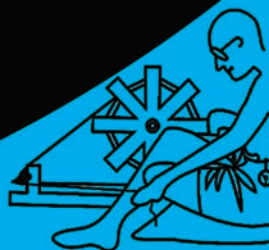




July 6, 2019
Vigyan Bhavan
New Delhi



GANDHIAN
YOUNG
TECHNOLOGICAL
INNOVATION
AWARD 2019

Gandhian Young Technological Innovation Awards (GYTI)



Publisher: SRISTI Innovations

P.B. No. 15050, Ahmedabad - 380 015

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Printed by: Rhudra events, Delhi

First Edition: 2019

Copies: 500

Price: Rs.200

ISBN: 81-87160-20-47

Editorial Team: Prof. Anil Gupta and Honey Bee Network Team

SIRSTI

AES BOYS Hostel Campus, Near Gujarat University Library and SBI Bank,
Navarangpura, Ahmedabad -380 009, Gujarat (India)

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SRISTI

**GANDHIAN YOUNG TECHNOLOGICAL
INNOVATION AWARDS
GYTI 2019**

Introduction

Solving the unmet needs of the society is a challenge that has to permeate every layer of educational ecosystem. GYTI Awards primarily represent one layer which is the higher education with occasional exceptions. This year we have included a school girl who is receiving an Appreciation for developing a simple non-invasive low-cost method for assessing the risk of oral pre-cancerous lesions and oral squamous cell carcinoma in chronic smokers. Nikhya Shamsher is an exceptional schoolgirl getting this distinction. Hopefully in future we'll have a separate programme to identify hundreds of such students all over the country. Attracting most curious and compassionate minds to the life sciences in particular biotechnological research is an important goal of our country. Most of the awards, like in the previous years, have gone to the elite institutions with just one exception. In the appreciation category there are a few more-smaller colleges. But this year the number of less renowned institutions making to the award or appreciation category has come down drastically. This is a pointer that we cannot ignore. The numbers of entries have come down but the quality of entries has gone up. Looking at the results of various years, many students apparently hesitate to apply. We have to make invigorated efforts to bring more and more applications from Tier 2 and Tier 3 colleges so that talent from such institutions does not remain unrecognised. At the same time the GYTI Awardees must visit such colleges and share their journey of research to inspire other students to work harder and raise the bar for quality of research. Every awardee or those who are appreciated will hopefully connect with some schools, particularly government school where children

from poor family predominantly study as well to motivate young children to pursue careers in biotechnology and allied life science disciplines.

The role of bio economy is going to become very central in time to come and we are not getting too many applications from young researchers who are developing bio materials for various applications. If India has to achieve the goal of establishing circular economy then the role of bio materials and repurposing technologies will be important. Posing medium to long term problems to students for a sustainable future happens today only at the level of individual faculty or sometimes through popular discourse. By highlighting the critical situation about water, the Prime Minister has drawn the attention of the country about conservation or augmentation and recycling of water. There are obvious implications of this concern for the research agenda. The technological innovations are needed which will reduce water consumption in industry, agriculture, construction and other sectors, reduce the need for water by developing new methods and materials and find affordable ways of reporting the waste water for more efficient and effective use.

Gandhiji had given a challenge award of 7,700 pounds (Rs. One Lakh) in 1924 for redesigning the Charkha. The Ambar Charkha was a derivation of that quest. We need to issue similar challenge awards to young students to generate solutions to the persistent problems at different level from district level up. There has to be

space for student driven research though often it becomes guide driven research. Last year we appreciated two undergraduate students from Rajasthan who developed a bio-polymer from bio waste to grow plants faster. This year they got selected out of a global competition for a Million Yen grant and incubation support in Japan. Such efforts completely designed and developed by students have a very important role to play in solving social problems and encouraging bio entrepreneurship. Narayan Lal Gurjar has already set up a company for commercialising the bio-polymer as growth promoter. During the last four years in a survey of 173 awardees and appreciated students based on response of 60 students, around Rs. 8 crore of investment was mobilised by students from various sources including BIG Grant. Depending upon one's outlook you can call it a small amount or a substantial amount but the fact remains that there is a need to encourage such students more vigorously than may have been the case so far. In the Bionest incubator set up by SRISTI known as Sanctuary of Inclusive Innovation and Entrepreneurship (SIIE) several grassroots entrepreneurs have been taken up for incubation.

I hope with the continued support of BIRAC, DBT and other stakeholders, the GYTI Awards will contribute much more significantly to address technological needs of the society and at the same time advance the technological edge.

I'm grateful to all the reviewers who have helped us in the review of entries and in some cases done it at a very short notice. Several

directors of IIT have been particularly responsive despite their excessive pressure making the review process very rigorous and efficient. I would like to particularly thank Dr. Ram Gopal Rao, Director IIT Delhi and Dr. Uday Desai, Director IIT Hyderabad for such help. I'm grateful to all the directors of national institutions such as IISC, JNC SAR, IITs, IISER, NITs and numerous other universities and colleges who have helped us in mobilising entries and reviewing them. I must also thank the reviewers from private sector, some of the eminent hospitals, electronic industry, and other leaders from pharma and life science related sectors for reviewing projects to assess their industrial utility.

We hope that GYTI Awardees and appreciated students will carry the spirit of Honey Bee network in their hearts and always give more weightage to the societal interest over the personal ones. I also hope that more and more students will connect with the grassroots innovators, creative children particularly in government schools and reinforce their faith and hope in future.



Prof. Anil Gupta

Highlights

The GYTI 2019 awardees include student innovators pursuing state-of-the-art scientific inventions, socially relevant discoveries and frugal manufacturing invention. While majority of these students are from premium institutes like IIT's, IISc, JNU etc., but a few are from smaller and less renowned public and private institutions also.

In the health care category a young high school student Nikhiya Shamsher worked on detection of pre-cancerous lesions of the oral cavity in heavy smokers by looking at the reactive oxygen species verses lipid peroxidase levels in the saliva. An affordable insulin pump for Type-1 diabetic patients in resource constrained settings is developed by Deval Karia's team at IISc Bengaluru. Its special design, working principle and size reduction makes the insulin pump cost effective and highly socially relevant for India, considered as the diabetic capital of the world. In occupational hazard category an affordable Anti-pesticide dermal gel is developed by Ketan Thorat's team at the Institute of Stem Cell Biology and Regenerative Medicine, Bengaluru, which will be helpful for farmers and workers. The skin-gel constituted with numerous chemical detoxifiers when applied, instantly attacks the pesticide molecule and catalytically cleaves it into smaller, non-harmful components, thereby diminishing the toxic effect of pesticides. During our shodhyatras (learning walks) and

shodhsankal meeting in every state of the country for the last 25 years, we have not come across a single instance when a farm worker had safety gear on while spraying pesticide.

A new methodology for early detection of osteoporosis is developed by Anu Shaju at NIT Surathkal. They are using metacarpal Radiogrammetry and texture analysis to make the diagnosis more affordable. It may replace the currently used, costly diagnostic technique of Dual Energy X-ray Absorptiometry (DXA).

In socially relevant technologies, a Pneumatic Damping Prosthetic Leg for above knee amputees has been developed by Muhammed Janish, MES College of engineering Kuttipuram, Kerala. It is a completely force responsive solenoid valve controlled mechanical prosthetic leg which makes the life of the leg amputees easy and stops them from stumbling. A rapid and non-destructive E-nose has been developed for detection of insect infestation in stored cereal grains by Gayatri Mishra and team at IIT Kharagpur. Using Fourier transform near infrared spectroscopy (FTNIR), electronic nose (E-nose), and hyperspectral imaging techniques will be helpful to the farming community, FCI godowns as well as grain selling businessman. Another socially relevant invention is Image Analyzing Drying Patterns of Blood and Plasma Droplets for the Rapid Detection of Thalassemia Carriers (prevalent in 10% of world

population) developed by Manikuntala Mukhopadhyay and team at IIT Kharagpur. The study has conclusively proven the distinct patterns observed on drying of whole blood droplets for carrier and normal samples, with an image analyzing software. A paper strip-based early detection of Mastitis in cows is developed by Harika Chappa and the team at Sri Venkateswara Veterinary University, Tirupati, which can be helpful to the farmers. A simple toy type Anemia meter is developed by Jeethu Raveendran at Amrita Vishwa Vidyapeetham, Coimbatore. Soil salinity sensor is developed by Sneha Munshi at IIT Madras. She made use of Cyt R protein as a marker and variation in structural stability with respect to salinity. To help the farmers to predict weather at village level, 'Bhu-goal' a series of antenna systems has been developed by Kartik Vij and the team at Chitkara University, Punjab, so that farmers can exactly predict the probability of rain after cloud formation. As we know that life forms on earth transact energy through phosphate chemistry, probably making use of this principle Ritambhara Gond and the team at IISc Bangalore developed pyrophosphate and metaphosphate based cathode materials for energy storage devices.

In the environmental protection and socially relevant research work, Uma Dwivedi at IIT Delhi, has developed an improved two-stage batch reactor system to produce fuel grade hydrocarbons from waste plastic. Development of Non-catalytic deep

desulfurization process using hydrodynamic cavitation may help in less polluting and energy consuming process for various organics synthesis, to reduce the interdependence cycle of metal ion pollution from industries. Roshini and team from Sathyabhama Institute designed Super Paramagnetic Iron Oxide Nanoparticles (SPIONs) with a larvicide, which kills the larvae and nanoparticles scavenge other metal ions, thus reducing the further breeding of the mosquito larvae.

In alternate fuel technology, Amit Kumar Singh and the team developed chemically powered micro motors comprising a collection of iron nanoparticles (FeNPs), namely ferrobots, for rapid on-site generation of pure hydrogen gas using formic acid as fuel. Yogesh Urunkar and the team developed thermal insulating ceramics from fly ash waste of power plants. Nikhil Gupta and the team at IIT Delhi developed an algorithm based artificial intelligence to detect biomarkers of knee osteoarthritis by looking at the change in walking style of a given patient. Magneto-Mechanical device to predict the plaque growth in coronary arterial system of the heart is under the development from Mallikarjunareddy from the Madanapalle Institute of Technology and Science and may help in the future to predict or detect plaque growth. Helical shaped magnetically driven nano robots have been developed by Malay Pal and the team at IISc Bangalore. For the convenience of upper limb above elbow amputees, an interlock

mechanism based bio-compatible, user-friendly and cost-effective elbow disarticulation prosthesis is developed by Mrutyunjay and Bhabani Shankar at IIT Guwahati. By cloning the fungal arsenic methyl transferase gene in to the rice, Shika Verma developed low arsenic grain rice at NBRI Lucknow. For the benefit of deaf and mute, audience response device is made by Manasi Mishra at Indira Gandhi Delhi Technical University for Women.

Under Electronic and software based socially relevant inventions, Real Time Surrogate Visual Tracking of Lung Tumors for Effective Radiotherapy has been developed by Darshan Ramesh Shet, Priya Singh and team from IIT Kanpur. Using the Machine Learning techniques ,they have developed time synchronized X-ray and visual surface tracking data sets and correlation models of the surface of the chest with the X-ray tracker data. Patient-specific spheroid-on-chip for cancer treatment, a combinatory drug screening is under development by Sharanya Sankar and team at IIT Hyderabad. They have designed and developed a special microfluidic device platform to screen the drugs and detect which drug is more relevant for a given cancer. The platform allows self-formation of tumor spheroids on passing the cancer cells through the inlet port. Low-cost, easy-to-use, in-house developed electric cell impedance sensing (ECIS) system for studying the dynamic behavior of the biological cell is under development by Uvanesh

and team at IIT BHU. Animal testing and animal sacrifices in laboratories and pharma companies can be reduced. It is low-cost, easy-to-use, portable electric cell impedance sensing (ECIS) system that shows a great potential for analyzing the physiological parameters in real-time both for in vitro and in vivo models. Using machine learning and new algorithms a more accurate detection and intrinsic subtype classification of breast cancer has been developed by the Bikash Ranjan Samal at IIT Kharagpur. A new Fibonacci series based rectangular microstrip patch antenna has been developed which may have applications in Bluetooth, WiMAX, ISM, C, X, Ku, K-band etc applications. To improve our railway system signaling during the foggy conditions smart signaling and interlocking system has been developed by S. Karthikeyan and the team at M. Kumarasamy college of engineering, Tamilnadu.

New drug discovery research developmentslike Modernization of traditional anti-malarial drug artesunate via nanomedicine approach has been developed by Deepika Kannan at Shiv Nadar University, Noida. , They have utilized the iron nanoparticles coated with the drug as enhancer of the anti-Parasitic activity in-vitro. Revelation of G-quadruplex formation as a molecular basis of fragile X tremor/ataxia syndrome (FXTAS) leads to a new direction in the drug discovery. It is developed by Yogeeshwar Ajjugal at IIT Hyderabad. They have utilized the CD spectroscopy techniques to

unravel the trinucleotide repeats, present in microsatellites of the human genome. Their abnormal expansion leads to many diseases like including fragile X tremor/ataxia syndrome (FXTAS). To fight the drug resistant Mycobacterium leprae, phytochemical-dapsone conjugated effective drug is prepared and the success is shown in the animal model by Shasank Sekhar Swain at the Institute of Medical Sciences and Sum Hospital. To fight the Parkinson's disease, a new drug target for the proteasome activation has been identified by using molecular simulation techniques and deciphered the mechanism of proteasome activation by the HbYX motif by MD Ahsan and Chinmai at IIT Madras.

Other future therapeutics, tissue engineering, medicine, chemistry and bioprocess technological developments. Growth factor free strategy for therapeutic neo-vascularization is developed by Shivam Chandel and the team at IIT Madras. They have utilized the shear stress principle of circulating mononuclear cells and developed a cone plate shaped instrument, which induces the mononuclear cells to secrete cytokines and generate new vasculature. Chemistry and self-assembling molecular chemistry for future artificially intelligent materials or self-assembling materials has been carried out by Ananya Mishra and the team at JNCASR, Bengaluru. They have developed Actin Mimetic ATP Driven Controlled Supramolecular Polymerization. Novel Hybrid Technology for Bioseparation is under development by the Jayeshkumar Mevada

and the team at ICT Mumbai. The team has utilized the controlled cavitation principle using the hydrodynamic cavitating device and selectively recovered intracellular biomolecules at microbial cell disruption stage. A recombinant biocatalysis method for the improved production of D-allulose utilizing the low-cost agro-industrial residues is developed by Satya Narayan Patel at Center Of Innovative and Applied Bioprocessing. D-allulose is a low calorie sugar. It cannot be metabolized by humans directly but human intestinal bacteria can. It reduces the incidence of obesity, diabetes, lipidemia and neuron degradation. To fight the drug resistance in cancer which are additionally infected with pathogenic bacteria, a special liposome drug delivery system is developed by Rohini Singh at IIT Delhi. A multifunctional granulator or pharmaceutical or nutraceutical granule production and all in one single machine and the process developed by Rajendra Prasad Moturu at Andhra University College of Pharmaceutical Sciences, Visakhapatnam. A process technology has been developed to produce a carbonated beverage from cereals and pulses at IIT Kharagpur by Anjali Thakur and Pooja Pandey. Manufacture of micronutrient, especially iron fortified Rice kernels through extrusion technology developed at IIT Kharagpur by Dalbhagat Genu and Jayshree Majumdar. A process machine for automated Panipuri vending has been manufactured by Saurav Jyoti Sarma and the team at Tezpur University.

Acknowledgment

We congratulate all the winners and compliment 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. Honey Bee Network and SRISTI wish the winners all the strength in their future endeavours. I must thank all the colleagues who worked day and night to pursue GYTI review process and helped in timely announcement of awards. We are all grateful to the SRISTI research advisory committee and mentors of Bionest SIIE incubator including Dr Anil Koul (CSIR-IMTECH Mohali), Dr. Kiran Kalia (NIPER-Ahmedabad), Dr. Mrutyunjay Suar (School of Biotechnology), Dr. Mahesh Chhabria (L M College of Pharmacy), Dr. Manish Diwan (SPED,BIRAC), Dr. Jitendar Sharma (AMTZ), Dr. Shirshendu Mukherjee (Welcome Trust), Prof. Amit Karna (IIMA), Prof. Debi P Sarkar (IISER-Mohali), Dr. Shashi Bala Singh (NIPER-Hyderabad), Dr. Rakesh Mishra (CCMB Hyderabad), Dr. Rakesh Rawal (Gujarat University), Dr. Charu Jain (LJ), Dr. V.M Katoch

(NASI-ICMR), Dr. Keyur Buch (CIMS Hospital), Dr. Amit Dinda (AIIMS), Dr. S K Maulik (AIIMS), Dr. Mamta Shah (L M College of Pharmacy), and Dr. Subhash Rajpurohit (Ahmedabad University).

We would like to acknowledge Dr. Renu Swarup, Secretary, DBT and Chairperson BIRAC, to have faith in SRISTI team to carry forward SITARE - Students Innovations for Translation & Advancement of Research Explorations.

We remain indebted to Dr R A Mashelkar, FRS and former Secretary, Department of Scientific and Industrial research, Chairperson Nif-India board and currently Chairperson SRISTI's Research Advisory committee. We get his constant guidance and support in every endeavour of Honey Bee Network.

I must particularly mention Dr. Mohd. Aslam (MD, SPED,BIRAC), Dr Manish Diwan, Dr. Shilpy Kochar (SPED,BIRAC), who guided the entire GYTI process and coordinated with SRISTI team most amiably. Dr Nirmal Sahay guided the SRISTI team from time to time and mentored them. Other team members for GYTI included Dr. Debleena Bhattacharya, Sagar Panchal, Hiral

Shastri, Prem Shah, Venushree Patel. Two of the key mentors of SRISTI viz., Dr. Dinesh Awasthi, and Dr. Vipin Kumar deserve our special thanks and appreciation. It is never enough to thank them because of their constant support and guidance. In addition, many volunteers have also helped in the process including Harshvardhan Tiwari, Meet Panchal, Sidhh Shah, Hardi Patel. I also thank our SRISTI colleagues and volunteers of the Honey Bee Network including Mahesh Patel, Rakesh Maheshwari, Tushar Garg, Dr. Anamika Dey, Mr. Ramesh Patel, Mr. Chetan Patel, Dr. Megha Barot, Yash Pandya, Alzubair Saiyed, Parth Pandit, Sagar Karia, Unnikrishnan, R Baskaran and the team.

We received 1780 entries in 42 technology domains from 267 universities & institutes belonging to 34 states & Union Territories. This year, more emphasis was given on offline review than online. Hence, a complete PDF file, with all the attachments of respective IDs, was made. With the help of team members and volunteers, entries were sent to the subject matter experts. Four rounds of evaluation of the shortlisted entries were undertaken by the experts at Delhi and Ahmedabad. The experts who participated in the evaluation were Prof. Seyed E.Husnain (Jamia

Hamdard), Dr B K Murthy, Dr V Patravale (ICT Mumbai), Dr. K K Pant (IIT Delhi), Prof Makarand Chhangrekar (IIT Kgp), Prof Shashank Mehta (NID), Dr. Mahesh Chhabria (L M College of Pharmacy), Dr. G. P. Vadodaria (LDCE), Prof. Pranab Mohalatra (IIT Gandhinagar), Prof. Neeta Srivastava, (IIT Delhi) Dr. Keyur Buch (CIMS Hospital) Dr. C J hishoo (Former Director, PERD Ahmedabad) Prof. P V M Rao (IIT Delhi), 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), Prof Anuj Grover (ST Microelectronics), Dr. Sanjeev Saxena (ICAR), Prof J. Ram Kumar (IIT Kanpur) Dr. Shirshendu Mukherjee (Welcome Trust), Prof Sarita Ahlawat (IIT Delhi), Prof. Suman Kapur(BITS Hyderabad), Dr. V N Shah(Zydus Hospital), Prof K. Ganapathy (Apollo Hospitals). In addition, hundreds of online or email reviewers helped the review process. We are grateful to all of them.

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Sr. No.	Name	Designation
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95	Prof Jaya S. Tyagi	Professor and Head, Department of Biotechnology All India Institute of Medical Sciences (AIIMS), New Delhi
96	Prof Rajan Kanhironan	Professor, Indian Institute of Science (IISc) Bangalore
97	Dr. Vinod Kumar Dixit	Professor, Department of Gastroenterology, Institute of Medical Sciences, Banaras Hindu University, Varanasi
98	Prof. K. Srinath Reddy	President, Public Health Foundation of India
99	Dr. Bikramjit Basu	Professor, Materials Research Centre, Indian Institute of Science (IISc), Bangalore
100	Dr. Anjan Ray	Director, CSIR- Indian Institute of Petroleum (IIP), Dehradun
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102	Dr S V Mohan	Co-Chair And Sr. Principle Scientist Energy And Environmental Engineering, CSIR-Indian Institute Of Chemical Technology

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107	Professor Santanu Dhara	Professor, School of Medical Science and Technology, Indian Institute of Technology Kharagpur (IIT - KGP)
108	Prof. Shantanu Roy	Professor, Chemical Engineering Department, Indian Institute of Technology Delhi (IIT - D)
109	Dr. Sourabh Ghosh	Professor, Department of Textile Technology, Indian Institute of Technology Delhi (IIT - D)
110	Dr. Biman B. Mandal	Associate Professo, Department of Biosciences and Bioengineering, Indian Institute of Technology - Guwahati (IIT - G)
111	Prof Santanu Dhara	Associate Professor, Medical Science & Technology, Indian Institute of Technology Kharagpur (IIT - KGP)
112	Dr. Pradeep Kumar Singh	Director, CSIR-Central Institute of Mining and Fuel Research
113	Dr Om P. Srivastava	Professor, School of Optometry, The University of Alabama at Birmingham

CONTENT :

1.	Novel hybrid Technology for Bioseparation.....	3 - 4
2.	Development of engineered E.coli for high-throughput drug screening against Malaria and Kala-azar	5 - 6
3.	Anti-Pesticide Dermal Gel	7 - 8
4.	Yog-I - An affordable insulin pump for Type-1 diabetic patients in resource constrained settings.....	9 - 10
5.	Magnetic-field actuated hybrid nanofiber scaffold and apparatus for 4D tissue engineering.....	11 - 12
6.	Modernization of traditional anti-malarial drug artesunate via nanomedicine approach	13 - 14
7.	Revelation of G-quadruplex formation as a molecular basis of fragileX tremor/ataxia syndrome (FXTAS) leads to a new direction in the drug discovery.....	15 - 16
8.	Low-cost, easy-to-use, in-house developed electric cell impedance sensing (ECIS) system for studying the dynamic behaviour of the biological cells.	17 - 18
9.	Growth factor free strategy for therapeutic neovascularization	19 - 20
10.	Real Time Surrogate Visual Tracking of Lung Tumour for Effective Radiotherapy	21 - 22
11.	Patient-specific spheroid-on-chip for cancer treatment: combinatory drug screening	23 - 24
12.	Pneumatic damping prosthetic leg for above knee amputees.....	25 - 26
13.	Actin Mimetic ATP Driven Controlled Supramolecular Polymerization	27 - 28

14.	Image Analyzing Drying Patterns of Blood and Plasma Droplets for the Rapid Detection of Thalassaemia Carriers	29 -30
15.	Development of rapid and non-destructive method for detection of insect infestation in stored cereal grains.....	31 - 32
16.	Utilisation of Real-World Waste Plastic for the Production of Fuel Range Liquid Hydrocarbons using Two-step approach.....	33 - 34
17.	Non- Catalytic Deep Desulfurization Process Using Hydrodynamic Cavitation	35 -36
18.	Dual action of SPIONS in effective removal of heavy metals and mosquito larvae from water.....	37 - 38
19.	Formic Acid-powered Ferrobots For Clean Energy Technology	39 - 40
20.	Early Diagnosis of Osteoporosis Using Metacarpal Radiogrammetry And Texture Analysis.....	41 - 42
21.	Novel and eco-friendly light weight thermal insulating ceramics from thermal power plant waste.....	43 - 44
22.	Artificial Intelligence based Biomarkers of Knee Osteoarthritis.....	45 - 46
23.	Developing Labscale Magneto-Mechanical Experimental Setup to Predict the Plaque Growth of Human Heart Coronary Arterial Layer System	47 - 48

24.	Development of low grain arsenic rice by the fungal arsenic methyltransferase via bio-volatilization	49 - 50
25.	Towards application of helical nanorobots for biomedical applications	51 - 52
26.	Development of improved biocatalysts for D-allulose production utilizing the low-cost agro-industrial residues.....	53-54
27.	Design and development of interlock mechanism based bio-compatible, user-friendly and cost-effective elbow disarticulation prosthesis.....	55 - 56
28.	Production of effective and low cost dapsone-phytochemical hybrid candidate for use in multidrug therapy against Mycobacterium leprae	57-58
29.	Proteasome Activation: A potential drug target for treatment of Parkinson's Disease.	59-60
30.	A more accurate detection and intrinsic subtype classification of breast cancer using machine learning.	61-62
31.	Fighting resistance in cancer due to bacterial infections with modular drug platforms: An idea towards personalized medicine.....	63-64
32.	Economical Paper-Strip For Early Stage Mastitis Disease Detection In Cow	65-66
33.	Anemia meter	67-68

