in different languages.

Trust, transparency and accountability

GIAN is committed to uphold highest standards of ethical responsibility in managing resources and other non-material contributions. GIAN welcomes opportunities for social audit where the people with whom it works evaluate its working and various contributions.

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 knowledge holders 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

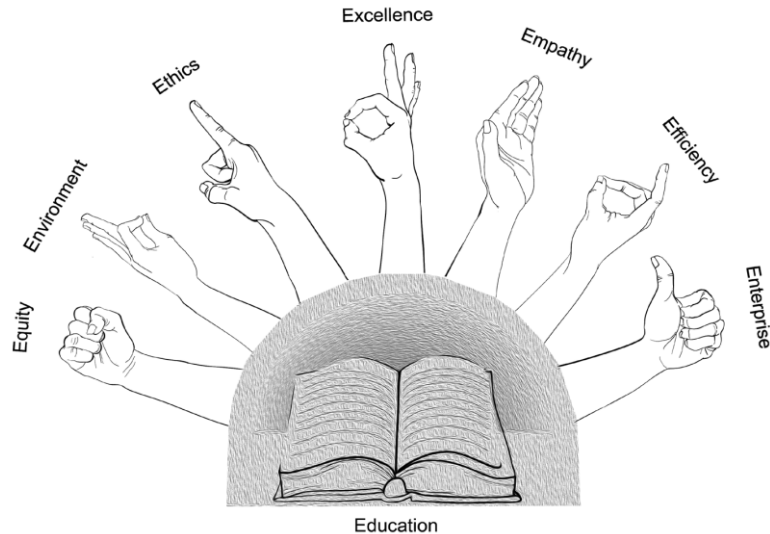
added. It has also set up a Fabrication Laboratory (Fab Lab) with the help of Massachusetts Institute of Technology (MIT), Boston for product development, apart from strengthening in-house research and development facilities for the initial validation of herbal technologies. Pro bono arrangement with 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 knowledge holders 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 countries for various technologies and has succeeded in commercialising products across countries in six continents, apart from being successful in materialising 89 cases of

1. Honey Bee Philosophy - The 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

National Innovation Foundation (NIF) – India towards a creative, compassionate and collaborative India

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 200,000 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.

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

* Explore kho kho 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

TECHPEDIA (www.techpedia.in)

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, remote 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.

Summer School on Inclusive Innovations

SRISTI has been engaging with children for tapping their creativity to address unmet social needs for over 25 years. World over, children are often treated as a sink of sermons rather as a source of ideas. The children creativity workshops are organised see the societal inertia through the children eyes. They are empowered to do research and identify the unmet social needs, and suggest solution. Later, the engineering and other students take some of these ideas besides others for fabricating solutions for addressing these problems.

Purpose is to generate extremely affordable solutions over next three weeks which improve the quality of life of poor children, women, workers and other disadvantaged social segments. It is possible that solutions developed during summer school may not be fully finished. We will give opportunity to some of the participants or external designer to finish these in coming months in partnership with the potential users.

Even if some of the problems remain unsolved, there will be better appreciation of the pathways that will not resolve these problems. SRISTI (Society for Research and Initiatives

for Sustainable Technologies and Institutions) in partnership with UNICEF (United Nations Children's Fund) has organised this Summer School on Inclusive Innovation through open, reciprocal and responsible framework guided by the Honey Bee Network Philosophy. It is hoped that young students will learn not to be patient with inertia. They may be sharpen their perceptions to learn the transition from samvedana to srijansheelta (empathetic way of creative problem solving).

A palm leaf broom maker has to beat the leaves on a wooden plank mounted with nails to tear a leaf into fine fibres. The drudgery involved in this act drains much of the energy of women who generally do this task.

Similarly, hundreds of thousands of tribals have to crack mahua nut to get the seed out for oil extraction. The construction workers carry brick on their heads straining their necks and spines. Women in Saurashtra and many other regions get hurt while harvesting the fruits from cactus like opuntia growing on the field bunds. Amla harvesting in the forest often involves cutting branches rather than just harvesting the fruits.

These and many other problems have been mobilized by the Honey Bee Network to challenge the young people to design solution to get over the indifference or inertia of formal design and technology institutions.

Every institution in the country will have to take the responsibility of mapping the unmet social needs in their hinterland and address them through student projects and summer and winter schools. Like every initiative that Honey Bee Network has taken, it may take years before policy and institutional reforms follow. The structure of governance in any society cannot remain indifferent to the persistent problems of the disadvantaged people for too long.

BIIS: Opportunity for technology students to work on grassroots innovations

SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions) in collaboration with BIRAC (Biotechnology Industry Research Assistance Council, Department of Biotechnology, Govt. of India) has organised a three-week BIIS (Biotech Innovation Ignition School) for validating, value adding and product development around grassroots innovations. The BIIS develop solutions for grassroots applications for human, animals, and agricultural applications including herbal technologies, medical devices and microbial application. The selected students are assigned individual projects in primarily four action-research areas drawing upon the Honey Bee Network Database:-

1. Pharmacognosy/Phytochemistry - SRISTI's Grassroots database contains many traditional knowledge practices as well contemporary innovations from across the country. These projects would involve validation/value addition to these practices. A few of these practices are presented here - <http://www.sristi.org/cms/sristi-birac>, http://www.sristi.org/hbnew/honeybee_database.php

2. Microbiology-SRISTI has a Microbial diversity bank containing 8000+ organisms (bacteria, fungi, and actinomycetes) isolated from the soil samples collected during Shodh Yatras in different parts of the country (<http://www.sristi.org/cms/shodhyatra>). An extensive study of screening these isolated microbes for novel human, animal, and agricultural application would be conducted.

3. Medical devices- Value addition/product development of any of the open source projects listed on our summer school website (<http://summerschool.sristi.org/>) regarding medical devices for human and animal health care or other medical devices for meeting unmet social needs.

4. Agriculture- Validation of grassroots practices by conducting field trials for the purpose of product development complemented by lab screening.

The abstracts along with the objective of the projects are shared with the selected students one week before the start

of the BIIS. The participants are expected to develop a project proposal and a work plan. These students receive an expert feedback on their proposals from the reviewers. The students also receive hands-on training in various techniques of microbiology, extraction, identification and characterization of phyto-constituents with the help of sophisticated instruments (AAS, HPTLC, HPLC, GC etc.) as per the need of the project in the first week of the event. The faculty from the institutions of participants are also invited to be associated with their projects as external supervisors. At least ten-fifteen of the outstanding selected projects from each BIIS further receive a research grant of Rs.1 lac to take their projects into subsequent stages of product development either at their institute or at SRISTI lab.