34	Understanding Sequence-Disorder-Function relationship of an Intrinsically Disordered protein to design Soil salinity sensor.....	69-70
35	A Simple, Non-invasive, Low Cost, Point of Care, Colorimetric Method, using Reactive Oxygen Species induced Lipid Peroxidative changes in Saliva, to Assess the Risk of Oral Pre-cancerous Lesions and Oral Squamous Cell Carcinoma in Chronic Smokers.....	71-72
36	MULTIFUNCTIONAL GRANULATOR (MFG) -A Multi functional device to prepare dried spherical granules.....	73-74
37.	Audience response device for Deaf and mute classroom	75-76
38.	Development of Process Technology for Manufacture of RTD Carbonated Grain Beverage	77-78
39.	Manufacture of Micronutrient Fortified Rice Kernels through Extrusion Technology.....	79-80
40.	An Automated Panipuri Vending Machine.....	81-82
41.	Fibonacci series based rectangular microstrip patch antenna	83-84
42.	Smart Signalling And Interlocking System.....	85-86
43.	Bhu-goal : Predicting Moods Of India	87-88
44.	Pyrophosphate And Metaphosphate As Next-generation Cathode Material For Energy Storage Devices	87-88



Jayeshkumar Mevada

Novel hybrid Technology for Bioseparation

Jayeshkumar Sevantilal Mevada
Institute of Chemical Technology, Mumbai

Guide :
Prof. Aniruddha B. Pandit

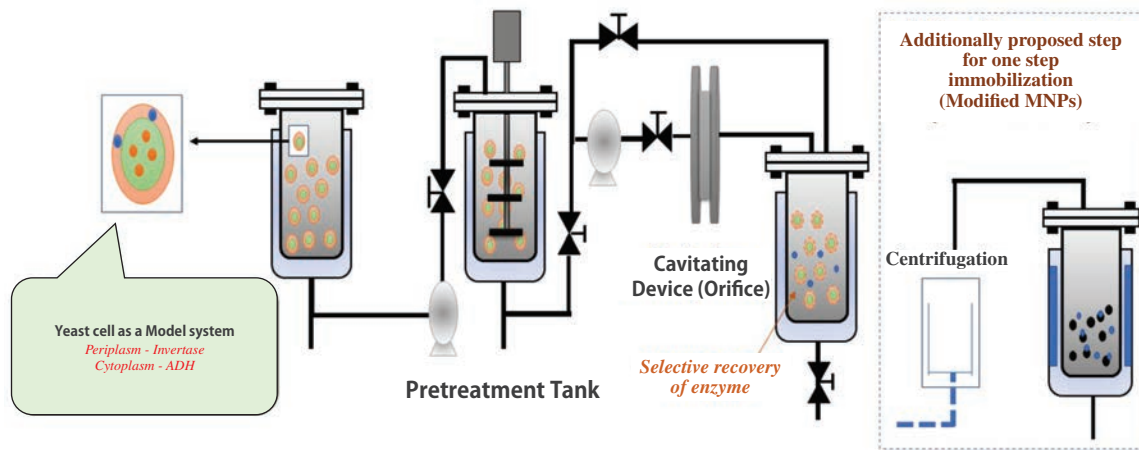
In Current era, the unaffordability of medicine to rural people and pollution of the river are the big issues for the developing countries. A biological approach is an alternative way for the replacement of hazardous chemical processes responsible for water pollution, but the cost is the primary concern for its applicability. The microbial cell is the factory of various biological products located intracellularly or extracellularly. Conventional method (High-pressure homogenizer) causes the complete cell disruption which results in the release of all the contaminating materials with the target product of interest. This contaminating materials restrict further purification which leads to problems such as membrane fouling, higher processing times, reduced life of chromatographic column, increase in the steps of purification (10-13 steps) and higher cost of purification (70 to 80 % cost of total production cost). We have developed novel hybrid technology where controlled cavitation using the hydrodynamic cavitating device was used for the selective recovery

of intracellular biomolecules at microbial cell disruption stage (with a pretreatment regimen of acidic as well as alkaline conditions). Synchronizing of pretreatment and cavitating conditions result in selective recovery of biomolecules from the cytoplasmic and periplasmic location of cells with minimal contaminating materials. The developed technology is believed to be novel and a breakthrough in the field of bioseparation. The expensive multi-bioseparation steps can be avoided because of the selective recovery of biomolecules at the initial stage. The uniqueness of this invention when compared with the existing technologies augment its characteristics in selectiveness, energy efficiency, easily scalable, reduced number of steps (from 10-13 to 3-5), low overall cost (3-4 times), 4-5-time reusability of immobilized product. Apart from the aforementioned qualities, the cost reduction by the developed technology can be considered as the big initiative step toward the greener processes and affordable cost biotherapeutics.



Hybrid Technology (Hydrodynamic Cavitation set up with pretreatment tank)

Novel Hybrid Technology for selective one step recovery of intracellular biomolecules (enzyme)





Preeti Yadav

Development of engineered E.coli for high-throughput drug screening against Malaria and Kala-azar

Preeti Yadav, Dr. Swati Garg, Dr. Soumya Pati
Jawaharlal Nehru University, Delhi

Guide :
Dr. Shailja Singh, Dr. Swati Garg, Dr. Soumya Pati

Eukaryotic parasites increase the functional diversity of their proteome through a number of post translational modifications (PTMs), to facilitate their survival and replication. Palmitoylation is one of the important PTM present in eukaryotic cells that modulate protein-protein interactions and plays a major role in several diseases like Cancer, Diabetes, Schizophrenia, Alzheimer's , Malaria, Leishmaniasis, etc. In malaria parasite, Plasmodium falciparum, 10% proteome have been found to be palmitoylated that plays a crucial role in disease progression and pathogenesis, while in Leishmania donovani, we have reported that 25% of the total proteome gets palmitoylated and is involved in flagellar motility, vesicular trafficking and invasion. Plasmodium falciparum and Leishmania donovani encodes for 12 and 20 Palmitoyl acyl transferases (PATs) respectively that transfer palmitate group to target protein. Being a major contributor of parasite-diversity, palmitoylation has not been explored as a chemotherapeutic target yet due to paucity of high-

throughput assays. Prevalence of drug resistance demands immediate action to search for newer drugs and newer targets. We have developed a novel strategy involving engineered E. coli to study parasite-specific palmitoylation. E.coli is a palmitoylation machinery-null system, but our in-silico study suggested that 110 proteins of E.coli contain sites for palmitoylation. Thus, these E.coli proteins can serve as substrates for parasite-specific PATs expressed in E.coli. Parasite PATs were cloned and expressed in E.coli in the presence of PAT inhibitor and palmitoylation status of E.coli was analysed using Click chemistry. The inhibitor, 2-Bromo-palmitate that we have used here acted both as anti-malarial and anti-leishmanial as deduced by parasite growth-inhibition assay and invasion assay respectively. This is the first ex-vivo study of parasite-specific modifications in E.coli, that could be used as a robust, high-throughput screening tool for anti-protozoan drugs targeting palmitoylation, thus helping in the development of novel anti-parasitic molecules.





Ketan Thorat



Subhashini Pandey

Anti-Pesticide Dermal Gel

Ketan Thorat, Subhashini Pandey
Instem, Bangalore

Guide :
Dr. Praveen Kumar Vemula, Dr. Sandeep C.

Due to lack of resources, spraying pesticide using hand-held manual device, is a norm in Indian agriculture. In the past three years, more than 3000 farmers in India were hospitalized due to an alarming frequency of pesticide exposure which eventually led to a tragic toll of 442 deaths. This severe clinical gap has a massive impact on the health of 263 million farmers and their families in India. Considering the above facts, the study has been conducted to develop a skin-gel that can protect the farmers from the harmful effects of pesticides. The skin-gel constituted with numerous chemical detoxifiers when applied, instantly attacks the pesticide molecule and catalytically cleaves it into smaller, non-harmful components, thereby diminishing the toxic effect of pesticide. Usually the skin is exposed to large amount of pesticide which transdermally enters the body. Overtime, these farmers are further exposed to multiple small doses of pesticides during spraying and handling at farms which leads to an accumulated, irreversible health

damage resulting to learning difficulties, suffocation, paralysis, muscle weakness, loss of stamina, and in certain cases-death. This impact affects healthcare costs and major socio-economic implications. The distinctive feature of this study is to formulate a skin gel that safeguards the transdermal route undertaken by the detrimental pesticide molecules to enter the human body. The pioneering work of this skin-gel technology lies in the fact that each detoxifier can detoxify multiple pesticide molecules. Therefore on single application it offers a 24 hr protection against pesticides.





Deval Karia



Rohit S. Nambiar

Yog-I - An affordable insulin pump for Type-1 diabetic patients in resource constrained settings

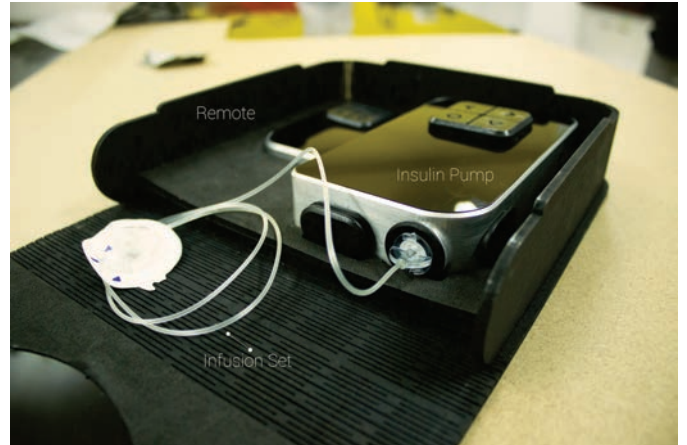
Deval Karia, Rohit S. Nambiar
Indian Institute of Science, Bangalore

Guide :
Dr. Manish Arora

Numerous studies have extensively documented the benefits of Continuous Subcutaneous Insulin Infusion (CSII) over Multiple Daily Injections (MDI) as an insulin therapy for Type 1 Diabetes Mellitus (T1DM) patients. Despite such overwhelming evidence in support, adoption of CSII is sparse, particularly in resource constrained settings like India. Institutional factors aside, fixed and recurring costs of such a device are often found to be a withholding factor to widespread adoption. The abstract describes the development of a novel, affordable insulin pump for T1DM patients matching the specifications of a state-of-the-art pump, while bringing down the cost significantly.

Most pumps rely on a lead screw/nut coupled with a geared DC motor to achieve precise micro-motion. These motors typically make use of micro-gears as a means of speed reduction, which are inherently expensive to manufacture. Consequently, they contribute significantly to the final cost of a pump. In this work we take an approach to distribute the

requisite speed reduction in multiple stages, with an acceptable compromise on the product size. The system is actuated by a nominal DC geared motor and a novel mechanism of converting continuous rotary input to intermittent output. The kinematic chain is feedback controlled which ensures volumetric accuracy of the delivered fluid. The pump can be wirelessly controlled via a remote. The same wireless channel can be used to connect to a Continuous Glucose Monitoring (CGM) device for subsequent integration with an Artificial Pancreas system. Preliminary accuracy tests show promising results comparable to commercially available devices.





Uday Kumar Sukumar



Vinay Kumar

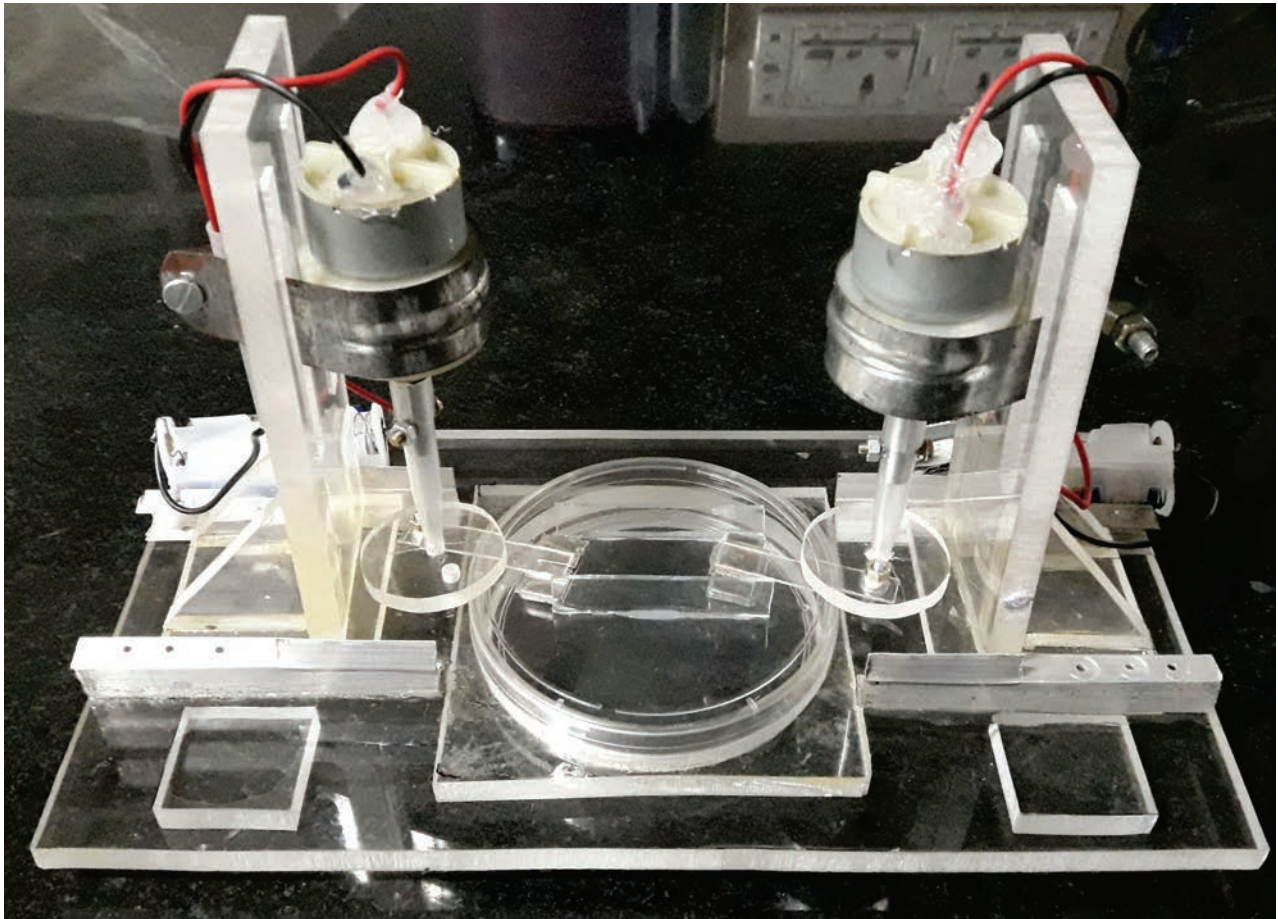
Magnetic-field actuated hybrid nanofiber scaffold and apparatus for 4D tissue engineering

Uday Kumar Sukumar, Vinay Kumar
Indian Institute of Technology, Roorkee

Guide :
Dr. P. Gopinath

The present invention provides a hybrid multi-layered nanofibrous scaffold and a four dimensional dynamic cell culture apparatus. The pre-existing 3D scaffolds in the market does not address the dynamic culture conditions covered in this technology therefore they do not represent the in-vivo conditions as closely as the 4D scaffold proposed in this research work. The market of 4D scaffolds is focussed in the area of therapeutics and diagnostics. 4D scaffolds are expected to reduce the need for animal disease models, as they are versatile in accustoming to different culture conditions, and are more relevant for cell culture studies as compared to 3D scaffolds. Furthermore, the scaffold is biocompatible and operates in non-contact mode and it is precisely controlled across all 3-dimensions. The hybrid scaffold apart from providing the extracellular matrix (ECM)-like scaffold, also meticulously simulates the mechanical stress cycles that cells experience under the in-vivo conditions. For monitoring cells on a real-time basis

under microscopes, the apparatus is provided with sufficient head space over the tissue culture plate for positioning a microscope lenses. The circular slot provided at the base of the apparatus perfectly accommodates cell culture plates and also enables easy transmission of light during microscopic observation without any interference of the apparatus body. Cell plasticity, differentiation and cancer metastasis are determined to large extent by cell adhesion and surface proteins which are effectively recapitulated in this scaffold. The scaffold serves as a realistic and relevant platform for studying the role of cytoskeletal proteins and focal adhesion proteins in various diseases in the fields of cardiology, dermatology, metabolism, gastroenterology, oncology and orthopedics.





Deepika Kannan



Nisha Yadav

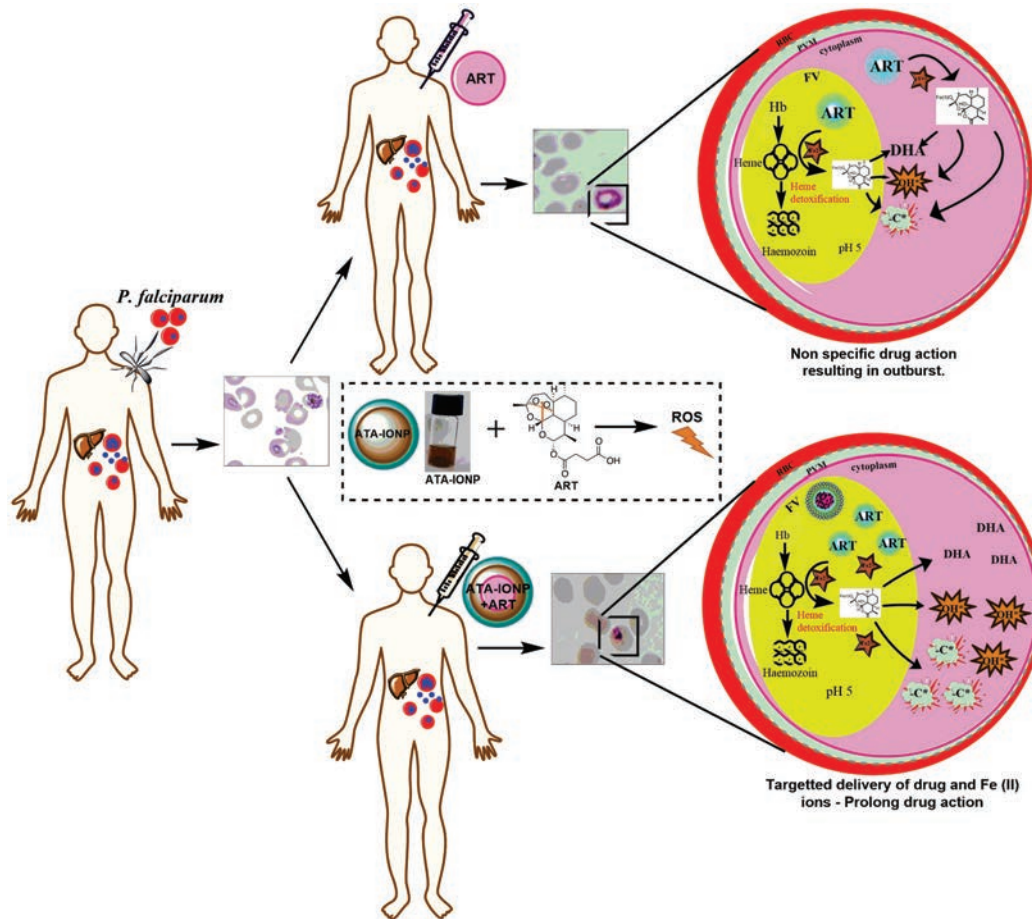
Modernization of traditional anti-malarial drug artesunate via nanomedicine approach

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Guide :
Dr. Shailja Singh, Dr. Bimlesh Lochab,
Dr. Soumya Pati

The burden of malaria has been prevailing since ages in India with a death toll of 1.31 million per year. The failure in combating the disease has been attributed to the drug resistance, limited efficacy of the drug or lack of immunogenicity of vaccine antigens against all strains of plasmodium. In our study, we have applied a smart strategy to deliver the drug along with its catalyst (ferrous ion) in a sustainable manner which will help in improving the therapeutic effect of the drug. The novel innovative approach undertaken in the study has showcased the efficiency of surface coated iron nanoparticles as enhancer of the anti-parasitic activity of artesunate in vitro. This further succour the targeted delivery of the drug and the nanoparticle to the parasite's food vacuole. The site of action being acidic in pH, the particle mediates delivery of the drug and ion in a slow release manner. Slow dispersion enables a constant mode of action of the drug rather than an outburst. Thus, a continuous source of radical species is released. Since in combination with nanoparticle the drug remains in the active state for a prolong period, the damages occurring to the parasite is extensive as compared to the drug without nanoparticle. Further observation

interpreted that in vitro the measure of ROS within drug+nanoparticles treated parasites were elevated as compared to the drug treated parasites. Additionally, increased ROS exerted increased DNA and protein damage (in terms of carbonylation and alkylation). Though the mechanism of free iron uptake by the plasmodium is still inconclusive, difficulty in protecting the human population against malaria by using iron nanoparticle is highly debatable. Based on the in vitro studies observation for the first time was deciphered that the surface coated iron nanoparticle alone did not affect the parasite growth. However, the results demonstrated iron nanoparticle together with artesunate depicted reduced parasite load in a dose dependent manner. In vitro and in vivo data indicated the combination exhibited ~5 folds (IC₅₀ value of 0.4nM) decrease in the dosage level as compared to artesunate alone (IC₅₀ value of 2nM). The fabrication of the nanomedicine provides a means to eliminate the parasite load sustainably such that the effect of the drug is prolonged, providing a mode of complete parasite clearance.





Yogeeshwar Ajjugal



Narendar Kolimi

Revelation of G-quadruplex formation as a molecular basis of fragileX tremor/ataxia syndrome (FXTAS) leads to a new direction in the drug discovery

Yogeeshwar Ajjugal, Narendar Kolimi
Indian Institute of Technology, Hyderabad

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Dr. Thenmalarchelvi Rathinavelan

Trinucleotide repeats belong to the family of microsatellites (a tract of 1 to 6 repetitive nucleotides) that are commonly observed in eukaryotes and exhibit repeat length polymorphism. The inherent ability of trinucleotide repeats is to undergo abnormal expansion (viz. increase in repeat length) which leads to many incurable genetic disorders that are mainly neurodegenerative. For instance, CGG repeat overexpansion in the 5' untranslated region (UTR) of fragile mental retardation (fmr1) gene from unusual nucleic acid conformations and it causes genetic instabilities. This results in fragile X syndrome (FXS) and fragile X tremor/ataxia syndrome (FXTAS). We have shown here that the number of G...G/C...C mismatches dictate the secondary structural choice of the sense and antisense strands of fmr1 gene and the corresponding transcripts. Circular dichroism (CD) spectra reveal that CGG sense strand and its transcript favour quadruplex structure due to the intolerance for periodic G...G mismatch in a

hairpin/duplex. Further, CD and molecular dynamics simulations show that more than four C...C mismatches cannot be accommodated in a RNA duplex consisting of CCG repeat (antisense transcript), instead, i-motif structure is favored. In contrast, CCG can form hairpin/duplex structure at the DNA (antisense strand) level irrespective of the number of C...C mismatches. Such unusual structures may be responsible for the increased R-loop stability, bidirectional transcription, RNA foci formation and repeat associated non-AUG translation for monopeptide aggregates in FXTAS, a mechanism similar to C9ORF72 GGGGCC repeat expansion that causes amyotrophic lateral sclerosis. The results presented here also suggest that G-quadruplex structure observed in fmr1 gene and its transcript can be a potential drug target.

Background & challenge



Normal X chromosome
Symptoms

Memory loss
Moodiness
Slow speech
Learning problems

Sunday Guardian live 4-Mar-2017

Financial Express, 18-Feb-2017

Nothing can be done in genetic Fragile X Syndrome a myth

News in Indian media & press

Times of India 2-Feb-2017

Pediatricians to spread awareness about Fragile X Syndrome

Express health care, 11-Apr-2017

The awareness levels in India with respect to Fragile X are considerably low

Indian Academy of Pediatrics

The Indian Academy of Pediatrics (IAP) is joining hands with Fragile X society of India to get awareness in India

FRAXA

Genetics Home Reference

Your Guide to Understanding Genetic Conditions

THE PIERCE FAMILY

Fragile X FOUNDATION

FRAXA

All about incurable **Fragile X-associated Tremor/Ataxia Syndrome (FXTAS)/Fragile X Syndrome (FXS)** neurological disorder



Science 12 Oct 2018; Vol. 362, Issue 6411, pp. 172-175 DOI:10.1126/science.362.6411.172

Incurable & challenging

Simple cause but complex disease: lack of FMRP protein due to increase in CGG repeats

FXS: 1/4000 in males & 1/8000 in females

FXTAS: 1/150-300 in females, 1/400-850 in males acts as carriers

Foundations & societies

FRAXA

Genetics Home Reference

Your Guide to Understanding Genetic Conditions

THE PIERCE FAMILY

Fragile X FOUNDATION

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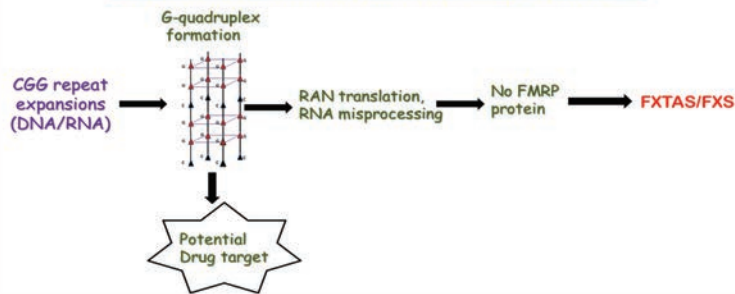
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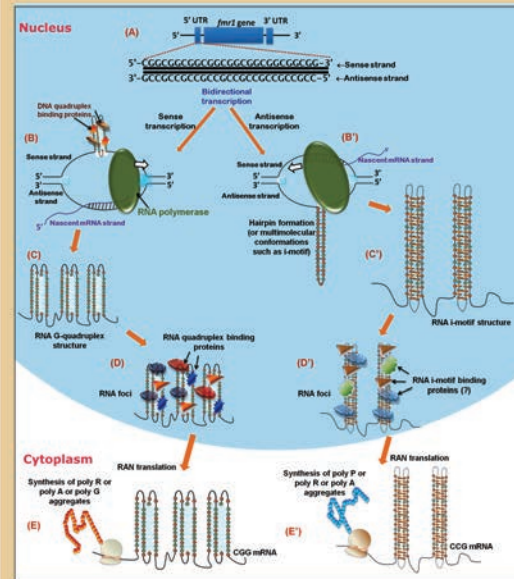
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FRAXA

G-quadruplex formation as molecular basis of FXTAS/FXS



Underlying mechanism for FXTAS



A) Overexpansion of CGG/CCG repeats in 5' UTR facilitates G-quadruplex (sense strand) and hairpin (antisense strand) formation. B) Extended stability for the R-loop facilitates (C) quadruplex formation in FMR1 CGG mRNA due to the stalling of RNA polymerase. D) RNA quadruplex binding proteins facilitate RNA foci formation and E) promote repeat associated non-AUG (RAN) translation to synthesize poly R or poly A or poly G aggregates. B'-E') RNA misprocessing and RAN translation associated with CCG antisense FMR1 mRNA. CCG repeats in RNA translate to either poly P or poly R or poly A aggregates.