Each participant is encouraged to become a volunteer of the Honey Bee Network which has helped in scouting and disseminating rural creativity and innovation over the last three decades.

All the output is credited to the knowledge providers and if it is published thereafter it will be with the prior written

concurrence of the BIIS team and knowledge providers.

Highest ethical code of Biotech research is followed. Team spirit and willingness to develop open source solutions is highly encouraged. Peer learning is strongly encouraged. The findings are shared with knowledge providers in the local language with the help of SRISTI and Honey Bee Network team.

So far two BIIS has been conducted and we have announced for the third BIIS which is scheduled to be held from April 30-May 29, 2018 (<http://www.sristi.org/cms/biis-3>).

GYTI 2012 Awardees

Sr. No.	Title	Students	Supervisor Name	College / Institute
1	LPG based Refrigerator	Jainil Bhatt DhruvinKagdi TirthJani KunjalJadav	Prof. Tushar Patel	LDRP-ITR College
2	Domestic Refrigerator with Water Heater	Dhruv Patel		Gandhinagar Institute of Technology, Gandhinagar
3	LPG based Refrigerator	Chintan Patel Mayank D Patel Mayank I Patel Biren Patel	Prof YL Raol Prof AB Patel	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	IIT Gandhinagar
6	Multi Desire Wheelchair	Pratik Gandhi Chintak Dholakia Sumit Shatwara Bhargav Desai Priyesh Rajnikant Vanraj Kamliya	Prof. B H.Parmar	L.D.College Of Engineering
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
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	Government Engineering College, Rajkot
11	Image, Speech Recognition and Speech Synthesis for physically disabled	Saurabh Saket Rahul Ranjan	Inderdeep Singh Grewal	Bhutta College of Engineering,
12	Jeevan Dhara hand-pump 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		Parul Institute of Pharmacy, Limda, Vadodara
14	Automobile air conditioning using engine exhaust	Harish Umashankar Tiwari Prof. Dr. G.V. Parishwad	Prof. Dr. G. V. Parishwad	Pimpri Chinchwad College of Engineering Nigdi Pune 44

GYTI 2013 Awardees

Sr. No.	Title	Students	Supervisor Name	College / Institute
1	Self-Cleaning Functional Molecular Material	M. B. Avinash T. Govindaraju Carsten Schmuck Elisabeth Verheggen	T. Govindaraju	JNCASR
2	High Performance Cooking Stove	Mayur Rastogi	Prof. S Ray	IIT Kharagpur
3	Apparatus for Making Silk Fiber Based Lamellar Biomaterials to Solve Problem Of Lower Back Pain	Maumita Bhattacharjee Maumita Bhattacharjee	Dr. Sourabh Ghosh. Prof. Alok R Ray	Indian Institute of Technology, IIT Delhi
4	Electronic Support System for Physically disabled(Deaf & Dumb)	Margie Ashok Joshi Vishal patel Chirag Patel Jay patel	Ms. Dipti Patel	C.K.Pithawalla Engg. college
5	Reactor & Catalyst development for oxygen evolving step in Sulfur-Iodine cycle for Hydrogen production	Kishore Kondamudi	Dr. Sreedevi Upadhyayula	Indian Institute of Technology Delhi
6	The Third Eye	Naveen Kumar Rai	Dr. Amit Sethi	Indian Institute of Technology Guwahati
7	Clubfoot Orthosis	KANWALJIT SINGH KHAS	Dr. P.M. Pandey (Dept of Mechanical Engineering, IIT Delhi)	IIT Delhi

8	Comprehensive Protection from Electrocution	RAMDAS M U Sonu Unnikrishnan K Ashfaq Muhammed T Shahin.T.A Sreelakshmy Suresh and Sruthy	DR. Sudha Balagopalan and Ms. Mary P Varghese	VIDYA ACADEMY OF SCIENCE AND TECHNOLOGY, THRISSUR
9	SHE- Society Harnessing Equipment	Manisha Mohan Rimpi Tripathi		SRM Univeristy , Chennai
10	VAJRA(vessel desk)	raghunath p lohar		Ganesh institute of engineering
11	Robotic Dredger	Amit Dinanath Maurya Digvijay Maheshwari	C. Amarnath	IIT Bombay
12	Chetna - Celebrate Your Pregnancy	Keyur Sorathia Amit Ranjan Jagriti Kumar	Keyur Sorathia	Indian Institute of Technology (IIT) Guwahati
13	Automatic Fish Scaling Machine	M.Rajesh Kanna C.Mathan M.V.Krishnamoorthy Mahesh Mithilesh	Dr.P.Rajesh Kanna	Velammal College of Engineering and Technology,Madurai.
14	Spectral Eye	Sai Vijay Gole Saket Choudhary Yashesh Gaur		Sai gole- IIT Madras, Saket Choudhary- IIT Bombay, Yashesh Gaur- DA-IICT
15	Cross Linked Antibacterial Hydrogel	Mr. Chakavala Soyeb Rafikbhai Ms. Vaishali Thakkar	Dr. Nirav V Patel, Dr. Tejal R. Gandhi	Anand Pharmacy College
16	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

17	Vision for the blind using ultrasonic sensors	Santosh Kumar Bhandari Amrita Pattnaik Vinod k		SRM , Kattankulathur
18	Snippets-Memory Aid for People With Disability	Devender Goyal Aditi Srinivasan(Bangalore) Nirali Savla(Mumbai)	Kshitij Marwah (MIT- Media Labs)	IIT-Hyderabad
19	Design of a Smart Automotive Ventilation System for Parked Vehicles	Gaurav Kumar Jaiswal Mohit Gandhi Sanket Phalgaonkar Harshal Upadhyay Ankit Agrawal	Dr. Vasudevan R.	Vellore Institute of Technology, Vellore
20	E-diagnoser: An Advanced Low Cost Patient Monitoring Watch	LIBIN VARGHESE PILLAI SAREESH SHIBINJOSEPH ADARSH.S CHITHIRA JACOB NITHYA MERIN ANOOP PILLAI SAREESH	Asst.Prof.Reshmi.v	Amal Jyothi College of Engineering
21	Ultra Low Cost Tunable Nano Scale Patterns	Nandini Bhandaru	Dr. Rabibrata Mukherjee	Indian Institute of Technology Kharagpur
22	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 (IIT) Delhi
23	Hybrid Classifier for Marine Vessel based on Propulsion	Piyush Aggarwal	Ms. Mukta Goyal	Jaypee Institute of Information Technology University, Noida
24	Laser Ignited Internal Combustion Engine	Kewal Dharamshi	Prof. Avinash K Agarwal	Indian Institute of Technology Kanpur

25	Saree cutting machine for mat making handlooms	Alap Kshirsagar Abhijit Patil Vikalp Jambhulkar	Prof. Suhas Joshi	Indian Institute of Technology, Bombay
26	A Portable and Efficient Electronic Filter for Sub-Micron Particles from Fluids	Aswathi R Nair	Sanjiv Sambandan	Indian Institute of Science
27	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
28	Development of a Geo-hazard Warning Communication System	Devanjan Bhattacharya	Dr. Jayanta Kumar Ghosh, Dr. Narendra Kumar Samadhiya	Indian Institute of Technology Roorkee
29	Cow Dung based Microbial Fuel Cells (CDFCs) to Light up Indian Villages	Vishnu Jayaprakash Prof.TS Natarajan	Prof TS Natarajan,IIT Madras	University of California at Berkeley
30	HIGHLY GAS IMPERMEABLE ELASTOMERIC RUBBER-RUBBER BLEND NANO COMPOSITES	Ajesh K Zachariah	Prof.(Dr.) Sabu Thomas	Mar Thoma College
31	Semi-Automatic Rubber Tapping Machine	G.R.MALARMANNAN S.Emmanuel Richards	Dr.P.Rajeshkanna	Velammal College of Engineering and Technology, Madurai

32	Multifunctional Nano-in-Micro Alginate Micro-spheres for Biosensing, Drug delivery and MRI	Rashmi Dilip Chaudhari Abhijeet Joshi	Prof. Rohit Srivastava	IIT Bombay
33	Digital Pen	Kalpesh Wani Vivek Bavishi Venkat Rao		Visvesvaraya National Institute of Technology, Nagpur
34	Target Oriented Niosome Based Delivery of an Antitubercular Drug, Development and Characterisation	Gyanendra Singh A.K. srivastava	Prof. Shubhini Saraf	Department of Pharmaceutics Indian Institute of Technology Banaras Hindu University, (IIT-BHU) varanasi-221005
35	Sancharak: A Cell-Phone for Blind People	Rohit Bharatkumar Singh Hitarth Narsi Patel Navnath Bhimrao Mane Tanmay Vinay Shinde Rahul Dilip Kapoor	Dr. K.T.V. Reddy	Padmabhushan Vasantdada Patil Pratishthan's College Of Engineering
36	Mosquitocidal Endotoxin from Vellore Poultry Farm Wastes	BISHWAMBHAR MISHRA Abhishek Gupta	Dr. Suneetha Vuppu, Associate Professor	VIT UNIVERSITY, VELLORE
37	Development Bamboo-epoxy nanocomposites for manufacturing of helmets and other structural applications	Vivek Kumar	Dr. Sanat mohanty	IIT Delhi
38	Nanofinishing of Free-form Surfaces of Prosthetic Knee Joint Implants	Sidpara Ajay Muljibhai	Prof. V. K. Jain, Prof. V. K. Suri, Prof. R. Balasubramanian	Indian institute of technology Kanpur
39	Hydro-operated Square-Bottom Paper and Jute Bag Making Machine	Anirudh Thakur		Ilriet moga

40	Re-arranging Unused Contacts in Mobile Phones for Quick Access	Bala Vishnu R T. Kartick Kumar P.Gowtham Raj M.Murali Prasnth	P.Natesan	kongu Engineering College
41	Ambulatory Health Network App	Jayesh Vrujlal Khasatiya	Ankita Shah	Narnarayan Shastri Institute of Technology, Jetalpur.
42	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	Council of Scientific & Industrial Research- Central Food Technological Research Institute (CSIR-CFTRI).

GYTI 2014 Awardees

Sr. No.	Title	Students	Supervisor Name	College / Institute
1	LPG based Refrigerator	Jainil Bhatt DhruvinKagdi TirthJani KunjalJadav	Prof. Tushar Patel	LDRP-ITR College
2	Domestic Refrigerator with Water Heater	Dhruv Patel		Gandhinagar Institute of Technology, Gandhinagar
3	LPG based Refrigerator	Chintan Patel Mayank D Patel Mayank I Patel Biren Patel	Prof YL Raol Prof AB Patel	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	IIT Gandhinagar
6	Multi Desire Wheelchair	Pratik Gandhi Chintak Dholakia Sumit Shatwara Bhargav Desai Priyesh Rajnikant Vanraj Kamliya	Prof. B H.Parmar	L.D.College Of Engineering
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
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	Government Engineering College, Rajkot
11	Image, Speech Recognition and Speech Synthesis for physically disabled	Saurabh Saket Rahul Ranjan	Inderdeep Singh Grewal	Bhutta College of Engineering,

12	Jeevan Dhara hand-pump 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		Parul Institute of Pharmacy, Limda, Vadodara
14	Automobile air conditioning using engine exhaust	Harish Umashankar Tiwari Prof. Dr. G.V. Parishwad	Prof. Dr. G. V. Parishwad	Pimpri Chinchwad College of Engineering Nigdi Pune 44

GYTI 2015 Awardees

Sr. No.	Title	Students	Supervisor Name	College / Institute
1	FOOD VENDING MACHINE FOR SCHOOLS	Subrahmanya Shridhar Shetty Chandarashekar Moger Shivanada L.C Udaya g	Pradeep Kanchan	NMAM Institute of technology
2	Nanoemulsions as a vehicle for delivery of omega-3 fatty acids for serum and tissue lipids	D.Sugasini	Dr.B.R.Lokesh	CSIR-Central Food Technological Research Institute
3	DOUBLE DISK ULTRASONIC ASSISTED MAGNETIC ABRASIVE POLISHING DEVICE	Prateek Kala Dr Pulak Mohan Pangey Sumit Kumar	Dr Pulak Mohan Pangey	IIT Delhi
4	RIGHTBIOTIC: The Fastest Antibiotic Finder	Shivani Gupta DV Padmavathi Anuradha Pal	Dr Suman Kapur	BITS Pilani, Hyderabad Campus