Uvanesh Kasiviswanathan

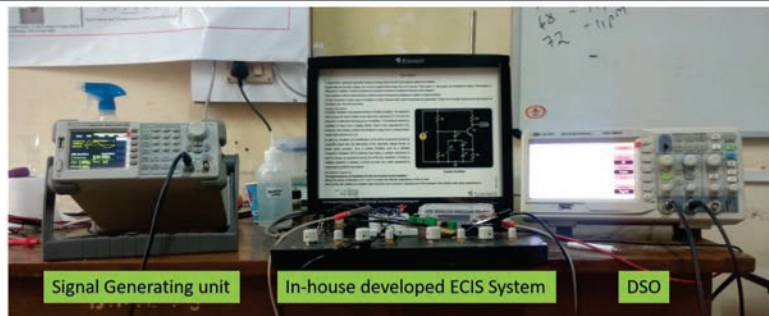
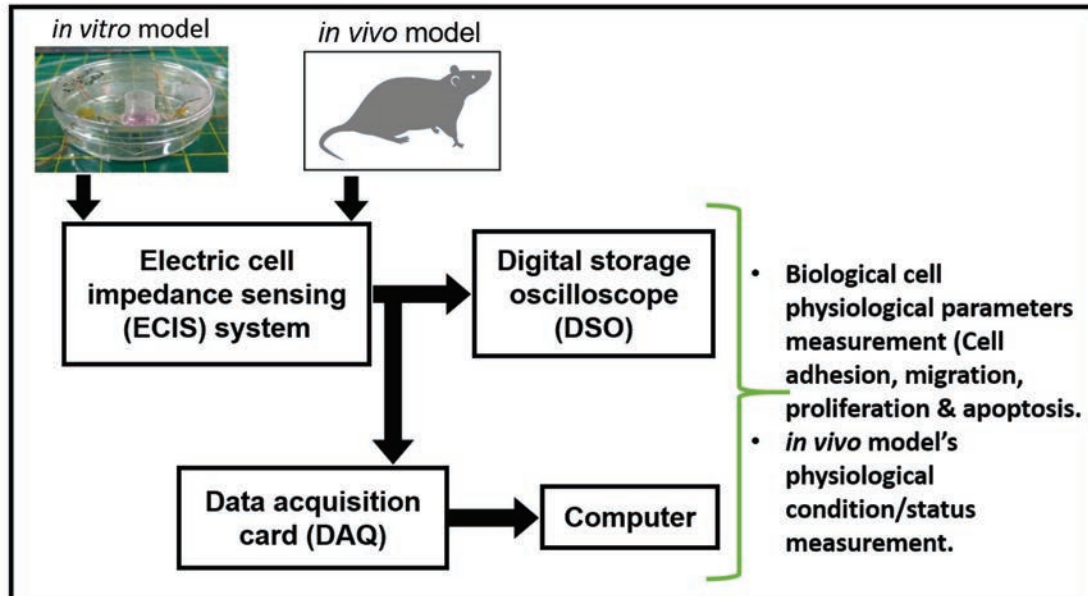
Low-cost, easy-to-use, in-house developed electric cell impedance sensing (ECIS) system for studying the dynamic behaviour of the biological cells.

Uvanesh Kasiviswanathan
Indian Institute of Technology
(Banaras Hindu University), Varanasi

Guide :
Prof. Neeraj Sharma, Dr. Sanjeev Kumar Mahto

Physiological properties of each and every living organism (either diseased or normal) changes randomly with the external environmental conditions. Thus, the continuous monitoring of these properties is crucial for both long and short term analysis of any particular in vivo models. Generally, a large number of animals are used as in vivo models to analyse and predict the effect of various synthesized/formulated moieties and moreover they are being sacrificed as and when required during the drug screening process. In addition, in the pre-clinical and clinical trials/stages such step lead to a huge failure rate not only due to differences in the in vitro and in vivo models selected but also because of the incompatibility issues concerning to the sensing devices utilized for both the models. Thus, an improved measuring/screening platform that can interface with both the in vitro and in vivo models need to be developed for measuring the dynamic behaviour of any biological cell/system. This study have designed and fabricated a low-cost, easy-to-use,

portable electric cell impedance sensing (ECIS) system that shows a great potential for analysing the physiological parameters in real-time both for in vitro and in vivo models. It is important to note that our device, by any means neither affects nor influences the biological models being tested. Further, the experimental data can be correlated with the physiological parameters through a theoretical calculation of the lumped-elemental electrical parameters of cell-electrolyte interface and metal-electrolyte interface.





Shivam Chandel



Abel Arul Nathan S

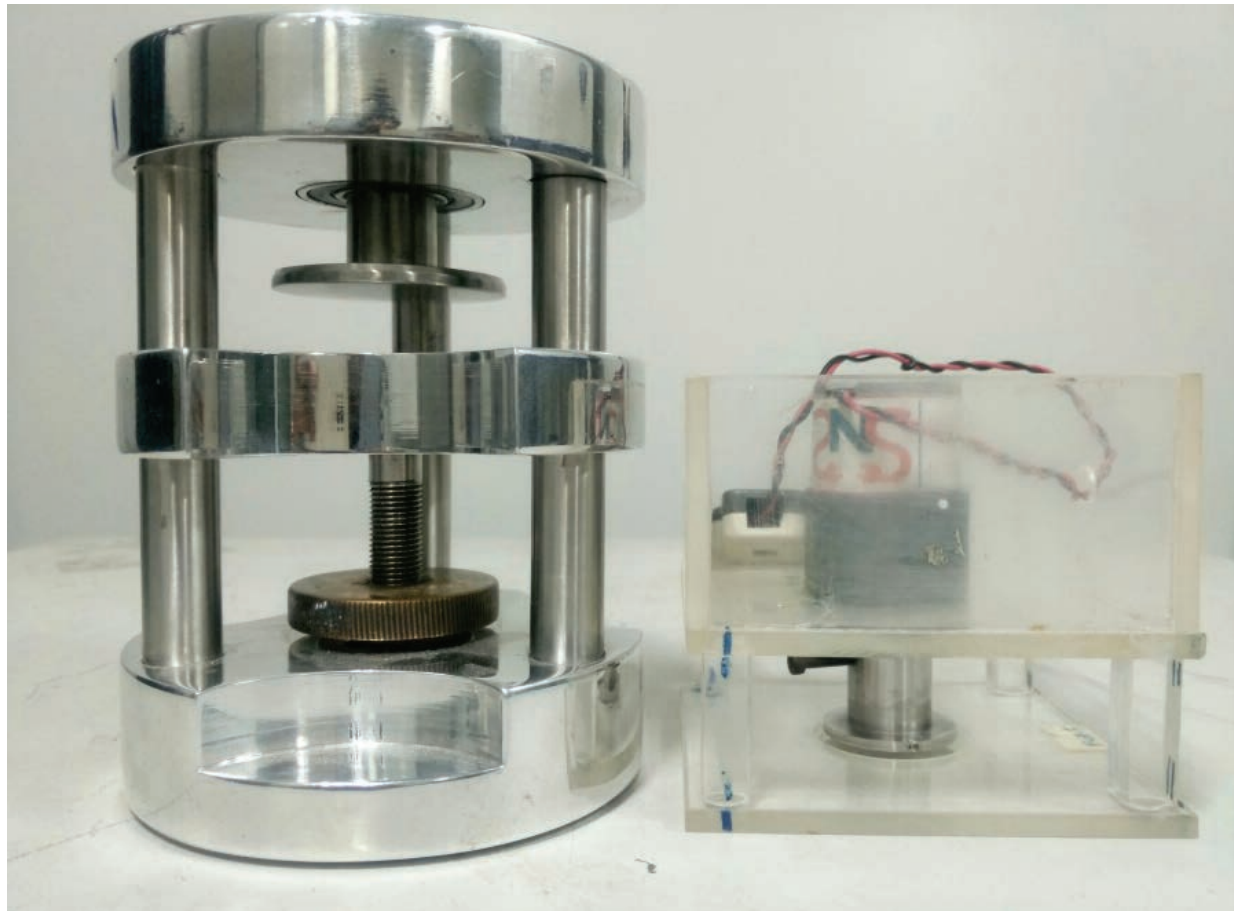
Growth factor free strategy for therapeutic neovascularization

Shivam Chandel, Abel Arul Nathan S
Indian Institute of Technology, Madras

Guide :
Dr. Madhulika Dixit

Endothelial progenitor cells (EPCs), a subset of circulating mononuclear cells are currently being studied as candidate cell sources for revascularization strategies. Increasing the number and/or improving the function of EPCs may be promising in the treatment of atherosclerotic disease, ischemia or Heart Failure. Current therapies for neo-vascularization are based on administration of growth factors and nitric oxide donors. Administration of NO-donors has been promising but failed to promote neo-vascularization particularly in elderly and diabetic patients. Several clinical studies using growth factors have failed in phase II which successfully passed phase I, either due to their short half lives or due to their harmful side effects. Studies have shown that application of fluid shear stress induces the differentiation of mononuclear cells to endothelial cells. Shear stress also enhances capillary blood flow and modulates the function and expression profile of angiogenic genes. However, the effect of shear stress on the

circulating mononuclear cells is not well characterized. Hence, to study the effect of shear stress on the angiogenic potential of circulating mononuclear cells, a cone plate based instrument assembly has been developed. This study focuses to enhance the angiogenic potential of mononuclear cells through ex-vivo preconditioning via application of shear stress.





Priya Singh



Darshan Ramesh Shet

Real Time Surrogate Visual Tracking of Lung Tumour for Effective Radiotherapy.

Priya Singh, Darshan Ramesh Shet
Indian Institute of Technology, Kanpur

Guide :
Prof. Venkatesh K Subramanian

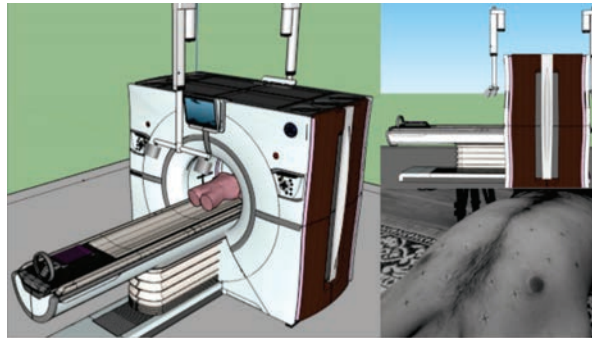
A cost-efficient solution to improve the accuracy of radiotherapy given to lung cancer patients. Radiotherapy is a common recourse for treating lung tumors, being considerably more localised than chemotherapy. It, however, faces the challenge of maintaining the focus of the radiation beam on the tumor. Due to physiological factors like respiratory motion, peristaltic motion, cardiac motion, coughing etc, the tumor and its surrounding tissue inside the thorax or abdomen can move dynamically, with a displacement of upto 3 cm. The result of such movement, if ignored during radiotherapy, is the exposure of surrounding healthy tissue and organs, causing severe damage to them.

This research provides a solution by real-time surrogate visual tracking of lung tumours in all the phases during radiotherapy. To achieve a precision simultaneous acquisition of two types of data was done for visual chest surface data and x-ray data of the tumour. To perform visual surface tracking, an array of 4 cameras in conjunction with an adequate

number of visible markers were implemented to capture the time evolution of the surface motion. The X-ray tracking of the tumour is performed using a CT scanner.

Using the time synchronised x-ray and visual surface tracking data sets, we have built a time and space correlation model of the surface of the chest with the X-ray tracker data using Machine Learning. The patient can be subjected to radiotherapy with beam steering (currently used in hospitals) directed by the surrogate measurements from the correlation model that we have developed. This provides a more accurate, and less expensive method to maintain the radiation focus than the standards used today.

Any innovation in the medical field demands extensive trials before adoption. We are seeking the cooperation of SGPGI, Lucknow to provide the infrastructure and subjects for the calibration step.



Data Acquisition

Voluntary and involuntary movements in thorax and abdomen region are captured from camera setup and at the same time internal organ movements are captured using 4DCT scanner machine. The period validity of above data expected to be at least 3 weeks depending on the development of a tumor.

External Movements

Visual surface tracking data

Internal Organ Movements

CT Imaging data

Data Correlation

From the above time synchronized joint data, the internal-external motion correlation modeling is performed.

Motion Prediction

Neural Network model for prediction of tumor corresponding to the surface motion is established.

Beam steering commands





Sharanya Sankar



Viraj Mehta

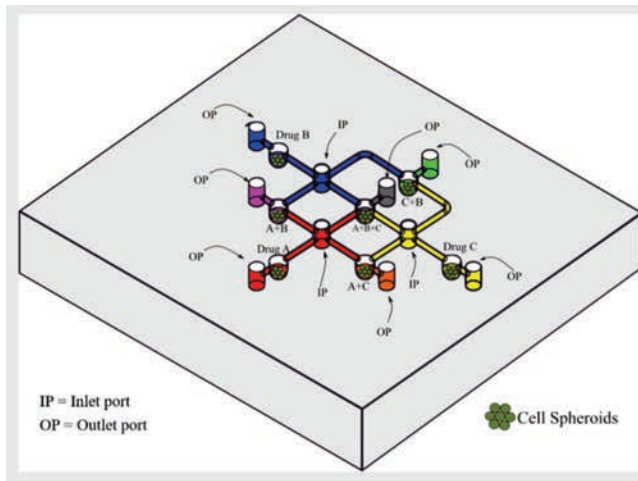
Patient-specific spheroid-on-chip for cancer treatment: combinatory drug screening

Sharanya Sankar, Viraj Mehta
Indian Institutes of Technology Hyderabad

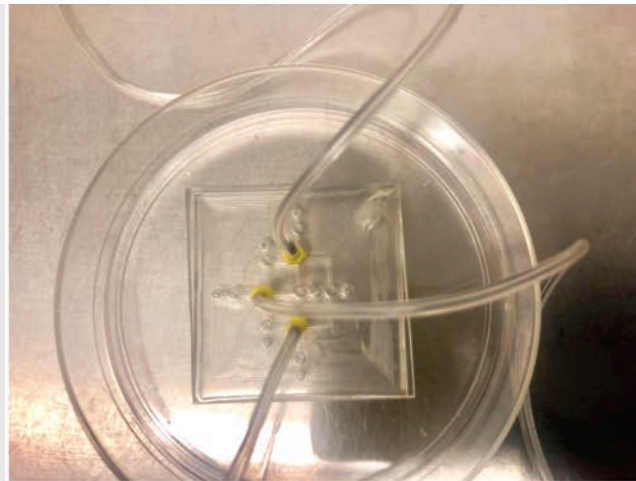
Guide :
Dr. Subha Narayan Rath

Screening tumor biopsies from cancer patients and finding the appropriate drug combinations to treat the disease at various stages has been a challenge owing to the failure of the in-vitro cancer models to recapitulate the native tissue microenvironment of tumors. Prominence of this work lies in the development of a personalized healthcare set-up for cancer diagnostics and treatment for patient-specific tumor sample. We have developed a microfluidic platform with strategically placed U-shaped wells for screening the combinatory effect of drugs on tumor spheroids. Also, the optimal flow conditions similar to the in-vivo flow regimes has been simulated. This set-up has inlet ports to provide continuous flow of media through it to mimic the tumor micro- environment in-vivo. The outlet ports would prevent the back-flow of the excess fluid and maintain the flow conditions inside the wells. The platform allows self-formation of tumor spheroids on passing the cancer cells through the inlet port. Due to the continuous flow of media, the conditions

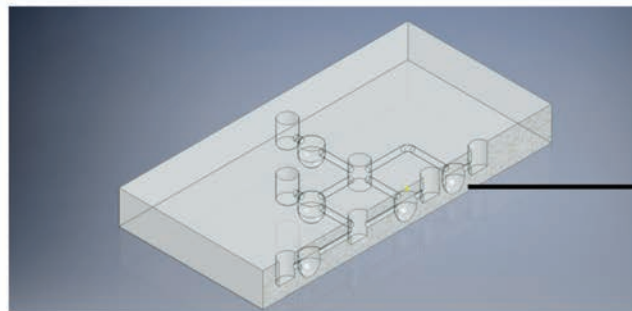
in the well would not be static as compared to the existing models and provide physiologically relevant data with accurate predictive results. Further, the chip can be re-used by sterilizing it through simple techniques making it cost-effective and affordable. Hence, patient- specific tumor samples can be tested in the chip paving a way to create a personalized profiling of drugs and their concentration for the treatment. Till date, standard drug treatments are administered to patients suffering from cancer irrespective of their conditions. This system would be a customized set-up to treat individual patients for their specific conditions. This would be a quick and effective approach in treating the fast progressing life- threatening disease. This innovation would be an invaluable step for developing an affordable healthcare set-up for cancer diagnostics and treatment.



Chip design



Fabricated microchip



Half section view

***U-shaped wells
for self formation of
tumor spheroids***



Muhammed Janish U



Abhijith A

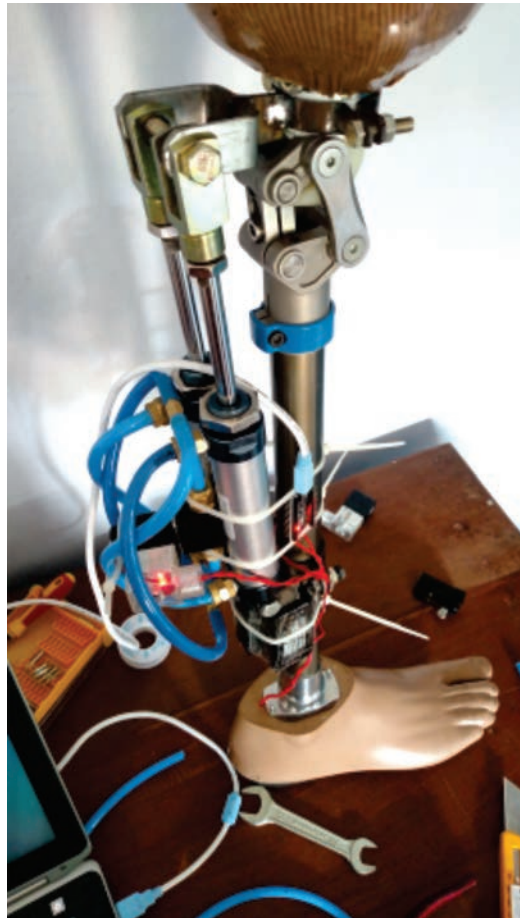
Pneumatic damping prosthetic leg for above knee amputees

Muhammed Janish U, Abhijith A
MES College of Engineering, Kuttippuram

Guide :
Prof. Padmakumar K

The prime focus of the project is to design a cost-effective feedback based on prosthetic leg for above-knee amputees. Currently majority of amputees in India depend on functionally low mechanical legs like Uni-axial knee, ReMotion knee, Jaipur limb, etc. As the cost of a high functional feedback-based leg is around 70000 dollars therefore mechanical prosthesis like Uniaxial Knee, ReMotion limb restricts to locks which transfer the load to the ground. The major default of the currently available prosthetics lies in the restricted application, where the patient cannot use it in bent position when the load is acting normal to the ground, as the lock won't be working and patient will stumble. Also mechanical legs won't give any walking assistance as they only provided support & drains more energy. A proportional solenoid valve has been incorporated to control the pneumatic damping system in a mechanical knee. Force sensor at the foot detect the pressure applied by the amputee and adjust the damping resistance at the knee which enables the

proposed device to lock the knee joint at any angle and position correspondingly so the amputee can transfer load to the ground even in bent position of leg. Compressed air inside the pistons absorb shock during stance phase of walking and provide walking assistance during starting of swing phase of walking and all this applications draws less energy.





Ananya Mishra

Actin Mimetic ATP Driven Controlled Supramolecular Polymerization

Ananya Mishra

Jawaharlal Nehru Centre For Advanced
Scientific Research, Bangalore

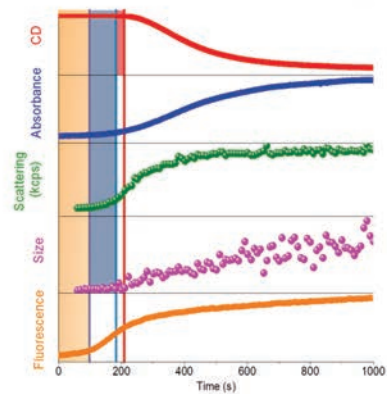
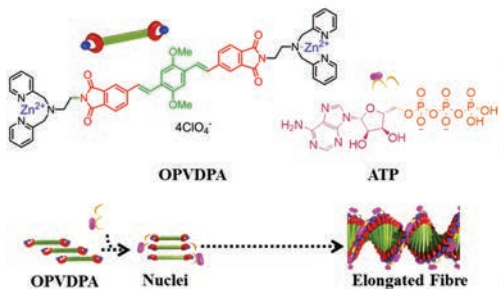
Guide :

Prof. Subi J. George

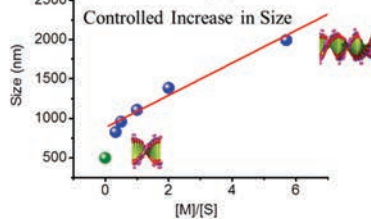
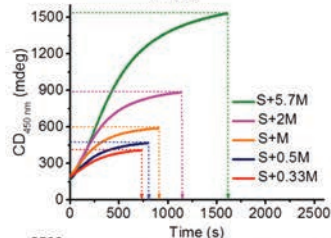
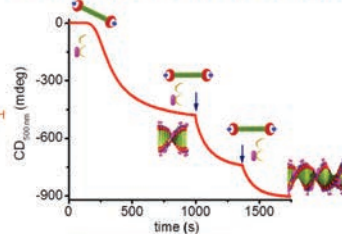
The need of supramolecular systems with increased complexity and structural control is growing in the direction of intriguing functions similar to their biological analogues like DNA and cells. The question, “How far can we push self-assembly?” is recognized as one of the biggest-challenges in supramolecular material science. This work describes a synthetic organic molecule, oligophenylene vinylene functionalized with dipicolyl ethylene diamine (OPVDPA), coming together and stacking on each other in a helical sense on electrostatic interaction with a biological cue, ATP. This process is very close to events occurring in nature that notably help a cell to maintain its shape, i.e. actin, which undergoes ATP driven temporal polymerization and dynamic instability. The study has come closest in synthetically mimicking this natural process. We have employed the facets of supramolecular chemistry as the area of investigation in this study, which deals with the interplay of non-covalent

interactions for self-assembly. Though in synthetic systems it is a fairly new field, most biological processes function are based on these principles. In this context, systems driven by ATP became inspiration for the team to work further. These systems are uniquely size controlled over kinetic regimes which allow fascinating stimuli responsiveness and adaptability that could not have been achieved in synthetic systems before. Since the stimulus in this case is one of the most ubiquitously present chemical such as ATP, therefore the study is a benchmark for what can be achieved synthetically. Furthermore as mentioned earlier the prospect of functional accessibility also makes the work more interesting.

SYNTHETIC STRATEGY FOR ACTIN MIMIC

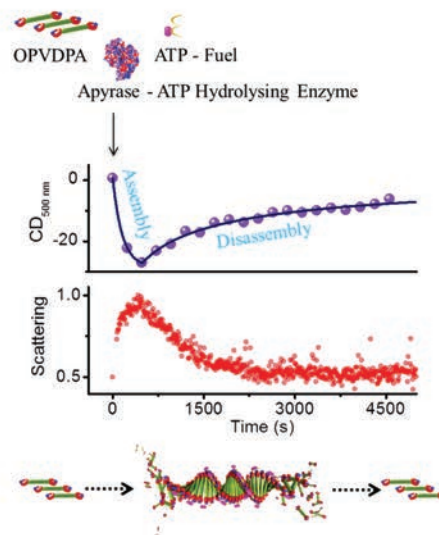


ATP DRIVEN LIVING SUPRAMOLECULAR POLYMERIZATION



ACTIN MIMETIC

ATP DRIVEN TRANSIENT SUPRAMOLECULAR POLYMERIZATION





Manikuntala M.