5	Development of Shape Controlled Palladium Structures as Electro-catalysts for Fuel Cell Applications	Kranthi Kumar Maniam	Dr.Raghuram Chetty	Indian Institute of Technology Madras
6	Rapid Non-invasive diagnostics kits for diabetics patients to check Glucose level thrice a day	Yadav Vijay Dukhran	Dr Prajakta Dandekar Jain	Institute of chemical technology (ICT)
7	REDUCED CONVERTERS AND BRUSHLESS GENERATORS BASED STANDALONE MICROGRID FOR RURAL ELECTRIFICATION	Krishan Kant	Prof. Bhim Singh	Indian Institute of Technology Delhi
8	INJECTION MOULDABLE POLYMERIC COMPOSITE BASED PASSIVE POLYCENTRIC KNEE JOINT	S. Arun Dr. S. Kanagaraj	Dr. S. Kanagaraj	Indian Institute of Technology Guwahati
9	A novel process to commoditize carbon dioxide gas into fuels and high value nutraceuticals at commercially viable scale	Dilip Singh Preeti Mehta A.S.Mathur Ravi P. Gupta D.K.Tuli	Dr.D.K.Tuli	DBT-IOC Centre for Advance Bioenergy Research
10	Novel Nanozyme Technology for combating Oxidative Stress Related Disorders	Amit Ashok Vernekar Prof. G. Mugesh	Prof. G. Mugesh	Indian Institute of Science
11	FLEXICAST: A breathable, washable and customized cast for immobilization of fractured limb	Nikhil Jamdade Dr. Pankaj Chhatrala Devanshi Saksena		IIT Kanpur

12	Development of X-ray Visible Polymers via In Situ Iodination-Cross-linking for Non-Invasive Real Time Imaging	paulomi ghosh Dr. Santanu Dhara Mr. Arun Prabhu Rameshbabu	Dr. Santanu Dhara	School of Medical Science and Technology, Indian Institute of Technology Kharagpur
13	Affordable power-assist for wheelchair	sripriya kalidoss KARTHIKEYAN SD VIVEK SARDA	Dr. Sujatha Srinivasan	IIT MADRAS
14	Utilization of marine algae as substrate and methanogen inhibitor in microbial fuel cell	Rajesh PP Jadhav D A Prof. M.M. Ghangrekar	Prof. M.M. Ghangrekar	Indian Institute Of Technology Kharagpur
15	Prashamana- A Smart Hospital Bed	Nikhil Jamdade and Toshib Bagde Nikhil Jamdade	Dr. Ramkumar Janakara-jan	
16	Linearly polarised planar inverted F-antenna for Global Positioning System and Worldwide Interoperability for Microwave Access applications	Mayank Agarwal Rajesh Singh and Dr. Manoj K. Meshram	Dr. Manoj K. Meshram	Indian Institute of Technology (BHU), Varanasi
17	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 Dr.Indumathi M Nambi Dr.Jaganathan Senthilnathan	Dr. Indumathi M Nambi	Indian Institute of Technology Madras,India

18	Use of High Nutrient, Low Cost Natural Materials for Preparation of Well-Engineered Emulsions for Variety of Applications	V. N. Lad Prof. Z. V. P. Murthy	Prof. Z. V. P. Murthy	Sardar Vallabhbhai National Institute of Technology - Surat
19	Clubfoot deformity measuring device	KANWALJIT SINGH KHAS	Dr. P.M.Pandey and Prof. Alok. R.Ray	IIT Delhi
20	Virtual Reality Based Minimally Invasive Surgical Simulator with Haptics Feedback	M.S.Raghu Prasad M.Manivannan	Manivannan M	Indian Institute of Technology Madras
21	Electrospun Cellulose Acetate Nanofibers for Female Hygiene Applications	Shital Yadav I.Manipujitha Tulika Rastogi	Dr. Chandra Shekhar Sharma	Indian Institute of Technology, Hyderabad
22	One drug to cure them all	Chandradhish Ghosh Dr. Jayanta Halder	Dr. Jayanta Halder	Jawaharlal Nehru Centre for Advanced Scientific Research
23	Sway: The rhythm within	Janhavi Joshi Nupura Kirloskar Ninad Kulkarni	Prof Sanjay Jain	MIT Institute of Design, Pune
24	Fabrication Of Nano Object Imaging Probe Using Simple & Fast Hydro-Mechanical Etching Technique	FAZLE KIBRIA	Rajib Chakraborty	University college of Science & Technology
25	Algiculture	Abitha R	Dr.H.N.Chanakya	Indian Institute of Science, Bangalore

26	Evaluation of Blood Pressure and Arterial Compliance by the Radial Arterial Pulse Pressure Waveform obtained using Fiber Bragg Grating Pulse Recorder	Sharath Umesh Prof S Asokan Dr Shwetha Chiplunkar Dr Anand Kalegowda Dr Sukreet Raju Dr Apoorva Girish	Prof Sundarrajan Asokan	Indian Institute of Science
27	Targeting lymphatics to treat HIV using lipid based formulations	Amita Joshi Dr. Amita Joshi	Amita Joshi	B. V. Patel PERD Centre
28	Redefined Spoon For Parkinsons Patient	Dhyey Mayankkumar Shah Eepsit Tiwari Rajesh Patidar	Prof. Bhaskar Bhatt and Prof. Harish P. M.	IIT Gandhinagar
29	Rapid diagnosis of brain injury- A novel approach using citrate-capped gold nanoparticles	SRISHTI AGARWAL	Dr. Anindya Roy (Assistant Professor at Department of Biotechnology, IIT Hyderabad)	INDIAN INSTITUTE OF TECHNOLOGY HYDERABAD
30	TAPARCH: A Visually Challenged People Footwear	Krishna sai Inkoolu		GITAM UNIVERSITY
31	Biodegradable LiposAu Nanoparticles for photothermal ablation of Cancer	Aravind kumar Rengan Amirali Bukhari	Rohit Srivastava	IIT Bombay
32	Biomechanical Investigation of Extracorporeal Irradiation and Reimplantation Therapy in Malignant Bone Tumours	sakshi chauhan K. Manoj (AIIMS) Dr Shah Alam Khan (MD AIIMS) Dr Anamika Prasad (Faculty IIT-D)	Dr. Anamika Prasad, Dr. Shah Allam khan	Indian Institute of technology, Delhi

33	Valproic acid prevents progression of the diabetic nephropathy: Elucidation of molecular mechanisms and proof of concept for promising therapeutic usefulness	Sabbir Khan Gopabandhu Jena	Dr. Gopabandhu Jena	National Institute of Pharmaceutical Education and Research (NIPER), Sector-67, S.A.S. Nagar
34	Suchi-Ahvana	Pratik Raj Deepak Nagar Kewal Chand Swami		PDPM Indian Institute of Information Technology Design and Manufacturing Jabalpur
35	Development of Membrane Technology for Industrial Progress, Societal Benefit and Environmental Safety	Siddhartha Moulik Dr. S. Sridhar	Dr. S. Sridhar	CSIR-Indian Institute of Chemical Technology
36	Recyclable Porous Sheets for Low-Cost Water Filter	Abhishek Gandhi Naresh Bhatnagar	Professor Naresh Bhatnagar	Indian Institute of Technology, Delhi
37	Methane Sensing Module: From concept to prototype	Anwasha Mukherjee Gautam Prasanna Kar R.K. Pavan Sanjay Rao Vaibhav Rao	Dr. Abha Misra	Indian Institute of Science, Bangalore
38	TEDKIT- An Audio Tactile Storybook for Visually Impaired Children	ANKITA GULATI NEIL SHAH	M.BALAKRISHNAN(HOD,CSE DEPTT.,IIT DELHI)	IIT DELHI
39	Development of A Powerful New Antibiotic That Kills All Drug-Resistant Bacteria	Venkateswarlu Yarlagadda Jayanta Halder Goutham B Manjunath Akkaapeddi Padma	Jayanta Halder	Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR)

40	Energy Efficient Robust Controller for Autonomous Underwater Vehicle	Meenakshi Sarkar	Dr. Sambhunath Nandy	CSIR - Central Mechanical Engineering Research Institute
41	Gift of New Abilities	Shiva Kumar H R	Prof. A G Ramakrishnan	Indian Institute of Science (IISc)
42	Real Time Wound Management System Wound Segmentation & Analysis Using Image Processing On Mobile Platform (Android).	ABHIRAJ GUPTA		Manipal Institute Of Technology
43	Inch worm mechanism for solar panel cleaning robot	Bhivraj Suthar	Prof. Sudipto Mukherjee	IIT Delhi

GYTI 2016 Awardees

Sr. No	Title	Student Name	Supervisor Name	College/Institute
1	Simple Low-cost Bioactive Titanium Foam via Novel Route for Skeletal Tissue Reunion	Kausik Kapat	Santanu Dhara	School of Medical Science And Technology (Smst)
2	Flexible biodegradable anti-microbial new advanced form of Intra Uterine Contraceptive Device (IUCD)	Bhuvaneshwaran Subramanian Selvakumar M, Dibyendu Gouri	Professor DR. Sujoy K Guha	Indian Institute of Technology, Kharagpur
3	Automated opto-fluidic Microscope for Cellular Diagnostic Testing.	Veerendra Kalyan Jagannadh Jayesh V. Adhikari, Albina L. Nirupa, Rashmi S, Bindu Bhat	Dr. Sai Siva Gorthi	Robert Bosch Centre For Cyberphysical Systems

4	3D printed hydroxy-apatite tray for segmental mandibular bone reconstruction by stem cell delivery for oral cancer patients	Sanskrita Das Dr. Pravesh Mehra	Dr. Sourabh Ghosh	Indian Institute of Technology
5	NStomoz - Vascular anastomosis assist device	Anand Parikh	Prof Venkatesh Balasubramanian; Dr V B Narayana-murthy	Indian Institute of Technology Madras
6	Wearable drug delivery device based on microneedles for efficient management of Chemotherapy Induced Nausea and Vomiting (CINV) and Nausea and Vomiting in Pregnancy (NVP)	Bhushan N Kharbikar	Prof Rohit Srivastava	Indian Institute of Technology Bombay
7	Automatic Urine And Fecal Disposal System	Neenu Jose Athul.K.Raj, Athira.K.R, Neenu.P	Jinu.Sebastian	Sahrdaya College of Engineering And Technology
8	Device for Intrapartum-Materno-Fetal Care	Vichal P M	Appaji M Abhishek	Bms College of Engineering
9	Rapid Endotoxin Entrapment and Detection on Surface-engineered Glass Substrates	Sachin Kumar Prasanta Kalita, Ruchika Sharma, Nitish Goel	Dr. Shalini Gupta	IIT Delhi
10	Near Infra Red light Activable Iron(III) Complex as a Remarkable and organelle-targeted Anti-cancer Agent for the Photodynamic Therapy Application	Aditya Garai	Prof. A. R. Chakravarty	Indian Institute of Science

11	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 Gourav Dhar Bhowmick	Prof. M. M. Ghangrekar, Department of Civil Engineering, IIT-Kharagpur	Indian Institute of Technology, Kharagpur
12	A Novel Compound Restores Obsolete Antibiotics to NDM-1 Superbugs	Divakara SS Murthy Uppu Goutham B Manjunath Padma Akkapeddi	Prof. Jayanta Halder	Jawaharlal Nehru Centre For Advanced Scientific Research (Jncasr)
13	Development of a novel, non-biological pyrogen/microcellular components detection technique for purification and depyrogenation of water.	Yadav Vijay Dukhran Rohan Chhabra, Nikhil Kalane, Anomitra Dey, Tejal Pant Dr. Ratnesh Jain	Dr. Prajakta Dandekar Jain,	Institute of Chemical Technology
14	A Compact Microwave Sensor for Characterization of Radomes and Dielectric Signature Detection of Materials in 3G and 4G GSM Bands	Abhishek Kumar Jha	Dr. M. J. Akhtar	Indian Institute of Technology Kanpur
15	Development of portable device based on polarized fluorescence for detection of cervical pre-cancer	Bharat Lal Meena Ms. Seema Devi, Prof. Asima Pradhan, Dr. Kiran Pandey, Dr. Asha Agrawal	Prof. Asima Pradhan	India Institute of Technology Kanpur