Rudra Ray

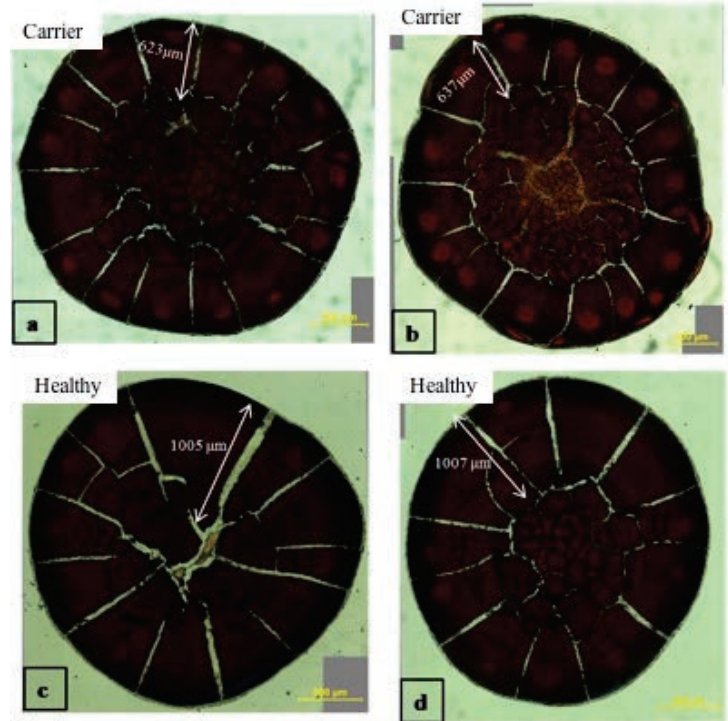
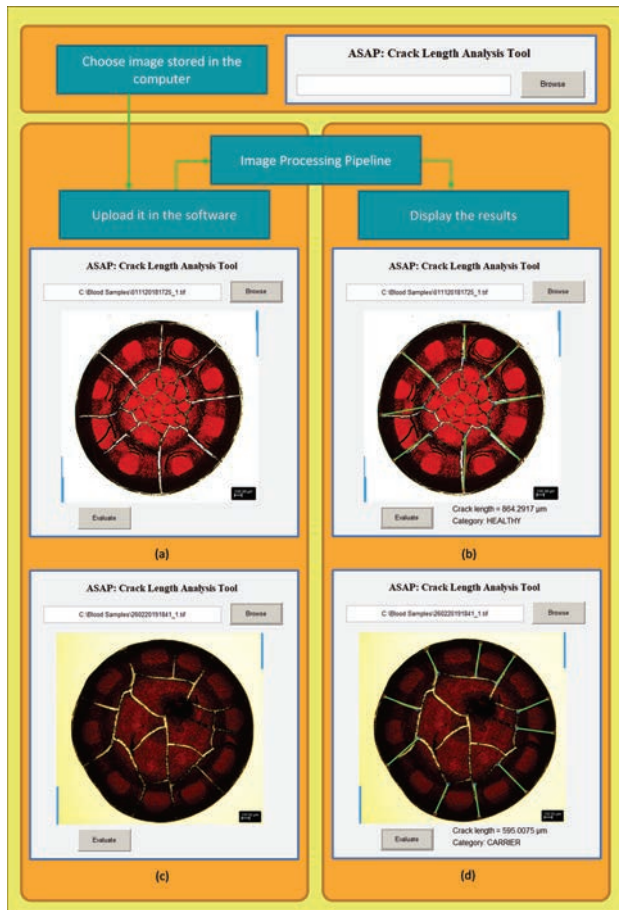
Image Analyzing Drying Patterns of Blood and Plasma Droplets for the Rapid Detection of Thalassaemia Carriers

Manikuntala Mukhopadhyay, Rudra Ray
Indian Institute of Technology, Kharagpur

Guide :
Prof. Sunando Das Gupta
Prof. Maitryee Bhattacharya

Thalassaemia is one of the most common single-gene disorder in which the production of haemoglobin is impaired. This autosomal recessive disorder is highly prevalent in Indian populations accounting to ~10% of the world's thalassaemia carriers. The beta-thalassaemia carrier state resulting from heterozygous mutation in beta globin gene, is clinically asymptomatic and thus remain undiagnosed. At present, the gold standard method that is used for carrier detection in hospitals requires expensive instruments, skilled manpower and time, thus, making it difficult to be used as an onsite method. A rapid, portable and automated technology for thalassaemia carrier screening is hence of significant importance. The present study has conclusively proven the distinct patterns observed on drying of whole blood droplets for carrier and normal samples. Length of the radial cracks is significantly shorter for carrier samples as compared to normal ones. A sample whose average crack length is less than 800 microns can be

classified as a carrier sample, whereas the ones with larger radial cracks are considered as normal. Identifying the carrier samples by this image analysis technique gave zero false negative results. These patterns can be further utilized to create a databank for automated classification of carrier samples, by employing appropriate techniques from computational pattern recognition and deep learning. Proposed method will examine the images of dried blood drops, extract its distinctive features and categorize as normal or carrier samples by comparing it with reference images stored in databank. This automated process will remarkably increase the number of total population screened for thalassaemia per year in the country and will reduce the burden in the state run advanced health facilities along with a significant reduction in costs incurred for screening of each sample.



Droplet drying pattern of whole blood on glass substrates (2 μl)



Gayatri Mishra



Ranjana Rani

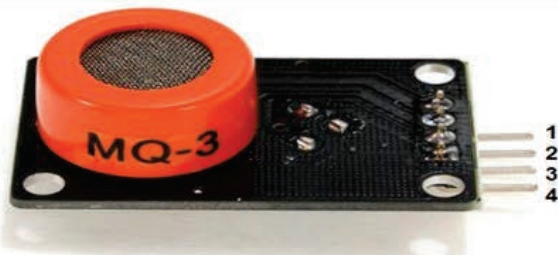
Development of rapid and non-destructive method for detection of insect infestation in stored cereal grains

Gayatri Mishra, Ranjana Rani
Indian Institute of Technology, Kharagpur

Guide :
Prof. H. N. Mishra, Shubhangi Srivastava

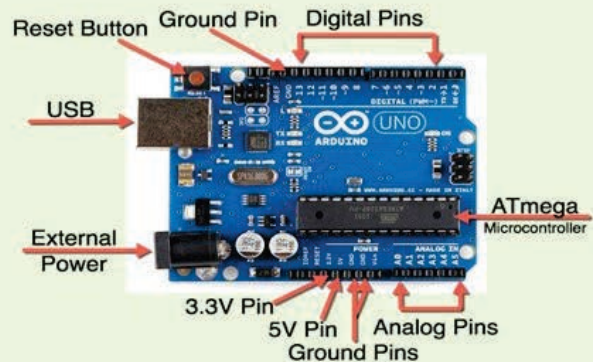
India is the second largest producer of cereal crops in the world but, with the existing facilities negligible part contribute to post-harvest losses. In this aspect, insect infestation is an alarming concern, accounting for losses in quality as well as quantity. Major portion of the post-harvest losses can be saved by detecting the insects in their early developmental stages and subsequent application of suitable disinestation approach is undertaken for their control. Current scenario demands rapid methods for insect detection, which can take a lead over conventional methods, on the ground of promptness, usability, non-destructiveness, affordability of start-up cost, and implementation feasibility beyond the laboratory domain. In this study, rapid methods were developed using Fourier transform near infrared spectroscopy (FTNIR), electronic nose (E-nose), and hyperspectral imaging techniques. The methods were then statistically compared to select most suitable technology for development of a portable sensor assembly for

detection of insect infestation of stored cereal grains (i.e. rice, wheat, and maize). E-nose was chosen among the various techniques and the experimental findings were adapted for development of a low-cost portable sensor. Based on the findings, alcohol and ammonia sensors were integrated with a microcontroller unit to fabricate the sensor assembly, which was effective enough to detect the level of infestation based on the headspace gas composition. The outcome of the project will lead to a convenient, rapid yet nondestructive approach for quality determination of insect infested cereal grains at various stages during the storage. The sensor will be a boon for developing countries like India to rapidly detect the infestation precisely and support the ideology "saving a grain is producing a grain".

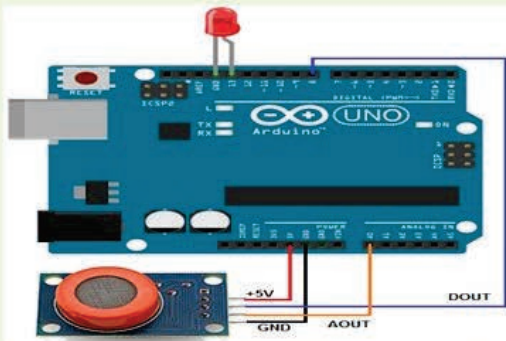


1 = +5V
2 = DOUT
3 = AOUT
4 = GND

Ammonia sensor module



Arduino circuit



Circuit diagram of the gas sensor



Developed sensor module



Uma Dwivedi

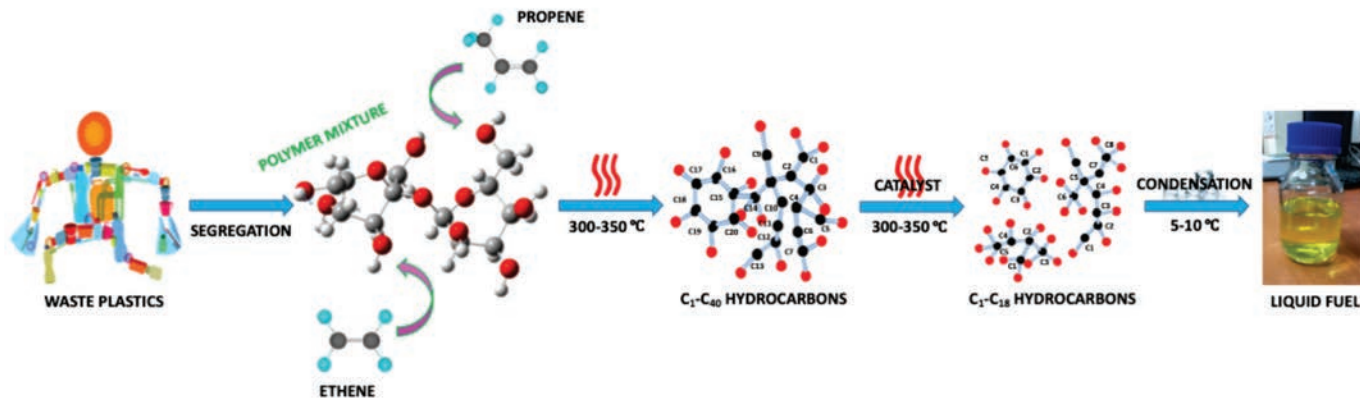
Utilisation of Real-World Waste Plastic for the Production of Fuel Range Liquid Hydrocarbons using Two-step approach

Uma Dwivedi
Indian Institute of Technology, Delhi

Guide :
Prof. K. K. Pant, Prof. S. K. Naik

Large amount of waste plastics is being generated because of the accessible properties of the plastics. However, due to lack of efficient end-of-life management in many developing countries; plastics are now posing serious threats to the environment and human health due to its non-biodegradable nature. Liquid fuel formation through thermo-catalytic cracking can provide good platform for the energy recovery by making use of dumped plastics. The process involves designing an improved two-stage batch reactor system, an effort for the replacement of petro-diesel compounds which covers the synthesis of highly active heterogeneously modified zeolite that supports the catalysts for effective breakdown of waste plastic. The developed two-step approach leads to the 100% conversion of waste plastic into value added products comprising 60 to 80% liquids, and 20 to 35% gases at a temperature range of 300-350°C. The results suggest that, the carbon chain length was narrowed to C 5 -C 28 when the zeolite catalysts

were employed, as well as significant yield of controlled fraction of paraffins, olefins and aromatics was obtained indicating that the obtained liquids are fuel-like products. The liquid fuel formed is expected to be an effective renewable fuel as supported with the comparable results of GC-MS, ¹H and C 13 NMR, Heating value, Proximate analysis, etc. which can be used as an alternative source of fuel for the IC engine operation. However, the usage of the developed catalyst shows the added advantages of reducing the cracking temperature as well as tailoring the selectivity. Eventually, it should be noted that the negative impacts of waste plastics could be addressed or minimized by recognizing the fact that waste plastics have a great potential for resource conservation when converted into valuable resource.





Nalinee B. Suryawanshi

Non-Catalytic Deep Desulfurization Process Using Hydrodynamic Cavitation

Nalinee B. Suryawanshi

CSIR-National Chemical Laboratory, Pune

Guide :

Dr. Vinay M. Bhandari

Deep desulphurization of various organics, in general, and transportation fuels in particular is a demanding operation, especially from pollution point of view. In this work, green approach is undertaken for desulfurization of fuels or organics without the use of catalyst or external chemicals/reagents/oxidizing agent using a simple methodology of hydrodynamic cavitation. The process involves pre-programmed mixing of the organic and aqueous phases, and can be carried out using simple mechanical cavitating devices such as vortex diode (patented by our group) and orifice. Three organic solvents (n-octane, toluene and n-octanol) containing known amount of a model sulphur compound (thiophene) up to initial concentrations of 500 ppm were used to verify the proposed method. A very high removal of sulfur content to the extent of 100% was demonstrated. The results were also verified and substantiated using commercial diesel as a solvent. The nature of organic phase and the ratio of aqueous to organic

phase were found to be the most important process parameters. The developed process has great potential for deep desulfurization of various organics, in general, and for transportation fuels, in particular. Estimated operating cost of desulfurization using hydrodynamic cavitation is far lower than the present refinery hydrodesulphurization process and adsorptive desulfurization process. The aqueous phase used in the proposed method can be recycled after removing a purge stream (with corresponding make-up water). The process offers many advantages, most importantly ease of operation and mild operating conditions for effective sulphur removal. Proposed method can be effectively implemented for large scale deep desulphurization operations.





Roshini S M



Karthika M.



Lavanya Agnes

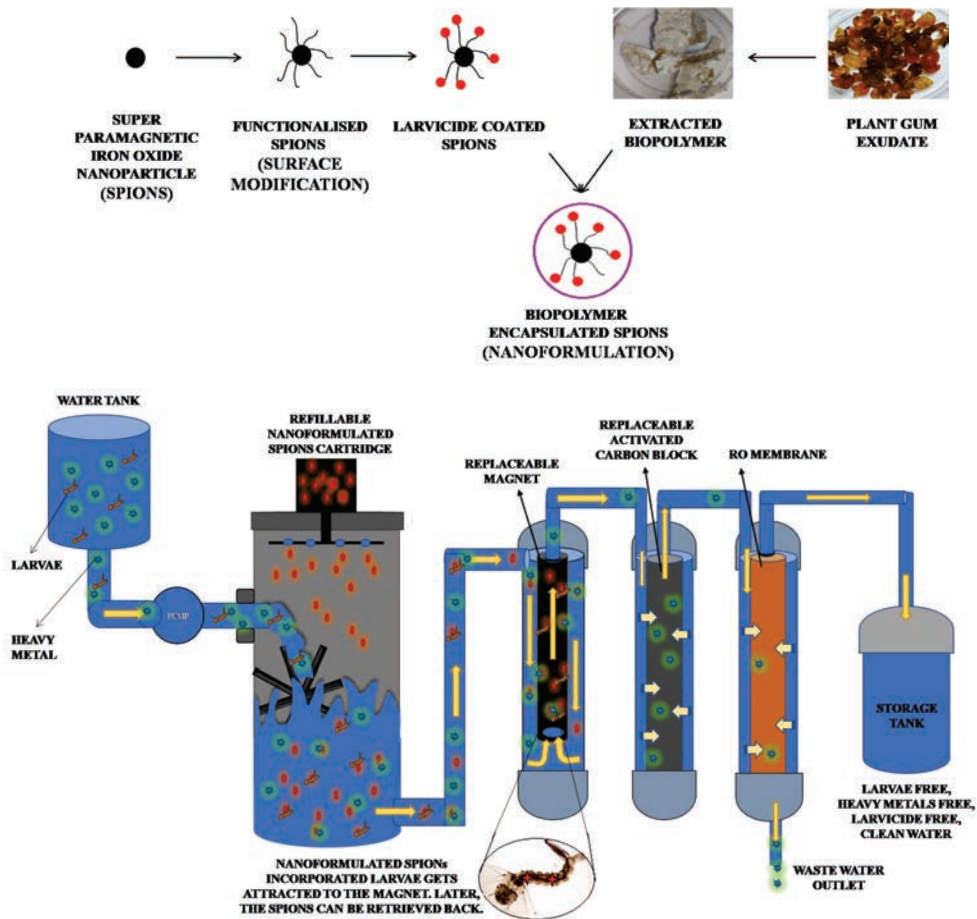
Dual action of SPIONs in effective removal of heavy metals and mosquito larvae from water

Roshini S M, Karthika M., Lavanya AAJ.,
Sathyabama Institute of
Science and Technology, Chennai

Guide :
Dr. Antony V Samrot

Water is vital for all known forms of life. Due to industrialization and improper effluent disposal, the natural water bodies in many parts of our country are alarmingly contaminated with heavy metals like Cd, Cr, Cu, Ni, As, Pb and Zn which are well known for their toxic impact to environment and human health. In the case of mosquitoes, it is reported that the presence of heavy metals enhances the breeding potency thus supporting the outbreak of various life-threatening diseases like malaria, chikungunya, yellow fever and dengue. Here with the support of Nanotechnology, a commercially available larvicide is used to eradicate the mosquito larvae as well as effectively remove the heavy metals from its breeding platform, water. Super Paramagnetic Iron Oxide Nanoparticles (SPIONs) are employed as the core carrier molecules which are nanoformulated to achieve the dual action. Chemically synthesized SPIONs are surface modified and tagged with a commercially available larvicide, further encapsulation was performed using a biopolymer.

The biopolymer encapsulation of the tagged-SPIONs helped the nanoformulation to accomplish stability and also offer biocompatibility. The biopolymer and SPIONs help in the heavy metal removal and eventually the tagged larvicide exhibit its lethal action against the target, mosquito larvae. Since SPIONs are magnetic nanoparticles, the application of magnetic field eases the removal of both SPIONs incorporated dead larvae and the targeted heavy metal after treatment. This action not only minimizes the release of larvicide in water but also removes the targeted heavy metals and mosquito larvae, thus making the water favourable for use. The ultimate goal of this innovation is to design a unit in association with conventional water treatment filters to bring out the aforementioned dual action and ensure the supply of heavy metal free and larvae free water.





Amit Kumar Singh



Saptak Rarotra



Viswanath Pasumarthi

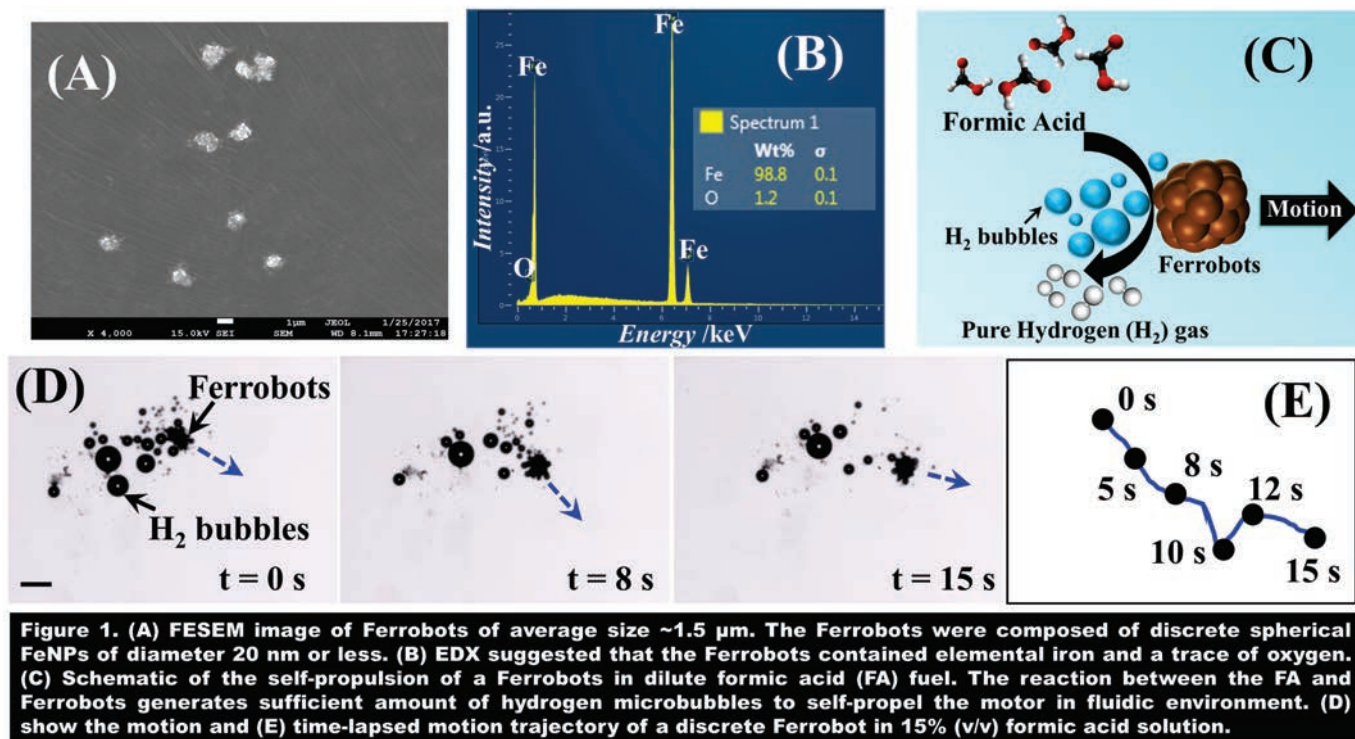
Formic Acid-powered Ferrobots For Clean Energy Technology

**Amit Kumar Singh, Saptak Rarotra,
Viswanath Pasumarthi**
Indian Institute of Technology, Guwahati

Guide :
Prof. Tapas Kumar Mandal
Prof. Dipankar Bandyopadhyay

Hydrogen fuel cells work by instigating stored hydrogen to react with oxygen in air, producing electricity and water. However, generation of pure hydrogen fuel can be a challenging problem. The large-scale production of hydrogen gas is mostly achieved by steam-methane reforming. The major drawback of steam reforming is that – (i) it takes place at high temperature and thus requires external heat energy to maintain elevated temperature and (ii) process results in emission of greenhouse gases as by-product of the reaction. Furthermore, hydrogen storage and transportation is expensive and requires exclusive tanks to store gas at enormously high pressure. In order to address this issue, we report chemically powered micromotors composed of a collection of iron nanoparticles (FeNPs), namely ferrobots, for rapid on-site generation of pure hydrogen gas using formic acid as fuel. Instead of storing hydrogen gas in bulky pressurized tanks, motile ferrobots could be easily deployed in to aqueous formic acid solutions for on-

demand release of pure hydrogen gas, devoid any of greenhouse gases, at room temperature. To demonstrate the proof-of-concept, reactive ferrobots were employed to power a portable toy fan equipped with PEM fuel cell. The pure hydrogen gas required for PEM fuel cell was generated through reaction of formic acid solution with self-propelling ferrobots, whereas, oxygen gas was produced by catalytic decomposition of peroxide fuel using same ferrobots. The as- generated hydrogen and oxygen gases were directly fed from reaction chambers to the fuel cell electrodes to generate electricity and thus power electronic toy fan. The advantage of this type of micromotor-mediated system is that liquid fuels are used for on-site hydrogen release, and thus gas storage will not be prerequisite in near future.





Anu Shaju Areeckal

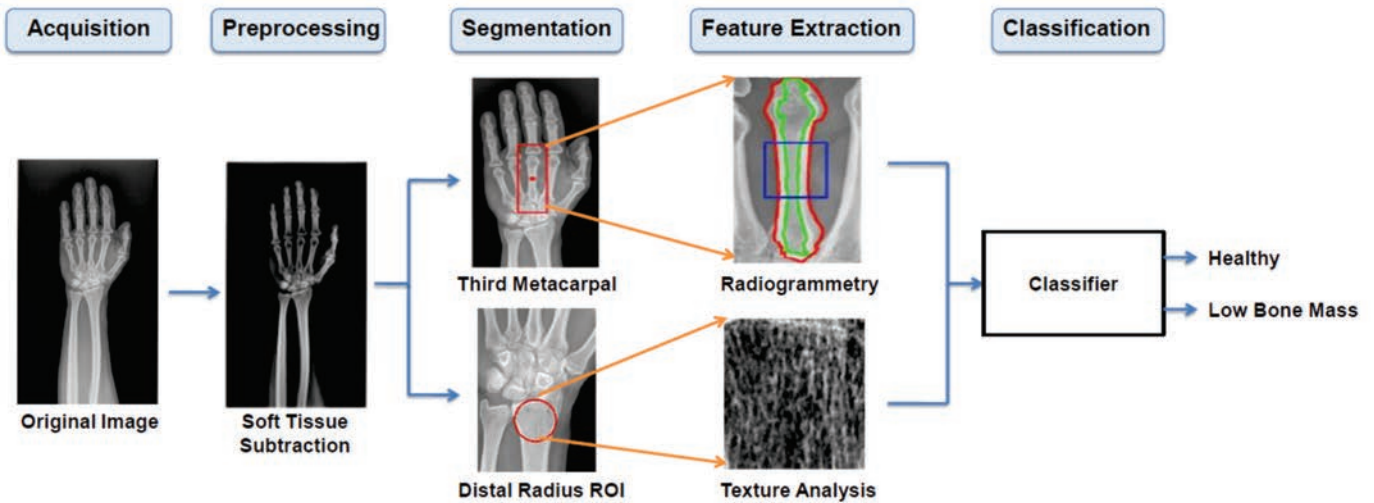
Early Diagnosis of Osteoporosis Using Metacarpal Radiogrammetry And Texture Analysis

Anu Shaju Areeckal
National Institute of Technology, Surathkal

Guide :
Prof. Sumam David S.