16	X-niff: Microcantilever based Electronic-nose platform for airborne chemical vapor sensing	Gaurav Gupta Vijay Shrinivas Palaparthi, Shambhulingayya Ningayya Dod- dapujar Pallabi Das	Prof. Valipe Ramgopal Rao	IIT Bombay
17	Design of an Innovative Retrofitted Tricycle for a Disabled Person	Pushkaraj Sonawane Prof. Pushkaraj D. Sonawane Prof. Dr. Sandip T. Chavan	Prof. Pushkaraj D. Sonawane and Prof. Dr. Sandip T. Chavan	Maharashtra Institute of Technology, Pune
18	Soya Nuggets A novel Drug Delivery Vehicle	Utkarsh Bhutani	Dr. Saptarshi Majumdar	Indian Institute of Technology Hyderabad
19	Air-Assisted Electrostatic Sprayer (AAESS)	Manoj Kumar Patel	C Ghanshyam	Academy of Scientific and Innovative Research (AcSIR-CSIO), Chandigarh
20	AN INDIGENOUS OXY-GEN DOSING DEVICE TO CONSERVE OXY-GEN USING PATIENT MONITORING SYSTEM	srividhyasakthi		Sri Ramakrishna Engineering College
21	NEURONAL CELLS PRODUCED FROM NON-NEURONAL CELL LINE USING WALNUT OIL	Varsha		Chitkara University
22	Cost effective self-stabilizing smart hand held platform (spoon/pen) for elderly or Parkinsons disease patients	Debjyoti Chowdhury	Dr. Madhurima Chatto- padhyay	Heritage Institute of Technology
23	Paper microfluidic chip	Avishek barla Sameer Sharma		IIT Madras

24	Multimechanistic Polymer Based Novel Drug Eluting Stent Coating	Ms. Shiva Kalyani Adepu	Dr. Govinda Kapusetti Prof Kiran Kalia	NIPER Ahmedabad
25	Harnessing Micro Air Jets for Spraying Viscous Non-Newtonian Fuels	Manisha B. Padwal	Prof. D. P. Mishra	Indian Institute of Technology Kanpur
26	Paper based resistive touch-pad for electronic applications	MITRADIP BHATTACHARJEE	Dr. Dipankar Bandyopadhyay	IIT Guwahati
27	High Altitude Wind Energy Using Kite- A revolution in Renewable Energy.	Roystan Vijay Castelino	Prof. Lokesh B	Srinivas Institute of Technology, Merlapadavu, Valachil, Mangaluru
28	Nano Material Based Flexible Aqueous Power Cell for Energy Conversion and Storage(Self-Charging and Flexible Aqueous Power Cell).	Vinay Gangaraju	Prof. Dinesh Rangappa and Dr. D. S. Prasanna	Dept. of Nanotechnology, PG Center Bangalore Region, Visvesvaraya Technological University
29	LOW COST SANITARY NAPKIN DISPOSAL MACHINE	AISWARYA PARAMADATHIL		ADI SHANKARA INSTITUTE OF ENGINEERING AND TECHNOLOGY
30	CHECKit - A low cost mobile OMR system	Rahul Patel	Mehul Raval, Dhruv Gupta	Institute of Engineering & Technology
31	Green flexible conducting paper from edible bacteria derived 3D nanocellulose matrix and polyaniline	Divya Anand	Dr. Mudrika Khandelwal	Indian Institute of Technology(IIT) Hyderabad

32	DESIGN AND DEVELOPMENT OF SEMI-AUTOMATIC FLOWER KNOTTING DEVICE	Dr. G. Senthilkumar C. Cornelius Durai, S.Lakshmana Raja, S. Sriram	Dr. G. Senthil Kumar	Velammal College of Engineering and Technology
33	Handicap Support Device	Vishrut Bhatt Sumanth Mudaliar . Joshi Ashay . Dave Kaushal.	Mr. Harshul Bhrambhatt	LJ Polytechnic
34	Biobased Adhesive Formulation for Construction Applications	Neelima Tripathi	Dr. Vimal Katiyar	Indian Institute of Technology Guwahati (IIT Guwahati)
35	LATEX (NATURAL RUBBER) CARRY BACKPACK	AJIN OMANAKUTTAN	Prof. ABI VARGHESE	AMAL JYOTHI COLLEGE OF ENGINEERING, KANJIRAPPALLY
36	Bio-Inspired Flapping Near Surface Underwater Vehicle	Mannam Naga Praveen Babu	Prof. Krishnankutty. P	Indian Institute of Technology Madras
37	E-Droid Meter	Bitu C. Ghoniya Shruti B. Patel, Jigisha M. Karangiya, Jinal N. Modi	Urmi Desai	Sarvajani College of Engineering & Technology
38	Design and development of multipurpose electric cycle	Patel Krunal Brijesh patel, Prashant solanki Jigar parmar	Sandip godse	Shri satasangi saketdham
39	Automatic Sugarcane Juicer	Nilkantha Dashrath Gadakh		K. K. Wagh Institute Of Engineering Education and Research, Nashik

40	Cost effective mechanical testing equipment for characterising creep behaviour of materials under combined tension-torsion loading	Vineesh K P	Prof. Vikranth Racherla	Indian Institute of Technology Kharagpur, Kharagpur
41	Application Of Nano Material To Analyze The Strength Of Concrete	Dhrafani Ishita Mayurkumar	Mr. Hitesh Rameshchandra Ashani	Vyavasayi Vidya Pratishthan's Sanch. College Of Engineering, Rajkot
42	mSleep - Measure your Sleep	Shuchita Gupta Yashovardhan Sharma	Dr Vinayak Naik	Indraprastha Institute of Information Technology, Delhi
43	Straut AERO : Solar Industrial Hot Air Generator	Sharad Parekh	Dr. Nilesh Bhatt	Universal College of Engineering & Technology

GYTI 2017 Awardees

SN	Project Title	Student (s)	Guide	Institute Name	Award
1	White Light Emission from Vegetable Extracts	Dr. Vikram Singh	Prof. Ashok Kumar Mishra	Indian Institutes of Technology, Madras	BIRAC GYTI Award
2	A Virtual Reality (VR)-based Immersive Simulator For Endoscopy Training	Shanthanu Chakravarthy	Prof. G. K. Ananthasuresh	Indian Institute of Science, Bangalore	BIRAC GYTI Award
3	Rotary Ultrasonic Bone Drilling	Dr. Vishal Gupta	Dr. Pulak M. Pandey	Indian Institutes of Technology, Delhi	BIRAC GYTI Award
4	A Novel Hybrid System for Textile Dye Waste Water Treatment.	Bhaskar Bethi	Dr. Shirish Hari Sonawane	National Institute of Technology, Warangal	BIRAC GYTI Award
5	Revealed: Dual functional characteristics of Escherichia coli outer membrane protein Wzi and its implications in the design of novel antibiotics	Shivangi Sachdeva Narendar Kolimi	Dr. Thenmalarchelvi Rathinavelan	Indian Institutes of Technology, Hyderabad	BIRAC GYTI Award
6	Targeted Theranostic Nanomedicines for Brain Cancer Therapy	Ms. Sonali Mr. Rahul Pratap Singh Mrs. Poornima Agrawal	Dr. M.S. Muthu Prof. B. L.: Pandey	Banaras Hindu University, Varanasi	BIRAC GYTI Award
7	Blood Quality Assessment Using Digital Holographic Microscopy	Mandeep Singh Azhar Muneer	Dr. Kedar Khare and Dr. Sarita Ahlawat	Indian Institutes of Technology, Delhi	BIRAC GYTI Award
8	STERI-FREEZ: Flash Freeze Sterilization	Ms. Saugandha Das Mr. Archit Devarajan	Prof. Padma V. Devarajan, Mrs. Vasihali Kavishwar	Institute Of Chemical Technology, Mumbai & Ramnivas Ruia Junior College, Mumbai	BIRAC GYTI Award
9	Prophylactic Transdermal Patch Against Neurotoxin Poisoning In Biological Warfare Situations.	Subham Banerjee	Prof. Pronobesh Chattopadhyay and	Defence Research Laboratory, Tezpur	BIRAC GYTI Award

			Prof. Animesh Ghosh	& Birla Institute of Technology, Mesra.	
10	Low cost and field-portable smartphone platform water testing kit for detection and analysis of contaminants in drinking water	Iftak Hussain Dr. Kamal Uddin Ahmad	Dr. Pabitra Nath	Tezpur University, Assam	BIRAC GYTI Award
11	Near Infrared Fluorescence Probes for Diagnosis of Alzheimer's disease	K Rajasekhar Kavita Shah	Prof. T. Govindaraju	Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore	BIRAC GYTI Award
12	Low Cost Automated Handheld Melamine Detection Device (for Testing Melamine in Milk)	Dhiraj Indana Dr. S.C.G. Kiruba Daniel Varun S. Prateek Katare	Dr. Sai Siva Gorthi	Indian Institute of Science, Bangalore	BIRAC GYTI Award
13	NeuroBuds - Brain Wave Mapping Smart Earphones	Nitin Vasanth	Prof. Unni A M	Cochin University of Science & Technology, Kochi	BIRAC GYTI Award
14	Affordable and Rapid Paper-based Test Kits for Antimicrobial Susceptibility Assays	Shantimoy Kar Tarun Agarwal Shubhanath Behera Varun Varma	Prof. Suman Chakraborty and Prof. Tapas K. Maiti	Indian Institutes of Technology, Kharagpur	BIRAC GYTI Award
15	Portable biosensing platform based on conducting polymer decorated optical fiber for bacteria as well as heavy metal sensing in tap water	Sutapa Chandra Arvind Dhawangale Rosna Binish	Prof. Soumyo Mukherji	Indian Institutes of Technology, Bombay	BIRAC GYTI Award
16	Affordable Kit for Cervical Cancer detection.	Appidi Tejaswini Syed Baseeruddin Alvi Anurag Meena	Dr. Aravind Kumar Rengan, Dr. Rohit Srivastava	Indian Institutes of Technology, Hyderabad and Indian Institutes of Technology, Bombay	BIRAC GYTI Award

17	Non-invasive, Point-of-care Diagnostic System for Early Detection of Oral Cancer using Digital Infrared Thermal Imaging	Manashi Chakraborty Dr. Santanu Patsa Dr. Nishat Anjum	Dr. Sudipta Mukhopadhyay Prof. Swapna Banerjee Dr. Sourav Mukhopadhyay Prof. Jay Gopal Ray	Indian Institutes of Technology, Kharagpur	BIRAC GYTI Award
18	Navyo-The Smart Glove	Madhav Aggarwal Mohd. Suhail Bhavesch Pachnanda	Prof. Vikas Rastogi	Delhi Technological University, Delhi	GYTI Award
19	A Novel Bio-engineering Approach to Generate an Eminent Surface Functionalized Template for the Selective Detection of Female Sex Pheromone of Certain Agriculturally Hazardous Pests	Dr. Parikshit Moitra Dr. Deepa Bhagat Prof. Rudra Pratap	Prof. Santanu Bhattacharya	Indian Institute of Science, Bangalore & Indian Association for the Cultivation of Science, Kolkata	GYTI Award
20	ANUBHAV - AN EFFICIENT WRITING TOOL FOR VISUALLY IMPAIRED	Sachin NP Vimal C	Prof. Shantanu Bhattacharya	Indian Institutes of Technology, Kanpur	GYTI Award
21	Swayam - Passively Stabilized Communication Satellite	COEP Satellite Initiative	Dr. M.Y. Khaladkar and Dr. B.B. Ahuja	College of Engineering, Pune	GYTI Award
22	Indigenous Technology of Soft Body Armour for Defence Applications Using 3D Woven Aramid Fabrics	Animesh Laha	Prof. Abhijit Majumdar	Indian Institutes of Technology, Delhi	GYTI Award
23	Affordable paper microfluidic device for blood glucose and cholesterol detection	Avishek Barla Abrar Ali Khan Sameer Sharma Vijay Anand Nitish Kumar Singh	Dr Vignesh Muthuvijayan	Indian Institutes of Technology, Madras	GYTI Appreciation

24	Never Ending Learning of Sound	Ankit Parag Shah Rohan Badlani Benjamin Elizalde Anurag Kumar	Prof. Bhiksha Raj Ramakrishnan	National Institute of Technology, Surathkal	GYTI Appreciation
25	OCR++: A Robust Framework For Information Extraction from Scholarly Articles	Mayank Singh, Barnopriyo Barua Priyank Palod Manvi Garg Sidhartha Satapathy Samuel Bushi Kumar Ayush Krishna Sai Rohith Tulasi Gamidi	Dr. Pawan Goyal and Dr. Animesh Mukherjee	Indian Institutes of Technology, Kharagpur	GYTI Appreciation
26	Paper-based Device For Rapid Detection Of Dengue	Sanjay Kumar Pulak Bhushan	Prof. Shantanu Bhattacharya	Indian Institute of Technology, Kanpur	GYTI Appreciation
27	TROLLEY STRAW BALER BY RAM COMPRESSING MECHANISM WITH TRACTION FORCE	Ramalingam.PI M.Prakash M.Prabhu C.Logesh Jayaprakash.P.S	Prof. R.VIGITHRA	Panimalar Institute of Technology, Anna University, Chennai	GYTI Appreciation
28	Enhancement of distribution system performance using HVAC Boost Converter and Fuzzy Controller	Anusha Vadde	Prof. V.S.N SitaramGupta .V	M S Ramaiah University of Applied Sciences, Bengaluru	GYTI Appreciation
29	Design of a Mechanical Device (Nanorobot) for Diagnosis and Removal of Plaque from Human Heart Artery System	Mallikarjunachari G	Dr. Pijush Ghosh	Indian Institute of Technology, Madras	GYTI Appreciation
30	"Electrolithography"- A Novel Nano Patterning	Santanu Talukder	Prof. Rudra Pratap, Dr.	Indian Institute of	GYTI