Osteoporosis is a disease characterized by reduction in bone mass and micro-structure, causing high risk to fragility fractures. The gold standard diagnostic technique for osteoporosis, Dual Energy X-ray Absorptiometry (DXA), is expensive and not widely available in India. We developed a low cost prescreening tool for early diagnosis of osteoporosis using hand and wrist radiographs. Automated segmentation method for extraction of third metacarpal bone and distal radius is developed. Cortical radiogrammetry of third metacarpal bone and texture analysis of distal radius is done and the most significant features are used to train classifiers. The prescreening tool is validated using 138 subjects from Indian sample population. The segmentation method shows detection accuracy of 89% and 93.5% for the third metacarpal bone shaft and distal radius, respectively. The trained artificial neural network (ANN) classifier achieves the best test accuracy of over 90.0%. A linear regression model shows a significant correlation of 0.671 with

DXA. A novel low cost technique to measure cortical bone volume using three dimensional (3D) reconstruction of metacarpal bone is also developed from hand radiographs in three views. Projections of the 3D reconstructed models are compared with manually segmented X-ray images of 20 subjects. The mean error percentage in combined with cortical thickness is 11.2%. The prescreening tool is a promising technique to identify people with low bone mass and will enable mass screening of people in primary health centres in non-urban areas where DXA is unavailable. This work is done in collaboration with Kasturba Medical College (KMC) Hospital, Mangalore, India and University Hospital of Geneva, Switzerland. The study protocol was approved by the Institutional Ethics Committee, KMC Hospital, Mangalore, Manipal Academy of Higher Education, India.





Yogesh D Urunkar



Chandrakant S Bhogle

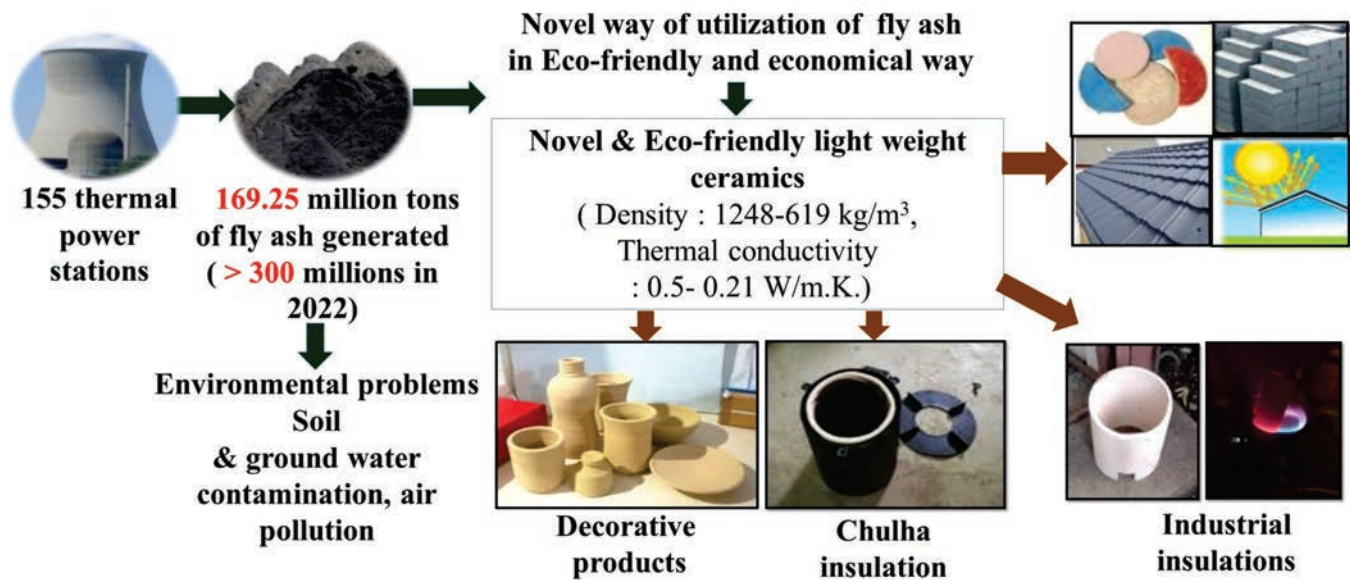
Novel and eco-friendly light weight thermal insulating ceramics from thermal power plant waste

Yogesh D Urunkar, Chandrakant S Bhogle
Institute of Chemical Technology, Mumbai

Guide :
Prof. Aniruddha B. Pandit, Prof. J. B. Joshi

India alone produces 169 MT of the fly ash per annum from 155 thermal power stations, out of which 50% were unutilized and dumped into the land. This may cause catastrophic effects on the environment. Therefore, it is very much essential to utilize this fly ash in novel, eco-friendly and economical way. This innovation targets the problems caused by fly ash due to its non- utilization and provides the sustainable and practical alternative to the existing ceramic material. The developed fly ash ceramic material has unique properties such as it is an ultra-thermal insulating and very lightweight. Density of the developed material is 0.6- 0.8 g/cc, so that it can also float on the water. Its thermal conductivity varies from 0.2- 0.5 W/m.k which is four to ten times better compared to the existing ceramic materials. Apart from this, it can be moulded into any size and shape and provides good mechanical strength. The raw material, which is a fly ash, abundantly available at zero cost. All these miraculous combination of

desired properties makes it very attractive alternatives to the existing ceramics. Therefore, developed ceramic can be used in the construction & building as roof tile, wall tile, roofing sheets, industrial thermal insulation, decorative pottery items, variety of other applications.





Nikhil Gupta

Artificial Intelligence based Biomarkers of Knee Osteoarthritis

Nikhil Gupta

Indian Institutes of Technology Delhi

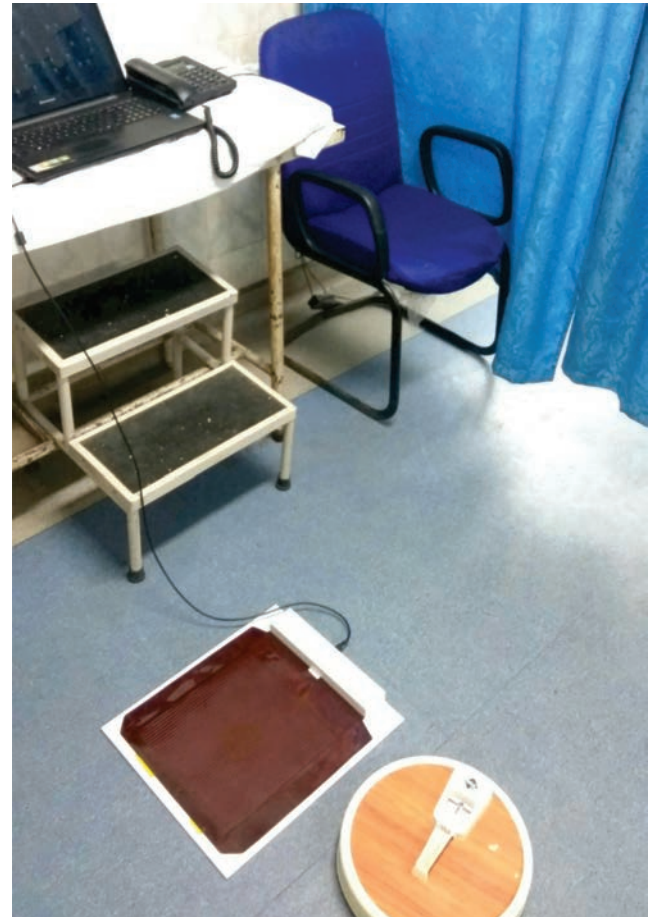
Guide :

Prof. Tapan Kumar Ghandhi

Dr. Alok Prasad

Knee osteoarthritis is a chronic, progressive disease characterized by the loss of cartilage in joints. It is one of the biggest problem affecting a large number of elderly people today. Commonly, orthopedicians use radiographic techniques like X-ray, CT-Scan, MRI etc. to look for the deterioration in cartilage or damage in the bones. But, it has been found out that almost 50% of patients with symptomatic Knee OA shows no signs in radiographs because of the low sensitivity of these diagnostic tools. The lack of biomarkers of knee OA and 35+ different ways a patient describing the pain leads to a lot of subjectivity in the diagnosis, lack of specific treatment for patients, and poor quantification of post-treatment stage. We have created an IOT enabled device which in conjunction with sophisticated machine learning algorithm that detects Knee OA at early stage from the walking pattern of a subject. The device collects 1000+ data points about the walking pattern and learns to create features which categorize the patient as per their

medical condition. This high touch solution can greatly help caregivers & doctors to understand the complication in a comprehensive manner. Doctors can now suggest much better treatment with the specific supplements, drugs, and surgical recommendations. This device in combination with an app will be highly useful specifically to early-stage subjects to help them track their disease condition and actually see themselves improving due to the results of management measures they are taking.





Mallikarjunareddy

Developing Labscale Magneto-Mechanical Experimental Setup to Predict the Plaque Growth of Human Heart Coronary Arterial Layer System

Mallikarjunareddy Boreddy

Madanapalle Institute of Technology and Science,
Andhra Pradesh

Guide :

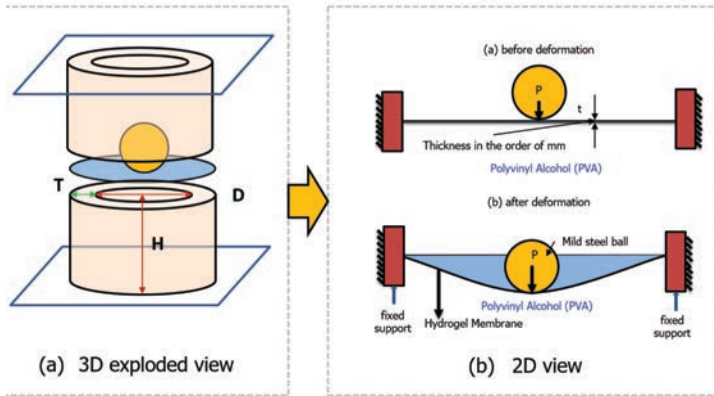
Dr. Mallikarjunachari. G

In India, one out of six men and one in ten women die from heart disease and the death rate is significantly increasing day by day. According to present estimates, India will soon have the highest number of heart disease cases in the world. Conferring to the Indian Heart Association, 50% of all heart attacks in Indians occur under 50 years of age, and 25% of all heart attacks in Indians occur under 40 years of age. One of the primary reason for the coronary heart disease is the growth of plaque in the heart arterial wall layers. The ratio of number of heart patients to the available specialized cardiovascular doctors is significantly high. Moreover, the average cost of a less severe heart attack is about ₹ 600,000. All above statistics indicate that the necessity of escalating the research in human heart artery system. In this regard, developing cost-effective experimental setup is an alternative way to fulfil the need. The identification and removal of plaque at the initial stages further bring down the cost significantly. Developing labscale magneto-

mechanical device to predict the plaque growth of human heart coronary arterial layer system. Plaque is the fatty (waste) substance that forms in between the heart arterial wall layers. The growth of this plaque at the interface of the layers blocks the blood flow and finally leads to heart attack or stroke. Identification of the plaque growth at the interface is one of the major challenges for the biomedical research community. Our team is very confident that this study will be extremely useful to researchers from the area of biomedical science, material science, interface biology and also from nano engineering.

Objective

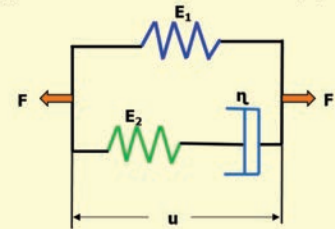
Estimating Mechanical Properties of Hydrogel Membranes during Swelling



Schematic diagram showing experimental setup of ball indentation technique (a) 3D exploded view (b) 2D view

Result and Discussions

(a) Directional swelling of hydrogel membrane (b) Three element model used to predict the viscoelastic properties



Where,

δ = central displacement

E = Young's modulus

F = applied force

u = displacement

η = viscosity of the dashpot

E_1 and E_2 are the elastic moduli.

$\varepsilon(t)$ is the deformation strain at time t

$\varepsilon(0)$ is the initial deformation strain

$\varepsilon(\infty)$ is the final deformation strain

$$\frac{6w}{EhR} = 0.075 \left(\frac{\delta}{R} \right)^2 + 0.78 \left(\frac{\delta}{R} \right)$$

$$\lambda = [12(1 - \nu^2)]^{3/2} \left(\frac{wa^2}{Eh^3} \right)$$

$$\frac{\varepsilon(t) - \varepsilon(0)}{\varepsilon(\infty) - \varepsilon(0)} = e^{-t/\mu\sigma}$$

$$E_2 = \left(\frac{\varepsilon(\infty)}{\varepsilon(0)} - 1 \right) E_1$$

$$\mu\sigma = \frac{\eta}{E_1} \left(1 + \frac{E_1}{E_2} \right)$$



Dr. Shikha Verma



Dr. Pankaj Kumar Verma

Development of low grain arsenic rice by the fungal arsenic methyltransferase via bio-volatilization

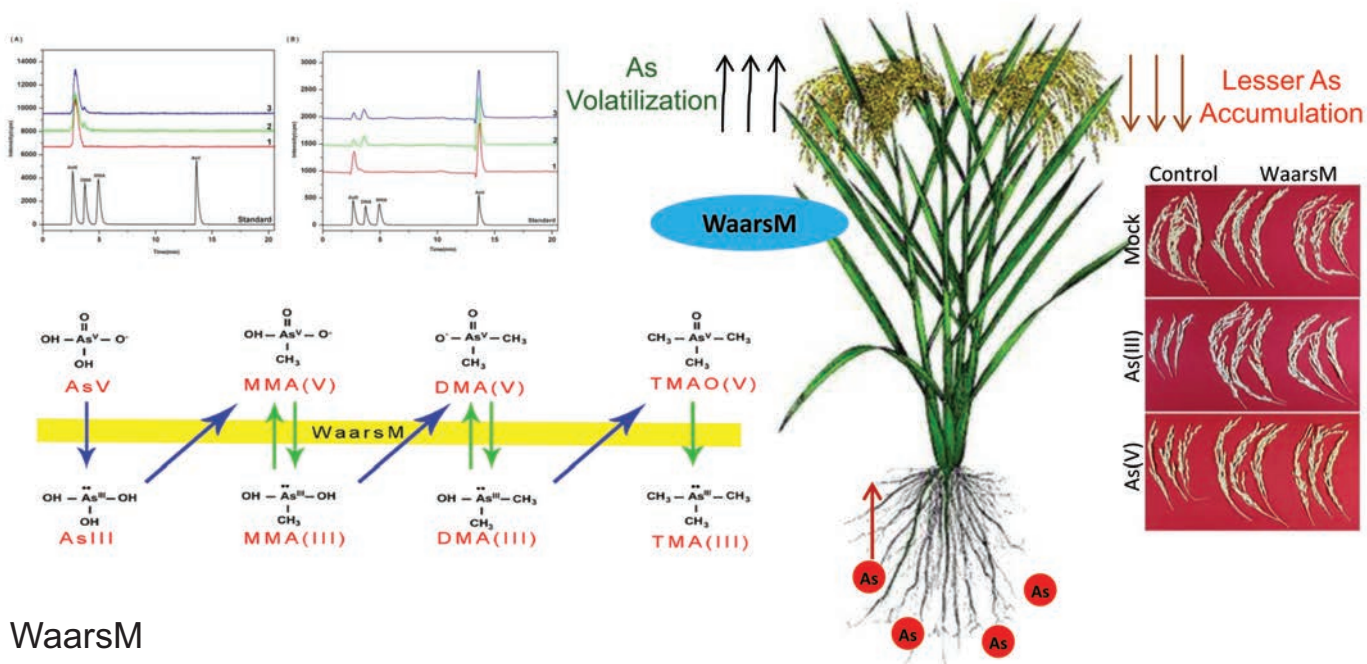
Dr. Shikha Verma, Dr. Pankaj Kumar Verma
CSIR - National Botanical Research Institute,
Lucknow

Guide :
Dr. Debasis Chakrabarty

Arsenic is potent toxicant and classified as class I carcinogen by the U.S. Environmental Protection Agency (U.S. EPA). Higher arsenic accumulation in crops causes serious health hazards, including cancer, especially in Southeast Asian countries. To cope up with arsenic toxicity, organisms develop various mechanism in which arsenic methylation is widespread phenomenon in nature. In the present study, we identified novel arsenic methyltransferase (WaarsM) gene from soil fungus, *Westerdykella aurantiaca*, isolated from arsenic-contaminated agricultural soil of West-Bengal, India. To study the role of WaarsM in planta, we genetically engineered *Arabidopsis thaliana* with WaarsM gene. The transgenic plants accumulate 36% and 16% less arsenic in seeds and shoots, respectively compared to (wild-type) WT plants which prove its ability to decrease arsenic accumulation in food crops grows in arsenic affected areas. Arsenic accumulation in rice grains is worldwide concern and influences the nutritional status of rice grains. In the present study,

WaarsM was expressed in Japonica rice (*Oryza sativa*) and found that transgenic plants produce methylated and volatile arsenicals. Transgenic Line, grown on soil irrigated with arsenic-containing water accumulates 50% and 52% lesser arsenic than NT in shoot and root, respectively; while arsenic concentration in polished seeds and husk of transgenic line was reduced by 52% compared to NT. This is the first report of arsenic volatilization in rice by arsM gene of eukaryotic origin. In conclusion, our study demonstrates that the expression of fungal WaarsM gene in rice induces arsenic methylation and volatilization as well as altering arsenic speciation in the plant.

Considering, no gene encoding arsM has yet been identified in the higher plant's genome, including rice genome, the present project provides a strategy to generate transgenic rice that accumulate less arsenic in the grains and will have tremendous societal impact related to public health



WaarsM

- improves arsenic (As) tolerance by volatilization
- causes As volatilization in rice
- healthy grains with low As
- Improved crop production



Malay Pal



Debayan Dasgupta



Arijit Ghosh

Towards application of helical nanorobots for biomedical applications

**Malay Pal, Debayan Dasgupta,
Arijit Ghosh, Neha Somalwar**
Indian Institute of Science, Bangalore

Guide :
Prof. Ambarish Ghosh, Dr. Deepak K Saini,
Prof. Ramray Bhat

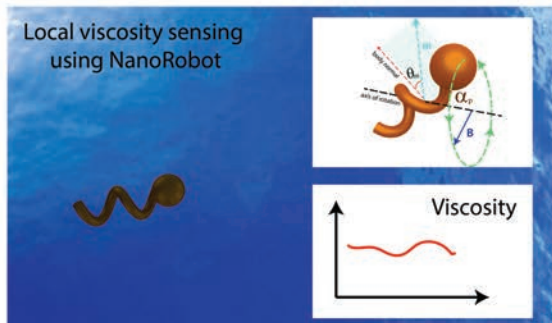
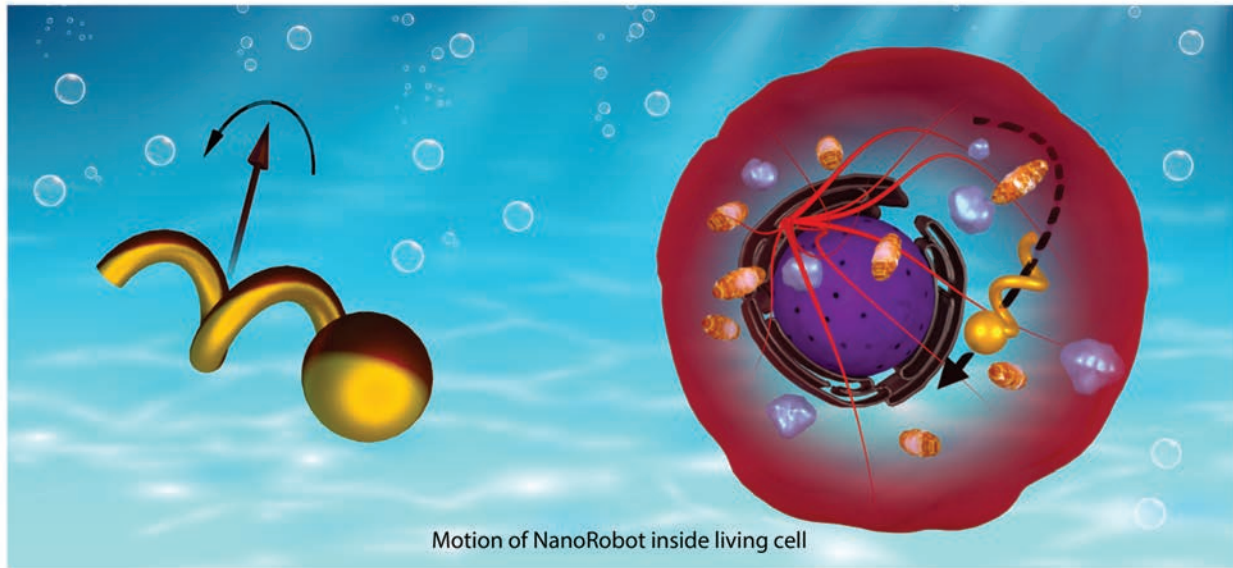
Magnetically driven nanorobots have gained immense interest for biomedical applications because of its wide range of potential applications. The team is working on helical shaped magnetic nanorobots that can be internalised by the cells when incubated for around 24 hours. Subsequently, these internalised nanorobots can be actuated remotely inside the living cell by application of a rotating magnetic field. This novel technique of intracellular manipulation is completely benign to the living cells which has been confirmed from cell viability studies. Our work also confirms that these



Neha Somalwar

tiny nanorobot can promptly detect changes in local environment inside a living cell which is very promising for new studies in cell biology and new techniques for sensing of intracellular matrix. Another important

application of helical magnetic nanorobot is that it can sense viscosity of surrounding environment with high spatio-temporal resolution as it moves through the medium. This active measurement is much faster than conventional passive rheological technique. Along with its ability to be positioned in any arbitrary location within the fluid medium, it is now possible to find out local heterogeneities in the medium very easily. Any other parameter that causes change in viscosity of the medium, for example: temperature, can also be measured using this active system. The current method can be applied to both Newtonian and Shear thinning fluids which is an added advantage as most of the biological fluids are also shear thinning. Above two results suggest that helical magnetic nanorobot is an appropriate candidate for future biomedical applications. We are exploring further for other exciting features of the helical magnetic nanorobots. Hopefully, in few years, we shall witness a paradigm shift in biomedical industry with help of these nanorobots.





Satya Narayan Patel

Development of improved biocatalysts for D-allulose production utilizing the low-cost agro-industrial residues

Satya Narayan Patel

Center Of Innovative and Applied Bioprocessing,
Punjab

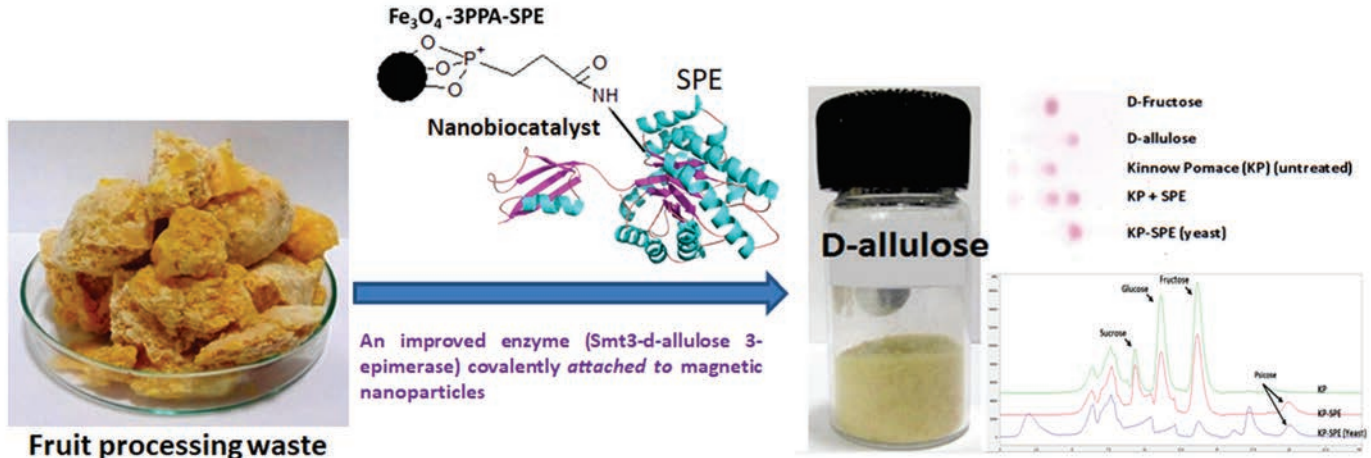
Guide :

Dr. Sudhir P. Singh

D-allulose (D-psicose) is a C3 epimer of D-fructose. It is a rare sugar having 70% of the relative sweetness of table sugar. It exerts only 0.3% calories of table sugar. Consumption of this sugar is beneficial to human health in several ways i.e. anti-obesity, anti-diabetic, anti-oxidative, hypoglycemic, anti-dyslipidemic, and neuro-protective effects. It improves the texture of food materials with pleasant flavor through the Maillard reaction. The team has developed a novel enzyme- systems for biosynthesis of D-allulose from D-fructose. Fusion of yeast Smt3 at the N-terminus of *Agrobacterium tumefaciens* D-allulose 3-epimerase improved thermal tolerance of this enzyme by several folds. This modified chimeric protein was covalently attached to the magnetic nanoparticles. This nanoparticle-enzyme conjugation system was demonstrated to be more thermo-stable and recyclable. Recently, we have discovered a novel gene encoding D-allulose 3-epimerase enzyme from the metagenomic information of a thermal aquatic habitat of extreme

temperature. The protein sequence of this novel enzyme exhibits significant dissimilarity with any known protein in the public databases. This novel biocatalyst shows excessive thermal stability at 50-60°C temperature, which is considerably higher than any D-allulose 3-epimerase enzyme known till date. These bio-catalytic systems have been used to bioprocess several agro- industrial wastes (e.g. fruit pomace, cabbage waste, banana pseudostem, and cane molasses) for transformation of in-situ D-fructose into D-allulose.

Bioprocessing of D-fructose containing fruit processing wastes for D-allulose production



- ❖ The Immobilized Smt3-d-allulose 3-epimerase enzyme was employed for the production of D-allulose using fruit processing wastes (fruit pomace) as feedstock

Patent Application No. 201611003411, 201611044752

Patel et al. Bioresource Technology 2016, 2018



Mrutyunjay Maharana



Bhabani Shankar Nayak

Design and development of interlock mechanism based bio-compatible, user-friendly and cost-effective elbow disarticulation prosthesis

Mrutyunjay Maharana, Bhabani Shankar Nayak
Indian Institute of Technology Guwahati,
All India Institute of Physical Medicine and Rehabilitation, Mumbai

Guide :
Prof. Sisir Kumar Nayak,
Prof. Deepak P. Prabhu

The upper limb amputation is a serious problem for human as it causes hindrance to the various daily activities. Especially for the elbow amputation, it causes severe damage to the movement of the hand for different common purpose. The available prosthetic elbow and disarticulation prosthesis are very costly and cannot be afforded by the common and economical backward people in India. By realizing the extreme requirement of elbow amputee people's usability and affordability, the design and development is carried out for interlock mechanism based bio-compatible, user-friendly and cost-effective elbow disarticulation prosthesis. There is no complicated electronic and motorized actuation involved therefore it makes this design simple. This design incorporates the internal slot mechanism which will provide an adequate motion of the artificial hand connected to the elbow joint. The joint is developed mechanically which helps the prosthesis to bring back sound gait of elbow and hand similar to normal elbow. The design is very

compact and not exposed outside of the hand so that normal clothing for the patient is not hampered. The design of elbow joint incorporates simple machining and manufacturing process for easy fabricated. Most importantly, the cost of the prosthetic joint is around Rs.1500-2000/unit by machining of single unit. However, the cost can be further reduced by mass production. Since the innovation is focused on the mechanical linkage based low cost prosthesis, this innovation will certainly benefit the elbow amputee people to bring back their normal hand gait cycle. Commercialization of this innovation is going to serve majority of the elbow amputees. As the development is specified for a very unique group of specially-abled people, the implementation of this will have positive impact on the society.





Shasank Sekhar Swain

Production of effective and low cost dapsone-phytochemical hybrid candidate for use in multidrug therapy against *Mycobacterium leprae*

Shasank Sekhar Swain

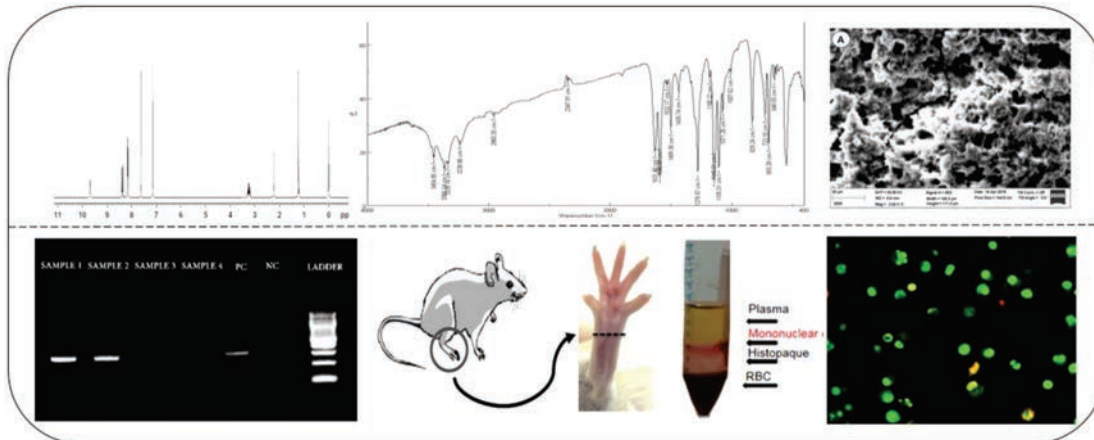
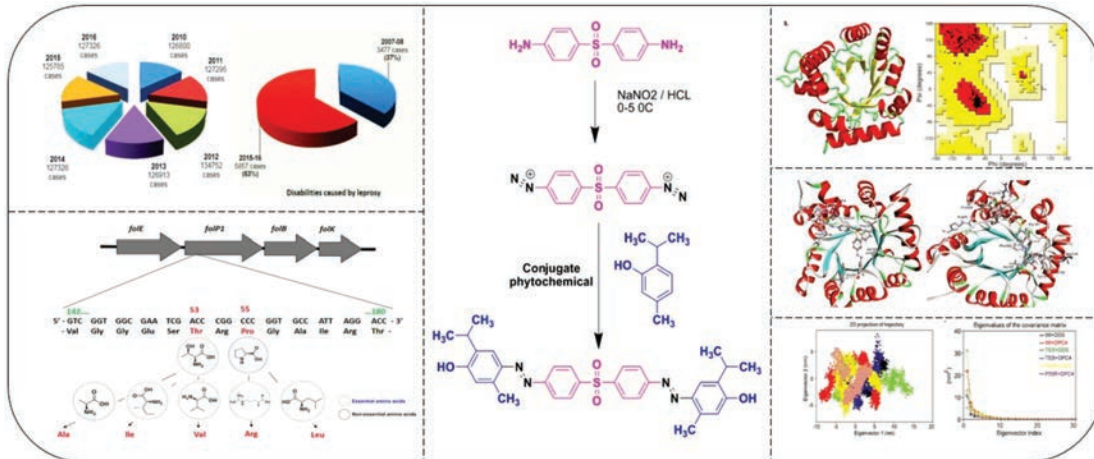
Institute of Medical Sciences and Sum Hospital,
Bhubaneswar

Guide :

Prof. Rabindra Nath Padhy
Prof. P. Sudhir Kumar

Leprosy, the staggering infectious disease caused by the obligate intracellular *Mycobacterium leprae* continues to be the belligerent public health hazard for causation of high disability and eventual long-term morbidity, even treatment with ongoing multidrug therapy (MDT). From the vast ethnomedicinal records and ethnopharmacological investigations, phytochemicals are potent against infectious diseases; but, none of those have gone up to the pure-drug stage due to the lack of the desired drug-likeness values and the required pharmacokinetic properties. To overcome the drug-resistant problem, the improvement of the primary antileprosy sulfa drug, dapsone through chemical conjugation with a suitable phytochemical for reuse of dapsone in empiric antibacterial therapy is the primary goal. With various bioinformatics and chemoinformatics analysis, dapsone-phytochemical conjugates were synthesized adopting azo-dye coupling reaction, and structural interpretation was carried out by UV, FTIR, NMR, HPLC, LCMS, and

SEM. From the in vivo 'mice-foot-pad-propagation' study, the 'dapsone-thymol' hybrid product at the WHO recommended dose for dapsone, 0.01 % mg/kg reduced one-log bacilli-population in 'dapsone-resistant', and no bacilli were found in 'dapsone-sensitive' *M. leprae* infected mice foot-pad in three months of oral treatment. Additionally from the in vitro host-toxicity study with cultured-human lymphocytes, it was confirmed that, the dapsone-thymol conjugate was safe for oral administration up to 5,000 mg/L, since a minor number of dead cells were found under a fluorescent microscope. In conclusion, the newly synthesized 'dapsone-thymol hybrid' product could be used in a revised MDT in place of dapsone against *M. leprae* after successful validation in the clinical phase. Indeed, conjugation of a phytochemical with the obsolete drug could serve the new trend in current antibacterial drug development with resources and time saving through the ingenious combination of bioinformatics and medicinal chemistry tools.





Mohd Ahsan



P Chinmai

Proteasome Activation: A potential drug target for treatment of Parkinson's Disease.

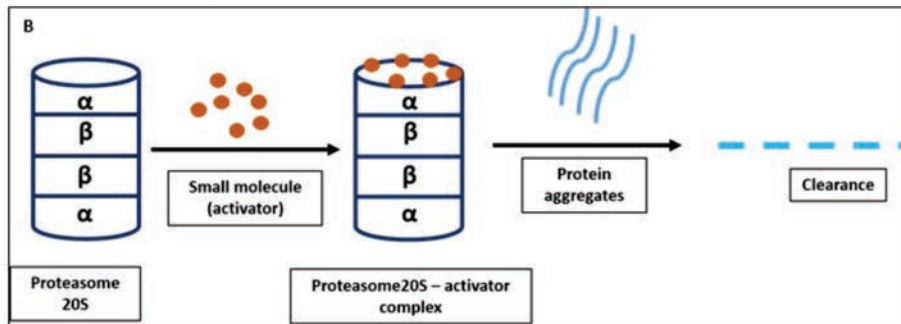
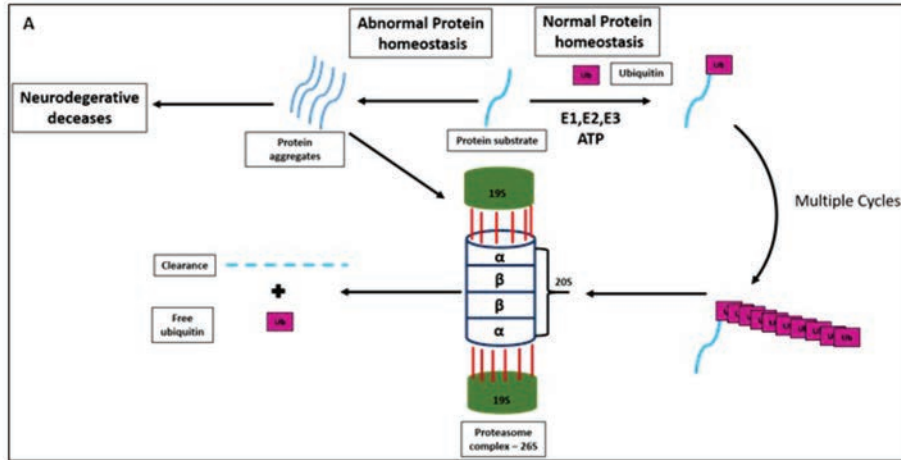
Mohd Ahsan, P Chinmai
Indian Institutes of Technology, Madras

Guide :
Prof. Sanjib Senapati

Parkinson's disease (PD), an age dependent neurodegenerative disorder occupies a significant portion of total disease burden of non-communicable diseases in our country. The accumulation of inclusion bodies/aggregation-prone proteins along with the loss of proteostasis eventually leads to death of neurons. Proteasome complex is known to be one of the key regulator of proteostasis in all the cells where the damaged and misfolded proteins are degraded. Recent studies have reported decreased proteasome function as a primary cause for many neurological diseases including PD. There are FDA approved inhibitors of proteasomal activity, however development of proteasome activators is rarely looked at. One of the prime reason behind this is the complexity of human proteasome, limited understanding of the mechanism of activation. Hence, in our study we exploited the archaeal proteasome complex through virtual screening and state-of-art molecular simulation techniques to decipher the mechanism of

proteasomal activation by the HbYX motif (present in endogenous activators). Results from our study showed that the extreme C-terminal residues (Tyr & Arg) of this motif directly participate in opening the central pore of the archaeal 20S complex. Arginine being the charged residue contributes more to the binding energy and tyrosine residue interacts with the N-terminal loop of each α subunit through a H-bond with the backbone of Gly19 (α subunit) side chain of Arg20 (α subunit). Thus, the dipeptide- Tyr-Arg is exploited as the initial lead for database screening followed by rigorous docking analysis. This extensive library screening resulted in three activator small molecules, working in both archaeal and human 20S complex. From our study we have successfully characterized the first lead chemical moieties as the potential proteasome activators. Hence, our results showed that the structurally simple archaeal 20S complex can serve as the ideal target for structure based drug-designing in order to find activators for the human 20S complex.

Figure 1





Bikash Ranjan Samal

A more accurate detection and intrinsic subtype classification of breast cancer using machine learning.

Bikash Ranjan Samal

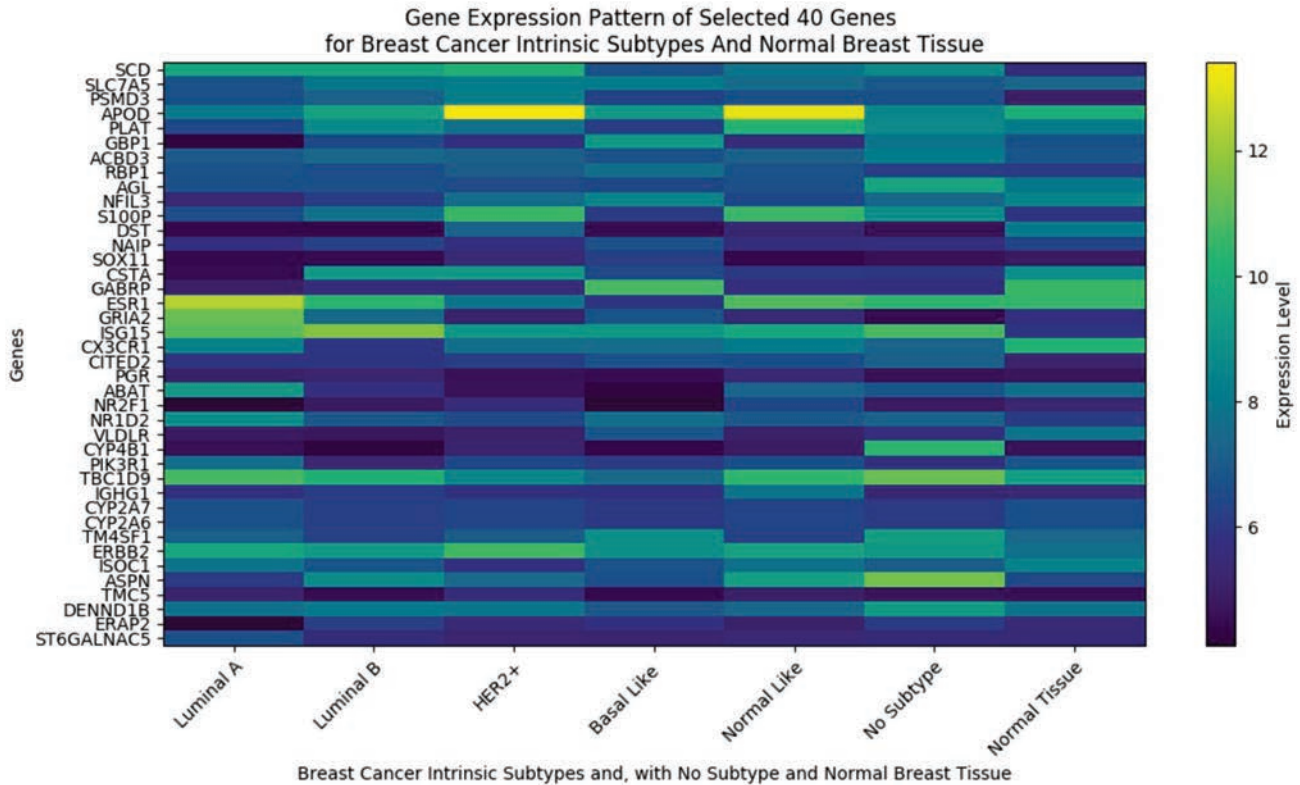
Indian Institute of Technology, Kharagpur

Guide :

Dr. Ranjit Prasad Bahadur

Breast cancer is a heterogeneous and complex disease, with a high mortality rate. It is one of the predominant cancer types that affects millions of cases and cause thousands of deaths every year in India. The effective treatment and prognosis of breast cancer development relies largely on a correct classification and also help patients in avoiding improper chemotherapy and undergo its side effects. In our studies, we developed a classifier to distinguish the five intrinsic subtypes of breast cancer using microarray gene expression profile data. The model is based on the supervised learning using support vector machine algorithm for classification. The genes required for acting as the important features for classification were identified with a greedy algorithm i.e. recursive feature elimination method via logistic regression. We identified a panel of 40 genes which serve as the important features for classifying the breast cancer intrinsic subtypes, using their gene expression profile data. The modelled classifier has an accuracy

score of 93-96% and it is more than the previous method. It has good precision, recall and F score for prediction. This method uses minimal number of genes as features, which indicates that lesser the number of features, lesser will be the number of gene probes that can be used in diagnostic chips to detect breast cancer and its subtype. In the identified panel of genes, it is found that some of them are involved directly in the cancer process which may act as prognostic signatures.





Rohini Singh

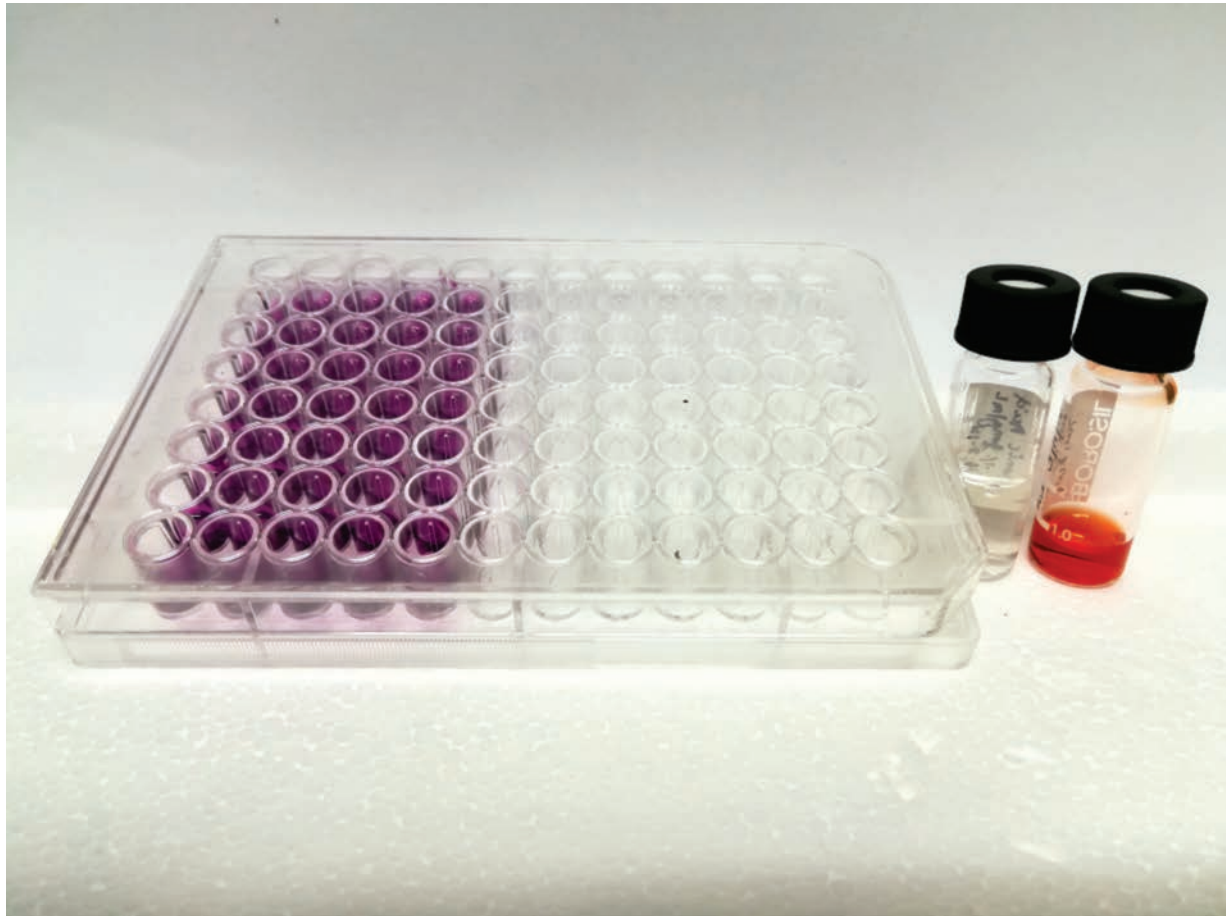
Fighting resistance in cancer due to bacterial infections with modular drug platforms: An idea towards personalized medicine

Rohini Singh
Indian Institutes of Technology Delhi

Guide :
Prof. Shalini Gupta

The motive of the study is to target intracellular bacterial infection in cancer and analyse the impact of bacterial presence on the efficacy of chemotherapeutic drug. We observed that bacteria have the capability to biotransform the anticancer drug which might affect its activity and it is the reason for resistance in cancer cells. We have developed multifunctional liposomes with dual capability to simultaneously target cancer and cancer cell internalized bacterial cells. The liposomes are encapsulated with doxorubicin and surface is functionalized with an antibacterial peptide sushi S3 which is used as drug delivery vehicle as a proof-of-concept in an in vitro model. A realistic in vitro cell model was created in which Huh-7 liver cancer cells were infected with Salmonella typhi. It has been observed that S. typhi has the potential to cause gall bladder and liver cancers. The efficacy of the drug delivery platforms has been tested on S. typhi-infected liver cancer (Huh-7) cell models. The presence of S. typhi

definitely decreased the efficacy of dox against Huh-7 cancer cells. The overall efficiency to kill cancer and bacteria got improved by approx. 70% than free anticancer drug/anticancer alone when both compounds were given in liposomal form. The efficacy of the nano-formulations can be enhanced by conjugating specific ligands expressed on cancer cells such as folic acid. We envision that such combinatorial platforms would definitely give a new direction in targeting co-existing infections with synergistic effects and help in curbing the drug resistance problem.





Harika Chappa



Avisek Barla



Navin V Naryanan

Economical Paper-Strip For Early Stage Mastitis Disease Detection In Cow

**Harika Chappa, Avisek Barla, Navin V Naryanan,
Sudip Chakraborty, Ahila Yegappan**
Sri Venkateswara Veterinary University, Tirupati

Guide :
Dr. Y. Hari Babu

Mastitis is an inflammation of the mammary gland in animal's udder that adversely affects the animal health therefore leading to an annual economic loss of around \$35 billion worldwide and 7615.15 crores rupees in India. Currently, the disease is detected in clinical settings by expensive techniques and also in places, which are miles away from remote villages.

The microfluidic paper-based analytical device fabricated for mastitis disease diagnosis in cattle is highly economical i.e. as low as Rs. 1/-, portable, ecologically compatible and self-diagnostic. It will help farmers to screen and monitor the most economically devastating mastitis disease in the bovine species at an early stage. The detection time of disease using the proposed method is 15 minutes approximately with high accuracy and efficiency. The major indicators of mastitis disease is the somatic cells, whose deformities are envisioned based on the qualitative and quantitative detection done on paper-strip method.

The unique combination of the reagent and dye achieve a cost-effective solution. A drop of milk is to be

added to the reagent incorporated paper strip having desirable pore size with hydrophobic nature, and incubated for about 10 minutes. Through the natural capillary action, the milk reacts with the reagent and provided dye is to be added. It will show an instant change in colour. Colour intensity is the measure of the prevalence of mastitis disease, captured by mobile camera and quantified by software or is self-descriptive through the naked eye. This paper- strip can be used by farmers, dairy industries, veterinarians, the households and regulatory agencies as an indicator of the safety and suitability of raw milk for consumption by humans and also preventing zoonotic diseases. Farmers can negotiate a good price with the dairy industry based on milk quality information from paper-strip and enhance the quality of life. Affordable Paper-strip can be utilised by relatively untrained people and it ensures laymen terms to deliver the best information and is complete with easy-to-understand information and enhance dairy industry contribution to Indian GDP.