	Technique Using Electric Field Induced Material Transport		Praveen kumar	Science, Bangalore	Appreciation
31	Cost Effective Inspection System For Automated Large Scale Cocoon Quality Assessment	Prasobhkumar P. P.	Dr. Sai Siva Gorthi and Prof. C. R. Francis	Indian Institute of Science, Bangalore	GYTI Appreciation
32	Industrial Production of Poly (lactic Acid) based Biodegradable Films with Highly Improved Gas Barrier Properties for Food Packaging Application: A Potential Candidate to Replace Conventional Synthetic Polymers	Akhilesh Kumar Pal	Dr. Vimal Katiyar	Indian Institutes of Technology, Guwahati	GYTI Appreciation
33	Fish inspired propulsion for remotely operated surface ships and underwater vehicles	Mannam Naga Praveen Babu	Prof. P. Krishnankutty	Indian Institutes of Technology, Madras	GYTI Appreciation
34	Development And Characterization Of Smart Nanocarriers For Oral Insulin Delivery	Ashish Kumar Agrawal	Prof. Sanyog Jain	National Institute of Pharmaceutical Education and Research, Mohali	GYTI Appreciation
35	Design & Development Of Automated Five Axis CNC Ball End Magnetorheological Finishing Machine	Dilshad Ahmad Khan Faiz Iqbal Zafar Alam	Dr. Sunil Jha	Indian Institutes of Technology, Delhi	GYTI Appreciation
36	Grid Interactive Solar PV Based Water Pumping Using BLDC Motor Drive	Rajan Kumar	Prof. Bhim Singh	Indian Institutes of Technology, Delhi	GYTI Appreciation
37	A Mechanism for Toilet Seat Sanitation	Arvind Pujari D V S S Kushal Kumar Reddy Shashwat Jain Subham Kumar Sahana Tanay Garg	Dr. Anil Prabhakar	Indian Institutes of Technology, Madras	GYTI Appreciation

38	Design of Highly Efficient and Inexpensive Membrane Equipment as Import Substitutes for Demineralized Water Production and Hemodialysis	Ms. Harsha Nagar Ms. Shaik Nazia Ms. M. Madhumala Mr. Y.V.L. Ravi Kumar	Dr. S. Sridhar	CSIR-Indian Institute Of Chemical Technology, Hyderabad	GYTI Appreciation
39	Portable Geo-specific Water Filtration Bottle	Ramesh Kumar Anupam Chandra	Prof. Thalappil Pradeep	Indian Institutes of Technology, Madras	GYTI Appreciation

Gandhian Young Technological Innovation Awards, 2019



SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions) has established three national awards for innovative

student projects in engineering, biotechnology, agriculture, pharmacy, material science and other applied technological domains. These awards are given every year during the Festival of Innovation And Entrepreneurship (FINE), Rashtrapati Bhavan, New Delhi in the month of March.

Last date for submission of entries is October 31, 2018

The awards will be given to young student innovators in the following category:

MLM (More from less for many), Frugal Innovation award- technologies that economise on the use of material, are extremely affordable, sustainable

SRISTI socially relevant technological innovation award-

products/prototypes that address unmet social needs or improve the functioning of existing solutions, increase affordability and/or improve circularity i.e. ecological compatibility

Technological-edge award-ideas that push the frontiers in any technological domain

BIRAC-SRISTI award for biotechnological/medical/healthcare innovation

Hari Om Ashram Prerit Dr. Amulya K.N. Reddy GYTI Award
Techpedia (www.techpedia.in) at SRISTI invites entries for these three awards by October 30, 2018.

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

already passed out and left the Institute/ University, the faculty member, who supervised the project, can also apply but awards are to be given only to students willing to take their ideas forward.

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 bench-marking such innovations

B: SRISTI social technological Award: The student projects which have a demonstrable proof of concept/ prototype having significant amount of novelty and social applications are eligible for this award. Any projects completed in or after 2016 can be submitted by the students or their faculty supervisors on their behalf.

C: 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.

D: BIRAC-SRISTI award for biotechnological/medical/healthcare innovation: A technology having potential for reaching the masses and/or addressing a felt social need or making it extremely affordable compared to available solution will be selected. Up to fifteen of the selected innovations may be given a grant of Rs.15 lac each and another 20-30 idea may be granted one lac each for taking the idea forward after they add value to grassroots innovations in Biotechnological Innovation Ignition School (BIIS) at Sristi, Ahmedabad.

The full project report of the shortlisted projects will be needed for final evaluation. Video, photographs, test reports, comparative advantage vis a vis existing solutions in that domain, literature & patent review etc., may be attached. Last date for submission of entries is oct 30,2019

All the shortlisted entries will be displayed by winners at the Festival of Innovations & Entrepreneurship Rashtrapati Bhavan in March 2019. The submitted entries will be included in www.techpedia.in database with due acknowledgement of the name of the team members, supervisor, college, department and any contact information

provided.

The exhibition will be visited by leading policy makers and practitioners of the country. The prototype may be retained to be displayed in a permanent exhibition likely to be developed soon at the national level with due acknowledgement of innovators, supervisors and the concerned institution.

The nominations have to be submitted at <http://www.techpedia.in/award> and only abstract of the content submitted along with innovator detail would be published at the site or shared otherwise. If the student wish to have incubation support, they should clearly indicate the same in their nomination form. Bionest incubator supported by BIRAC, DBT, Government of India welcomes applications from innovative biotech researchers. For those interested in IPR support, assistance from a network of pro bono attorneys can be mobilised at concessional term.

For any query, please contact Team Techpedia-GYTI at gyti.techpedia@sristi.org. Call us at +919099258492. For looking at the awards given this year, please visit

www.techpedia.in , www.sristi.org, biis@sristi.org initiative.

Looking forward to your enthusiastic cooperation to make India Innovative And meet the unmet social needs.