Sudip Chakraborty



Ahila Yegappan

Apparatus Required



Paper-Strip and Dye

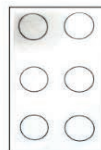
Economical Paper-Strip For Early Stage Mastitis Disease Detection in Cow



Reagent Incorporated
Paper-Strip



One drop of milk is to be added



One drop of Dye



Change in Color



Jeethu Raveendran

Anemia Meter

Jeethu Raveendran

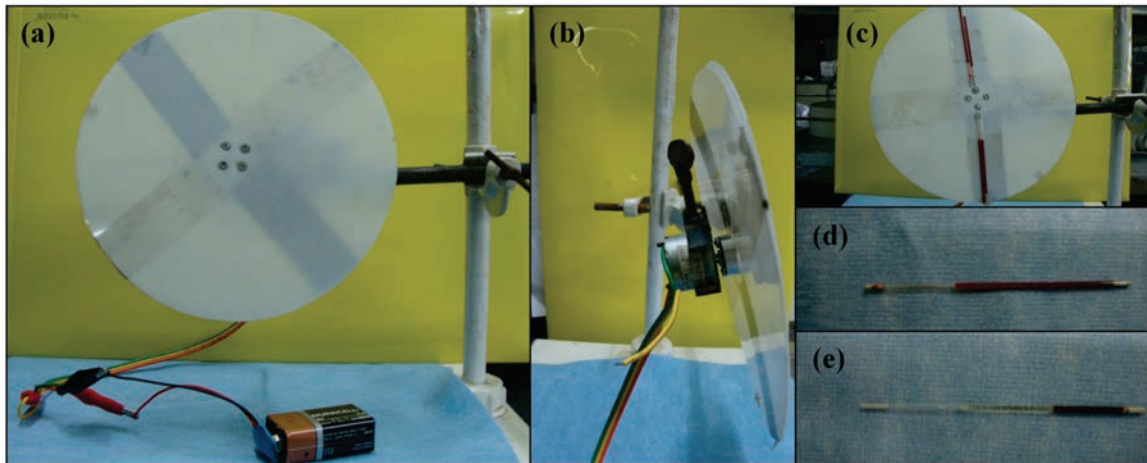
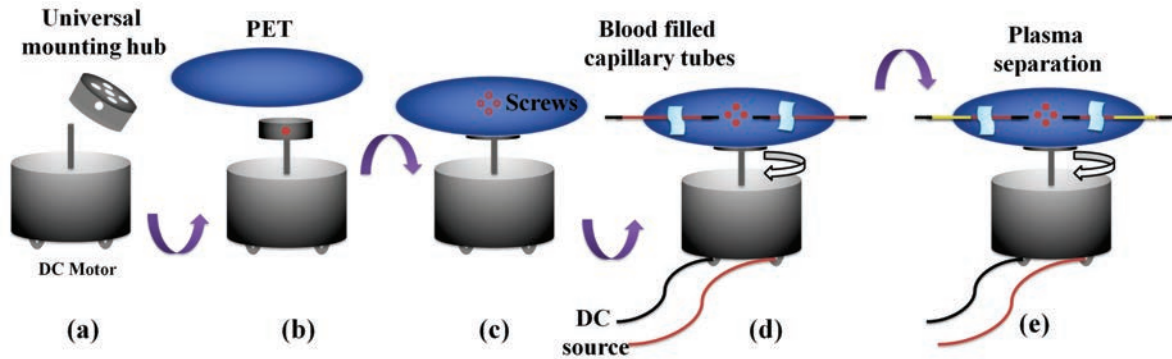
Amrita Vishwa Vidyapeetham, Coimbatore

Guide :

Dr. T. G. Satheesh Babu

Anaemia is a disorder that affects over one billion people worldwide. Typically, anaemia is detected by examining the haemoglobin/haematocrit values. Generally these tests were conducted using a haematology analyzer, haematocrit centrifuge or spectrophotometer. These instruments are expensive, non-portable, and require operation by trained personnel; they are therefore unavailable in many low-resource settings. These tests are also expensive and are not affordable by the common man. This indicates a requirement of an accessible and affordable technology for anaemia detection. A simple battery powered microhaematocrit centrifuge system with commonly available materials like DC motor, polyethylene terephthalate (PET) sheet, mounting hub, and screws was fabricated. The development of the system is as simple as it can be assembled by any nontechnical personnel and can be used as an electric toy. This portable system could be used as a replacement for commercial benchtop centrifuge which is bulky and

expensive. The device can be used as a simple anaemia reader. The system also has been employed for the estimation of haematocrit and using the haematocrit values the haemoglobin levels were calculated. The main advantages of the device are its simplicity and low cost which make this a global solution for haematocrit estimation, anaemia detection and serum-based diagnostics in resource free settings.





Sneha Munshi

Understanding Sequence-Disorder-Function relationship of an Intrinsically Disordered protein to design Soil salinity sensor

Sneha Munshi

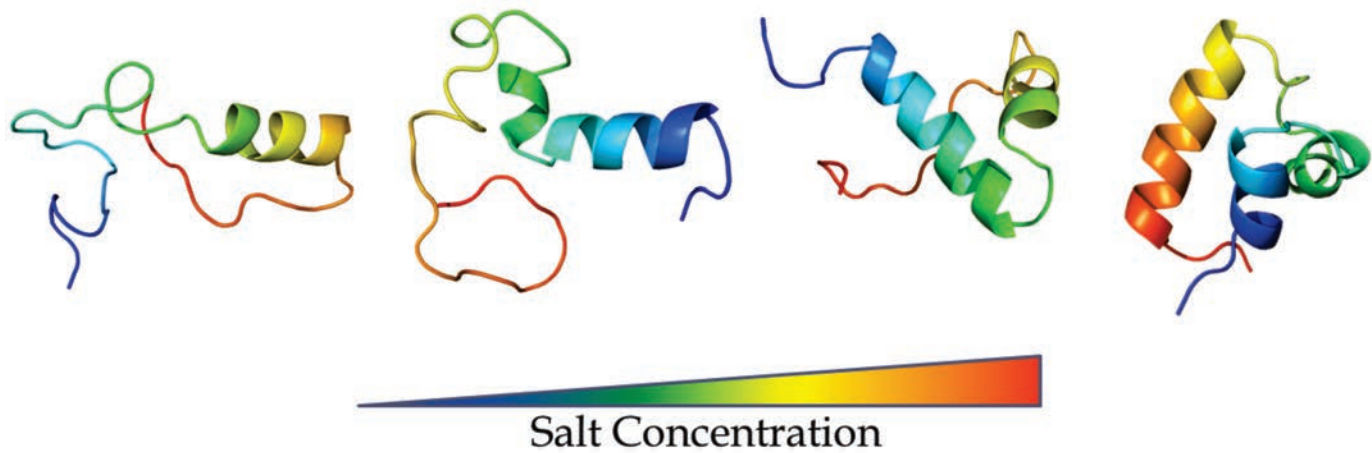
Indian Institute of Technology, Madras

Guide :

Dr. N. Athi Narayanan

Soil is one of the important element of our ecosystems which has been subjected to degradation due to both natural and man-made causes. Native rock weathering, low precipitation, high surface evaporation, wind, irrigation with saline water or disposal of solid waste severely affect the salinity of the soil. The statistical analysis revealed loss of 12 billion dollars of the agricultural crop every year and 3,230,000 km² irrigated land has been affected globally. To handle these issues on time, soil salinity needs to be monitored routinely. Advancements have been made in recent years to explore intrinsically disordered proteins (IDPs) as biosensors. These are an essential part of proteome and do not possess any well-defined structure but still are functional. These proteins are highly sensitive to temperature and solvent fluctuations. In current work, we have revealed the effect of increasing salt on the structure and stability of Cyt R DNA Binding Domain (DBD). We observed that Cyt R gradually attains secondary and tertiary structure

with increasing salt concentration. Cyt R displays a graded increase in structure, stability and folding rate on increasing the osmolarity of the solution that mimics the non-specific screening by DNA phosphates. The gradual structural acquisition is observed for almost all basic salts like phosphate, sodium chloride, potassium chloride and sodium sulfate. This property of Cyt R can be exploited to be used as soil salinity sensor.





Nikhiya Shamsher

Care, Colorimetric Method, using Reactive Oxygen Species induced Lipid Peroxidative changes in Saliva, to Assess the Risk of Oral Pre-cancerous Lesions and Oral Squamous Cell Carcinoma in Chronic Smokers

Nikhiya Shamsher

Greenwood High International School,
Bengaluru

Guide :

Prof. Aloysius D'Mello

Smoking, the leading cause of oral cancer in India, kills over 5 people every hour. As high mortality is due to late diagnosis, early detection is vital. Free radical induced lipid peroxidation (LP) is known to promote multistep oral carcinogenesis. Free radicals generated by smoking, damage polyunsaturated fatty acids releasing end-product Malondialdehyde (MDA). A simple, home-based test was devised to determine salivary Malondialdehyde to assess early risk of oral pre-cancer and cancer. It was hypothesized that heavier smokers would exhibit greater degree of salivary LP. A highly sensitive QuitPuff reagent was formulated which when heated with saliva, produces a colour change, directly proportional to the amount of MDA. The MDA level was measured by matching the color change with a colorimetric Lipid Peroxidation Index (LPI) chart. QuitPuff was tested on 500 subjects and validated using UV Spectroscopy, the gold standard for the test. The mean LPI was consistently and significantly elevated ($P < 0.001$) in smokers with oral pre-

cancer and cancer (4.34), smokers who smoked more than 20 (4.12), between 10-20 (3.43) and less than 10 cigarettes per day (2.43) as compared to non-smokers (0.26). The mean LPI's of the test and validation methods correlated. Spearman's correlation indicated significant positive association between colour changes and UV spectroscopy readings ($r=0.93$). QuitPuff detected the salivary MDA levels with 96% accuracy. Smokers exhibited greater degree of salivary LP as compared to non-smokers, the heavier the smoker, greater was the degree of LP. QuitPuff has great potential as a point-of-care test for oral pre-cancer and cancer.





Rajendra Prasad Moturu

MULTIFUNCTIONAL GRANULATOR (MFG)

A Multi functional device to prepare dried spherical granules

Rajendra Prasad Moturu

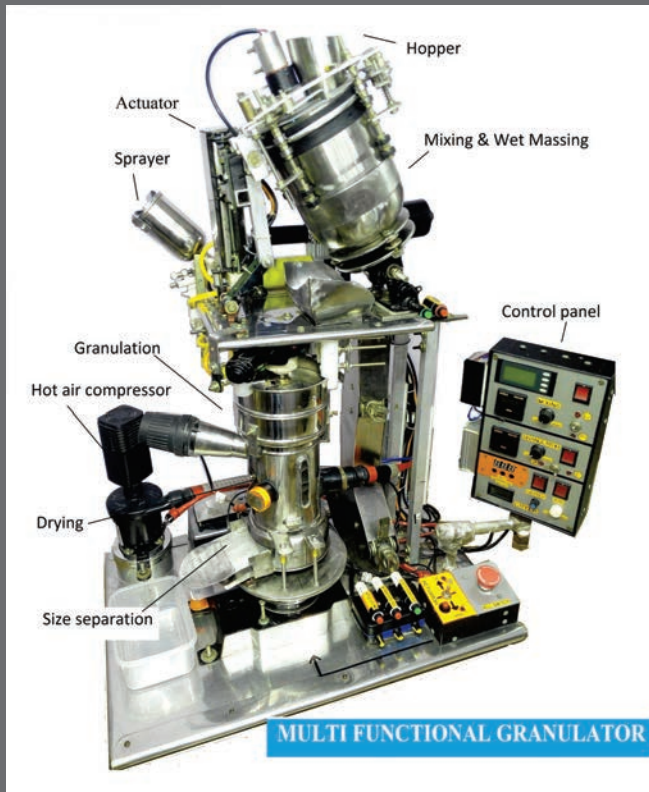
Andhra University College Of Pharmaceutical Sciences, Visakhapatnam

Guide :

Prof. K.V. Ramana Murthy

From the past drug discovery had made the new exploration in the field of R&D and Production. Even though most of the drugs are discovered, the way of presenting these drugs to the patients has not changed since the tablet dosage form is playing a key role in patient health care management, due to its patient compliance. The manufacturing process of tablets dosage form is having more number of process steps like mixing, wet massing, granulation, drying, size separation, punching and it is very tedious process depending upon preparation technique. The present new innovation “Multi Functional- Granulator” can make a new trend in production of granulation industries, as it is designed to be single equipment for all these steps. Multi Functional- Granulator is well designed equipment involving mixing, wet massing, granulation, drying and size separation of dried spherical granules. By using this equipment we can see a 3-Dimensional mixing which is required for uniform mixing and wet massing. Granulation

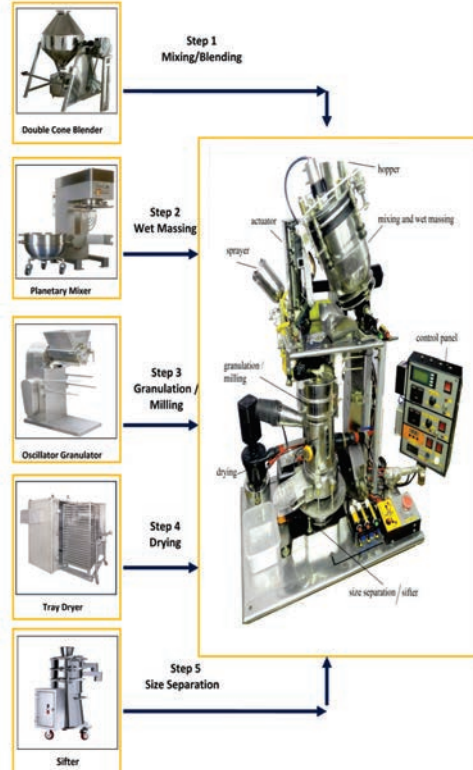
technique is also well designed as it is having a double granulation to form spherical granulation of selective size requirement. The next subsequent step in the process is to dry the spherical granules, this is achieved through more surface area in less space by passing hot air through spirally arranged trays. These granules are collected according to their sizes by using size separation technique-“Sieve Analysis”. All these process steps described are performed within a single equipment therefore it reduces the cost, time, set up area/space, human intervention and it is one of the best equipment in the point of design and efficiency for granulation industries like Pharmaceuticals, API; Chemicals, Ayurvedic, New Chemical Entities (R&D), Fertilizers and Detergents.



MULTI FUNCTIONAL GRANULATOR

MULTI FUNCTIONAL GRANULATOR

5 step multi functional device to prepare dried spherical granules



Applications



Pharmaceuticals



Fertilizers



Detergent Powders



New Chemical Entities



Ayurvedic



Manasi Mishra

Audience response device for Deaf and mute classroom

Manasi Mishra

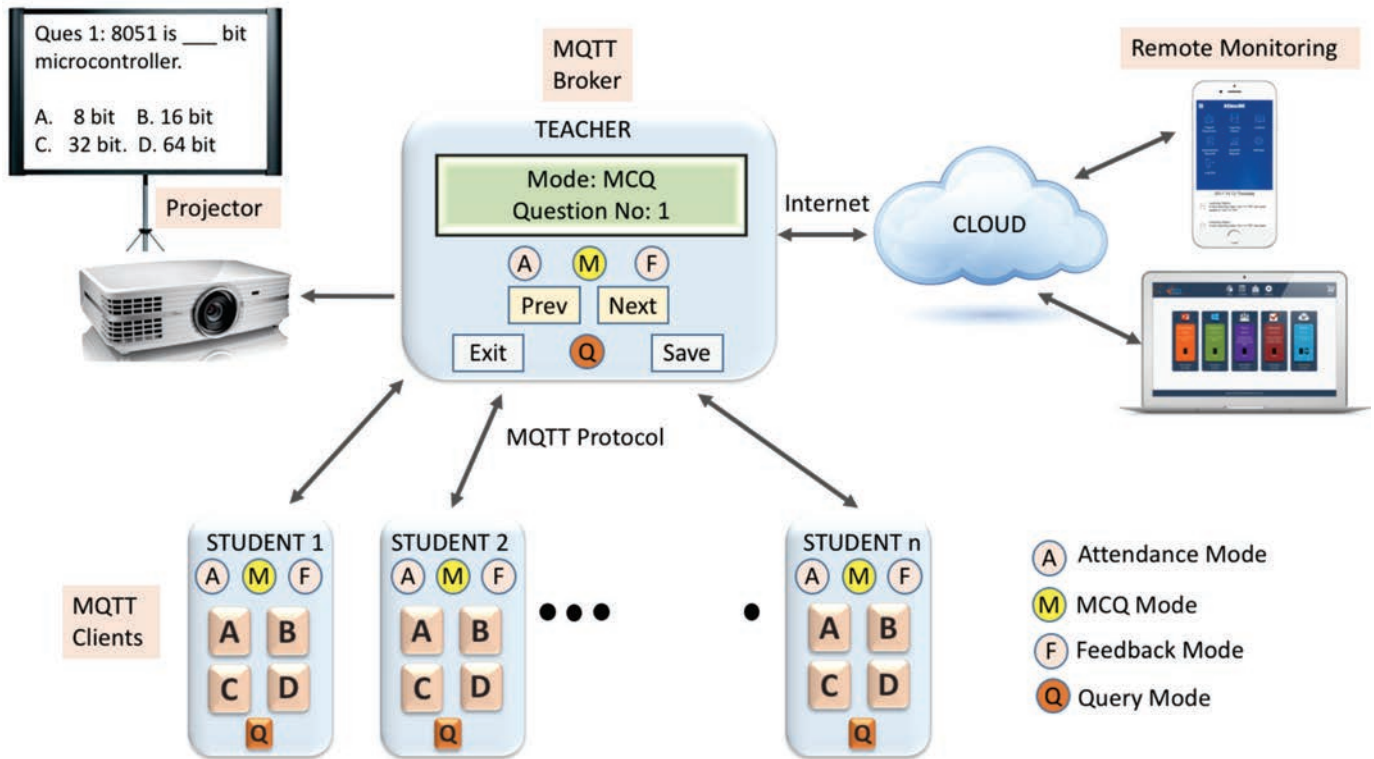
Indira Gandhi Delhi Technical University for Women,
New Delhi

Guide :

Prof. S. R N Reddy

Speaking and hearing plays an important role in effective teaching, individuals who lack these abilities faces an uphill battle. Quantum of work has focused on designing various approaches to teach deaf and mute students. However, it is equally important to assess whether students are following the course materials or there is a need to adjust the pace and methodology of teaching. Creating an active learning environment in D & M classroom is a tedious task as it becomes very difficult for a teacher to observe every student's response at a time through sign language. The level of their enthusiasm and active engagements in the classroom can degrade due to being unheard or unnoticed. This scenario demotivates them to respond in classroom. This innovation can facilitate multiple classroom activities easily without the need for speaking or hearing such as performing quiz, aggregating & analyzing student's responses, taking attendance, receiving student's feedback & handling queries, assessment of every individual, Assistance for

emergency or panic situation. Real-time feedback will allow the lecturer to adapt the lecture during the presentation so as to achieve the maximum efficiency during the lecture & also to modify the future lectures based on the "lessons learned" from the past cases. Students whose performance is poor needs special attention; their performance can be shared automatically to their guardians via E-mail. In future it can also be integrated with the learning management system designed specially for deaf & mute students. This system is low cost, easy to use & configure, uses the light weight protocol for device to device communication, allows remote monitoring through the use of cloud computing technology, highly scalable, can be easily integrated with existing infrastructure.





Anjali Thakur



Pooja Pandey

Development of Process Technology for Manufacture of RTD Carbonated Grain Beverage

Anjali Thakur, Pooja Pandey
Indian Institute of Technology, Kharagpur

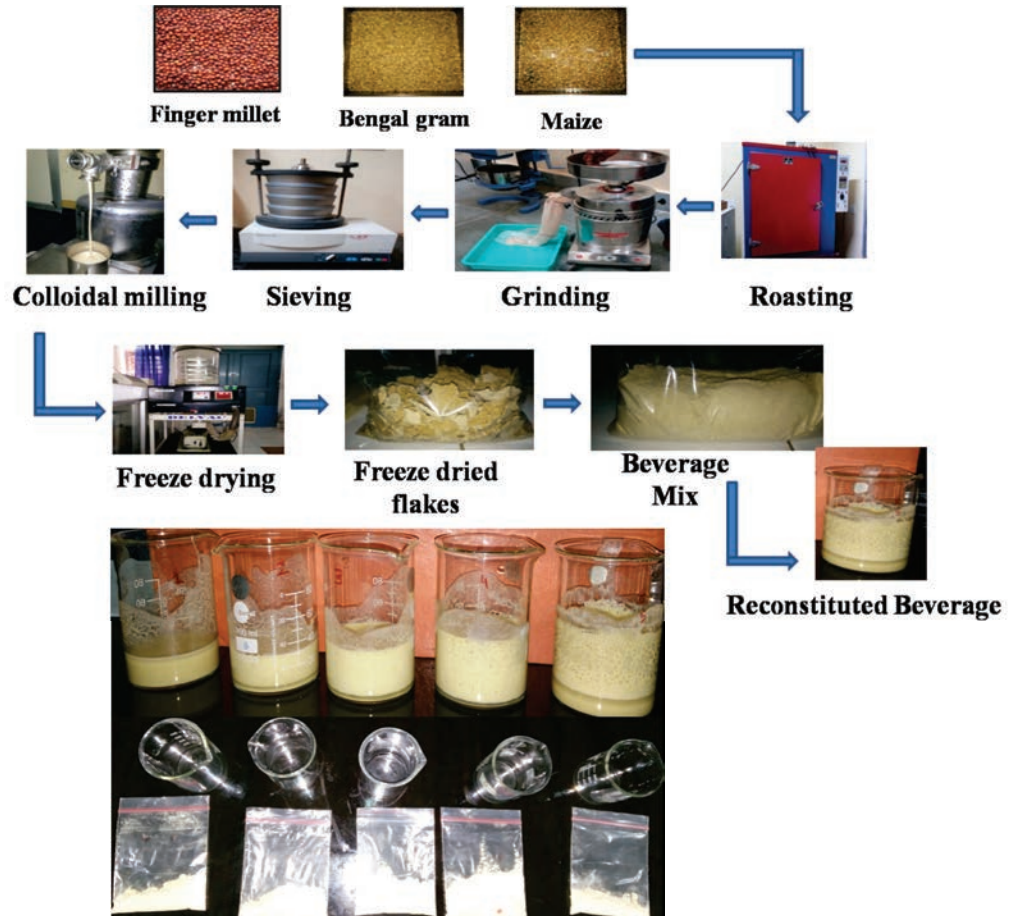
Guide :
Prof. H N Mishra

There is a huge demand for carbonated soft drinks amongst the consumers. Most of the available soft drinks typically contain artificial sweeteners, colors and harmful additives which lead to set of diseases like diabetes, obesity, teeth & bone damage, decrease in metabolism etc. Therefore, a cereal based carbonated beverage mixed with adequate protein and energy can serve as a healthy alternative. Maize and Bengal gram were roasted at a temperature of 160-180°C while finger millet at 80- 120°C for 10-30 min. The optimized conditions for roasting of the maize, Bengal gram and ragi were 180°C for 10 min, 180°C for 27 min and 110°C for 30 min; respectively were determined using face centred composite design (FCCD) and response surface methodology (RSM). The formulation of the beverage premix was obtained using linear programming in the combination of 30g, 30g, 10g, 20g and 10g of roasted maize, Bengal gram, finger millet flours, sugar (powdered) and pea protein isolate, respectively. The formulated instant carbonated cereal beverage was high in protein and energy with low cost (Rs 10/100 g). The prepared carbonated grain based

drink was very much nutritious (16% protein and 390 Cal/ 100g energy). The final formulation obtained gave adequate amount of iron (11.6 mg/100 g). The effect of carbonation was found best for 8% carbonation powder concentration with 1:4 beverage mix to water ratio. The sensory evaluation showed an overall acceptability of 7.7. Unique features are as follows-

- * The formulated instant carbonated cereal beverage with high protein, energy and low cost in the form of dry powder is one of the unique features of the present beverage mix.
- * The prepared carbonated grain based drink is very much nutritious (16% protein) and easily digestible.
- * The final formulation obtained gave adequate amount of iron (11.6 mg/100 g).
- * The sensory evaluation showed an overall acceptability of 7.7.
- * The effect of carbonation was found best for 8% carbonation powder concentration with 1:4 beverage mix to water ratio.

Dry beverage powder can be easily stored in sachets or sealed containers with maximum flexibility of transportation.





Dalbhagat Genu



Jayshree Majumdar

Manufacture of Micronutrient Fortified Rice Kernels through Extrusion Technology

Dalbhagat Chandrakant Genu, Jayshree Majumdar
Indian Institute of Technology, Kharagpur

Guide :
Prof. H N Mishra

Iron deficiency anaemia (IDA) has become a serious problem in India. National Family Health Survey (2015-16) revealed that almost half the population is affected (Children- 58.4%, Women - 53 %; Men- 22.7 %) with anaemia. Fortification of staple food with essential micronutrients would be a key solution to alleviate the IDA. Being a staple food, rice provides a unique opportunity for the micronutrient fortification which leads to address the prevalence of IDA among the affected population. Fortified rice kernels (FRK) have been developed by using rice brokens (byproduct of rice milling industry) and micronutrient premix (containing iron, folic acid and vitamin B12) in three different sizes (long, medium and small) using extrusion technology. The FRK contains 280-425 mg of iron, 750-1250 µg of folic acid and 7.5 – 12.5 µg of vitamin B 12 per 100 g according to the Food Safety and Standards (Fortification of Foods) Regulation, 2016. Optimization of the extrusion process parameters such as die head temperature, barrel temperature,

screw speed, feeder screw speed and feed moisture content were done to produce FRKs which resemble the natural rice in physical, nutritional, sensory & cooking characteristics. Drying process was standardized to avoid any fissure formation in the FRKs. The FRK, thus produced, is mixed with the natural rice in the ratio of 1:100 to obtain iron fortified rice (IFR). Sensory study of rice dishes prepared using FRK (made by using Sona masuri Cv. rice) had shown a good resemblance with those of the natural rice dishes both in raw and cooked form. The iron losses during washing (1%), soaking (2%), cooking were negligible (8%). A pilot scale facility of production capacity 100 kg FRK per day has been established at IIT Kharagpur, promoting the concept of “Make in India”.

लौह पोषीकृत चावल विनिर्माण इकाई
IRON FORTIFIED RICE MANUFACTURING UNIT
 प्रायोजक: जैव प्रौद्योगिकी विभाग, भारत सरकार • Sponsored by: Department of Biotechnology, Government of India



Micro Pulveriser



Blender & Conditioner



Twin screw extruder



Packaging Machine



FRK-NR Mixer



Rice Polisher



RC-Tray Dryer



Saurav Jyoti Sarma



Abhijit Nath



Chandeeep Suman Gogoi

An Automated Panipuri Vending Machine

**Saurav Jyoti Sarma, Abhijit Nath,
Chandeeep Suman Gogoi**
Tezpur University, Assam

Guide :
Er. Polash Pratim Dutta

The focus of the PVM is to provide hygienic panipuri and to deliver it without consuming much time with a 24/7 service experience to the customers. This machine will work as a single unit, but it will contain various sub units for storing the individual items such as hollow bread, different types of ingredients, various types of flavoured water and sauces too. These individual items can be replenished manually when required. The whole process starts with washing and boiling of the potatoes automatically. Then comes the mashing section where all the ingredients and the potatoes will be mashed for making the required paste that will be injected inside the hollow bread. A small heater is attached inside the system to keep the hollow breads fresh and crispy. Since various types of flavoured water will be stored, a refrigerating unit will be there to keep the flavoured water cool and fresh. All the processes will be controlled by a single control unit. This vending machine also has a processing unit which makes panipuri as per customer's requirements. An

interface unit (OLED screen) is there which allows customer to choose appropriate option and guided instruction for transaction. Opening a new stall takes lot of space but installing this machine will reduce the space requirement. The machine can be moved from one place to other where the electricity is available. It is very easy to install in places like malls, restaurants, luxury hotels, airports etc. This machine is believed to promote acceptability and ensure availability of this Indian Snack across the world.





Devan G. Patanvariya



Kalyan Sundar Kola

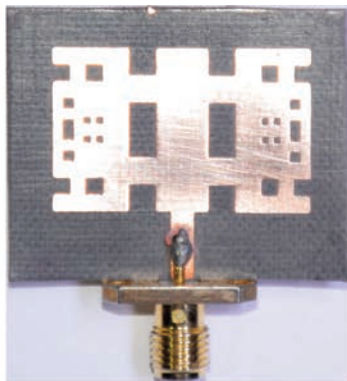
Fibonacci series based rectangular microstrip patch antenna

Deven G. Patanvariya, Kalyan Sundar Kola
National Institute of Technology, Goa

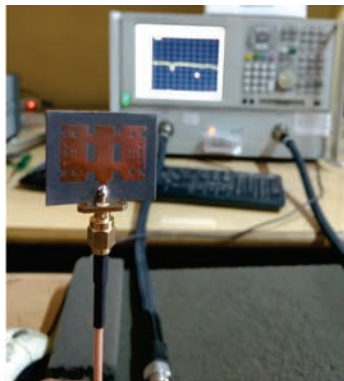
Guide :
Dr. Anirban Chatterjee

The project presents a new fractal microstrip antenna, which is derived from Fibonacci series and Koch snowflake first iteration. The proposed structure has four fold centro-symmetry about the origin. The symmetry is obtained by implementing Fibonacci square box followed by etching of Koch snowflake (first iteration) in all the four quadrants of the structure. The overall dimension of the proposed fractal geometry is interrelated with the area of the smallest square box (C_1) inside the geometry. Therefore, the resonating frequency of a microstrip antenna, based on the proposed design, can be determined by choosing the length of the smallest square box (in mm) inside the fractal geometry. Moreover, the proposed geometry provides a balance between the etched and un-etched portion in the radiating surface of the patch and thereby capable of providing satisfactory gain as compared to the most commonly available fractal microstrip patch antennas. The proposed fractal can also be an excellent choice to design antennas for Bluetooth,

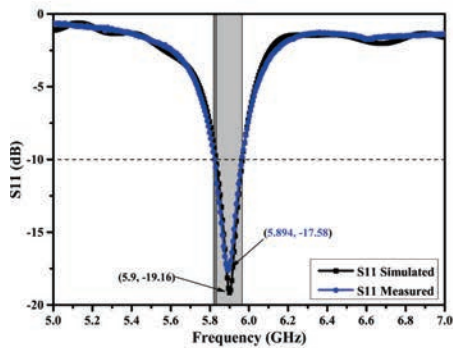
WiMAX, ISM, C, X, Ku, K-band applications, since it can provide very good gain and bandwidth while operating in the corresponding frequencies. The fabricated prototype can directly be used for DSRC application, since it satisfy the gain and bandwidth requirement. Moreover, design of the proposed antenna using three different substrate material of: Roger 5880, Neltec (NX9320) and FR-4, satisfy the gain and bandwidth requirements for the DSRC band.



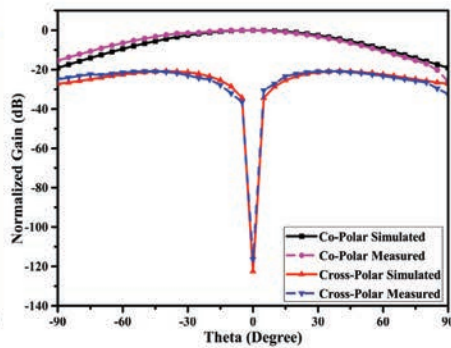
(a)



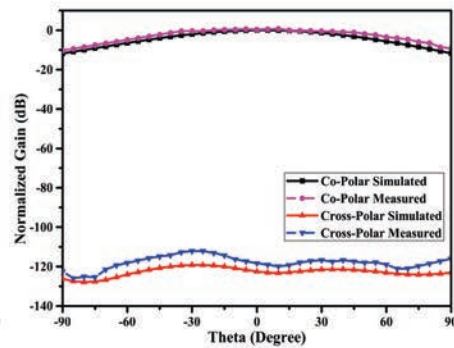
(b)



(c)



(d)



(e)



S.Karthikeyan



Umasankar.S



Karthikeyan.S

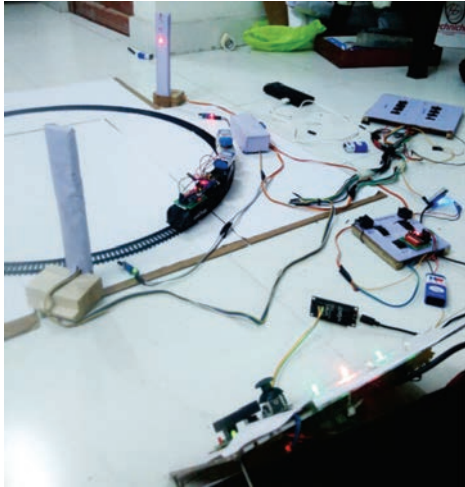
Smart Signalling and Interlocking System

S.Karthikeyan, Umasankar.S, Karthikeyan.S
M.Kumarasamy College of Engineering, Tamil nadu

Guide :
Dr. C. Ramesh

During the foggy condition, the Loco Pilot driver are unable to see the signals, so an innovative approach was done to make a Smart System which uses a Low Power High Range Radio signals to transmit the signal between Station Master, MACL Signal and Loco pilot cabin. This system uses a special data packets for effective communication between the devices. This Data packets carry the information like Train Parameters, Loco pilot Parameters(VCD) etc. The vigilance control system helps in identifying the alertness of loco pilot. The Smart signaling uses the current technology of railways like axle counter and MACL signals for effective usage of Data Produced by them. This results in real time monitoring of various parameters of rolling stock and MACL signals. The use of axle counters in rail yard management software which uses data from various occupancy to switch and prevent the traffic routes. This system does not need Internet connectivity for transmission of data from train to station master cabin. Display panels are provided at

both place of station master room and Loco cabin. This shows the real time details of various parameters. Some of the components used in our system are relays, radio transceiver system. The main aim of our project is to increase the operation of railways in various climatic conditions. The team has designed a system on the objective of "One solution to solve various problems". As a result of it the smart system also helps in solving the various problems like Unmanned Level Crossing and Manned Level Crossing, Alertness of the Loco Pilot while driving, Real Time Monitoring of various parameters in operation of train.





Kartik Vij



Rahul Kinra



Debarshi Ghosh

Bhu-goal : Predicting Moods Of India

Kartik Vij, Rahul Kinra, Debarshi Ghosh, Rouble Gupta
Chitkara University, Punjab

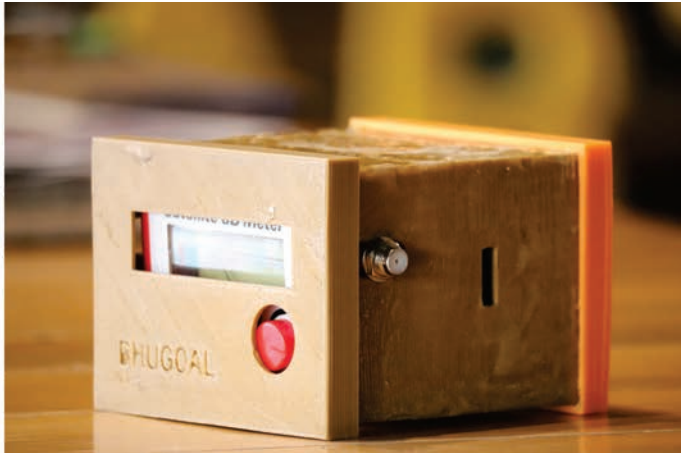
Guide :
Dr Nitin K. Saluja

After working with the farmer community from the last few years, our team has seen farmers complaining God for the uncertainty of weather. When we suggest farmers to follow weather predictions available through applications, the exact words from them are “It doesn't provide us with information about our village” means it is not precise for our village location. The uncertainty about information through weather satellite is quite high. It is difficult to afford such high technology satellites by developing country like India for the next few decades. Hence, the alternate sources should be used for precise information about the weather. The proposed product BhuGoal uses satellite TV signal distortion for precise prediction of rain at a defined location. BhuGoal predicts the rain exactly 2 hours before it is expected with far more accuracy than the billion-dollar satellite. Satellite TV signals use Ku (nearby 10 GHz) band to communicate the channels. While it is established scientifically that the rain impact TV signals as the cloud formation happens

before the rain. While the signal distortion is a function of weather condition, the distortion behavior depends on the channel we are watching. Hence, a network of BhuGoal node will be established with the help of SRISTI to create multispectral and multiple location data. Hence, the nodes installed in different positions provide additional spatial information regarding the current position of clouds and hence it improves the prediction further.



Rouble Gupta





Ritambhara Gond



Anshuman Chaupatnaik



Krishnakanth Sada

Pyrophosphate and Metaphosphate as next-generation Cathode material for energy storage devices

**Ritambhara Gond, Krishnakanth Sada,
Anshuman Chaupatnaik**

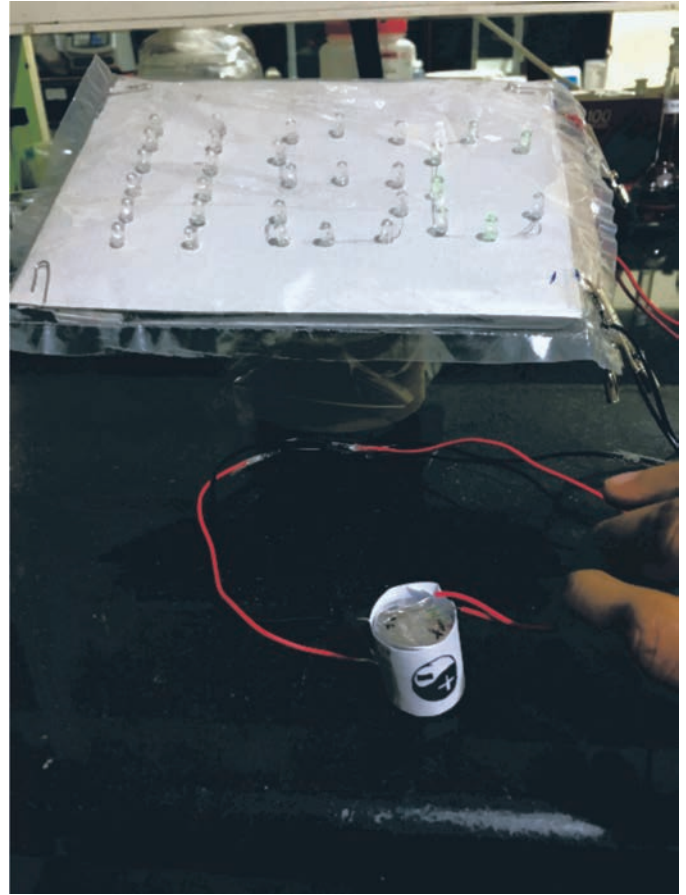
Indian Institute of Science, Bangalore

Guide :

Prof. Prabeer Barpanda

These days it is very common to see portable electronics everywhere and soon petrol and diesel vehicles need to be replaced by electric vehicles to save our planet earth from global warming. The growing concern is to develop cost-effective, much safer, and long cycled life Li-ion batteries. Large storage devices such as for grid storage we need very efficient Na-ion batteries. The cathode, being a major component in any battery can alone raise the energy density of batteries up to 57% by doubling its capacity. Combining good electrochemical performance to safety and materials economy, chemists have discovered suites of cathode materials where the story started with oxides (e.g. LiCoO_2 , LiMn_2O_4 , $\text{LiMn}_{3/2}\text{Ni}_{1/2}\text{O}_4$, $\text{LiCo}_{1/3}\text{M}_{1/3}\text{Ni}_{1/3}\text{O}_2$), a plethora of polyanionic compounds have followed the suit. Among polyanionic compounds, LiFePO_4 has seen the commercialization. These polyanionic class of materials has been proven ground for material discovery for Li-ion and Na-ion batteries with

promising electrochemical performance along with chemical/ thermal stability, economy and operational safety. Lab-scale Na-ion batteries have been made from $\text{NaCo}(\text{PO}_3)_3$ and $\text{NaFe}(\text{PO}_3)_3$ but while studying intercalation chemistry, we found them to be a more efficient catalyst for metal-air batteries than the cathode. Another material which was studied and possible commercialization for large scale energy storage for Na-ion batteries can be imagined is pyrophosphate. Sodium metal pyrophosphate ($\text{Na}_{2-x}\text{T M P}_2\text{O}_7$, $\text{T M} = \text{Fe, Co}$) forms an economic cathode alternative with a 3 V operation (vs Na/Na^+) having capacity approaching 90 mAh/g with excellent rate kinetics and reversibility. For these polyanionic compounds, the strong inductive effect can increase the energy of the transition-metal redox couple and enhance the operating potential vis-a-vis sodium oxide cathodes.



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

INTRODUCTION:

SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions), which means creation in Sanskrit, was born in 1993, to support the activities of the Honey Bee Network (1987-88) to recognize, respect and reward creativity at the grassroots level.

SRISTI, as a developmental voluntary organization strengthens the spirit of creativity and innovations by knowledge rich, economically poor individuals and communities. It builds bridges between informal and formal science, protects intellectual property rights of grassroots innovators and helps in conserving and augmenting biodiversity and associated knowledge systems. It supports eco-friendly solutions to local problems being scouted, spawned and spread by the Honey Bee Network volunteers for over 26 years. It also nurtures ecopreneurs engaged in conserving biodiversity, common property resources, cultural diversity and educational innovations. There are five pillars of Honey Bee Network which SRISTI is committed to backstop:

Educational innovations by school and college students, teachers, and other stakeholders; Institutional innovations at community and other levels in managing natural and other resources, cultural creativity so that curiosity, collaboration, and compassion grow through art, literature and crafts Technological innovations and traditional knowledge dealing with human, animal, plant and ecosystem health, and Policy reforms to generate frugal innovations for sustainable development at all levels, with specific reference to youth, children, women and elderly.

Essentially, it aims at improving access of knowledge rich-economically poor people to various informal and formal institutional resources to trigger self-reliant development process as per the Gandhian ethics and principles.

OBJECTIVES:

1. Systematic documentation, dissemination of, and value addition in, grassroots green innovations and also support biotechnological innovations by communities, technology students and others for a sustainable future.

SRISTI

2. Providing intellectual property rights protection and risk capital support.
3. Help for in situ and ex situ conservation of local biodiversity and associated knowledge system.
4. Empower the knowledge rich but economically poor people by adding value to their innovations, traditional knowledge and associated biological diversity including microbial diversity.
5. Link formal and informal science to enrich both the knowledge systems, build databases of innovations by farmers, artisans, mechanics, technology students, teachers and other social innovators,
6. To provide early stage risk capital and mentoring support to grassroots innovators, students and other mavericks to scale up products and services based on grassroots and youthful innovations through commercial or non-commercial channels.
7. To embed the insights learnt from grassroots innovations in

BIODIVERSITY

**Give me a place to stand.
I will move the world.**



the formal educational, policy and institutional systems in order to expand the conceptual, cognitive, institutional and policy space available to these innovations.

INITIATIVES:

BIOTECH INNOVATION IGNITION SCHOOL (BIIS)

The young biotech and life sciences students have to be
Gandhian Young Technological Innovation (GYTI) Awards

engaged with the rich traditional knowledge and grassroots innovations scouted by the Honey Bee Network to explore science underlying creative pursuits of local communities and develop value added solutions for improving their livelihoods. SRISTI pursues an innovative pedagogy in collaboration with BIRAC (Biotechnology Industry Research Assistance Council), DBT, GOI, New Delhi a three week Biotech Innovation Ignition School (BIIS) at SRISTI Sadbhav Sanshodhan natural product and microbial diversity lab.

The students selected from all over the country are encouraged to hone their skills for validation and value addition in the local knowledge and innovations. It is hoped that some of the results of student research will lead to product development for community wellbeing either as open source do-it-yourself (DIY) solutions or commercializable solution through market mediation with an objective of ensuring fair and just benefit sharing. In most cases, further research may be needed to take the results of the BIIS to their logical conclusion.

The rationale of BIIS is to develop solutions for grassroots applications for human, animals, and agricultural applications including herbal technologies, medical devices, and microbial

applications while building youth leadership in Biotechnological applications for social good.

BIRAC's BioNEST

SRISTI Innovations-BIRAC's BioNEST is an innovation and grassroots distinctive traditional knowledge based business incubator, an entity funded by BIRAC (Biotechnology Industry Research Assistance Council, Department of Biotechnology, Govt. Of India). Innovations based on 'out-of-the-box' thinking, traditional knowledge, grassroots level knowledge systems, ideas of university students and even children are supported for successful product development and commercialization. Innovations from both formal and informal sectors are supported. The incubator caters to sectors like biotechnology, biological sciences, environmental sciences, food technology, medical science and technology, nanotechnology, pharmacy, rural development and other allied areas.

CHILDRENS' CREATIVITY:

The Children's Creativity and Co-creation workshops empower children to not only identify and articulate their own problems as well as that of socially disadvantaged segments, but also to find their solutions individually and collectively.

Involvement of children in solving the social challenges faced by them and others help us mobilise the creative potential of children around the world. This might help in overcoming persistent social inertia in emerging and sometimes even in advanced regions.. It is hoped that many of these children will grow into empathetic, creative and compassionate leaders in future.

INSHODH – “TEACHERS AS TRANSFORMERS

Teachers as Transformers, by Vijaya Sherry Chand and Shailesh Shukla, Ravi J. Matthai Centre for Educational Innovation, Indian Institute of Management Ahmedabad, was the title of a volume brought out by UNICEF, Gujarat, in 1998 that presented the work of 30 outstanding teachers of Gujarat. It was published by SRISTI Innovations, the publishing arm of SRISTI for distribution at National level. This volume was the genesis of a search for outstanding teachers who, using their own intellectual resources, have managed to innovate and improve education in their contexts. The initial work was supported by the Sir Ratan Tata Trust, Mumbai. Three yearbooks of case studies of innovative teachers were brought out (2005-07). In addition, a number of other accounts were produced.

SRISTI has been a partner in this action research led by prof Vijay Sherry Chand at IIMA. Some of the selected teachers are invited at ICCIG conference, and are honoured with SRISTI samman along with other social innovators.

SHODH SANKAL

The concept of Shodh Sankal (a chain of experimenting farmers) to generate a lateral learning environment among grassroots innovators was started by SRISTI in 1996. The idea was to bring together experimenting farmers and discuss the results of trials that farmers have taken up on their own to solve various local problems.

SOCIAL INNOVATION FUND

The main objective of Social Innovation Fund (SIF) is to provide mentoring, financial support, fabrication, validation, and value addition facilities in labs, fields, and R and D Institutions, part of [HBN, for nurturing creativity in culture, education, technology and governance.](#)

SRISTI INNOVATIONS

A sec 8 company was set up with the objective of strengthening

the capacity of grassroots inventors, innovators and ecopreneurs in the area of conserving biodiversity and developing eco-friendly solution to local problems and is engaged inter alia in the areas of documentation, experimentation, search, development and diffusion of sustainable technologies and institutions. It now hosts the Bionest incubator besides publishing HBN newsletters and other books in Hindi, Gujarati and English languages. It also develops commercialization product ensuring a fair share of benefits going back to knowledge providing communities.

Gandhian Young Technological Innovation (GYTI) Awards celebrates the spirit of students' innovation in engineering, biotechnology, agriculture, pharmacy, material science, design and other applied technological domains through extremely affordable/frugal solutions or the ones pushing the technological edge. It is SRISTI initiative to foster youth-driven tech innovations. Gandhian Young Technological Innovation Awards 2018 were given by the President of India, Shri Ram Nath Kovind during the Festival of Innovation and Entrepreneurship (FINE), at Rashtrapati Bhavan, New Delhi on March 19, 2018.

Other ACTIVITIES:

SATTVIK FOOD FESTIVAL:

A festival to celebrate traditional nutritious food and associated knowledge systems was started fourteen years ago at the IIM-A, to provide market based incentives for conserving agro-biodiversity. Creation of demand for rarely or less cultivated nutritionally rich crops and varieties may stimulate their cultivation. The festival also hopes to encourage the farmers to grow such crops and augment their incomes. More details can be availed from <http://sattvik.sristi.org/>

SHODHYATRA

journey Awa:k through the villages around the country is undertaken to search and share knowledge, creativity and innovations at the grassroots. ShodhYatra is an attempt, on the part of SRISTI, to reach out to the most remote parts of the country with a firm belief that the hardship and challenges of natural surroundings are in many cases, prime motivators of creativity and innovations.. We also share the Honey Bee database with the villagers. So far, 43 Shodhyatras have been pursued covering all the states of India once, some twice or more times covering more than 5000 km. More details at <http://www.sristi.org/shodhyatra/>

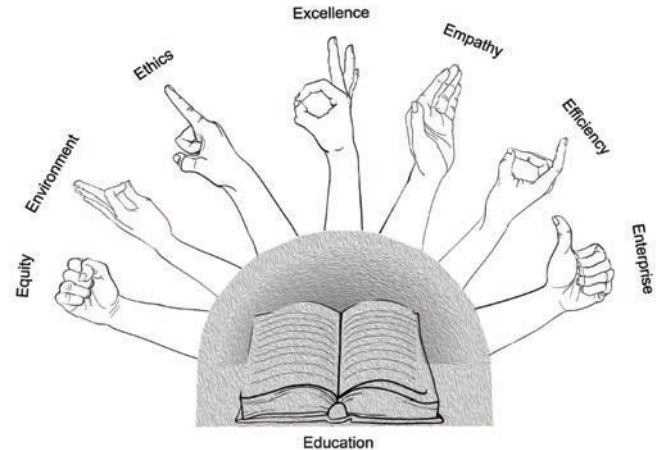
SRISTI LAB:

SRISTI believes that adding value to indigenous knowledge will help local communities co-exist with biodiversity by reducing primary extraction and generating long term benefits. Such an approach will lead to augmenting sustainable resource use and livelihood support systems.

it converts local knowledge and resources into value added products with simultaneous development of processing facilities in rural region where natural resources exist but not enough in situ value addition takes place.more at <http://www.sristi.org/sristi-lab/>

AASTIHK

Academy for Augmenting Sustainable Technological Inventions, Innovations, and Traditional Knowledge (AASTIHK) began as an independent programme in 2005. It aims at creating a virtual and real knowledge community of professionals and experts in the field of invention, innovation and traditional knowledge



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

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

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>).

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.

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 Auto-motive 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.P 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 Prostheses 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	Lalajibhai 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 UL-TRASONIC 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 diabetic 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 Parkinson's disease patients	Debjyoti Chowdhury	Dr. Madhurima Chatterjee	Heritage Institute of Technology
23	Paper microfluidic chip	Avisek 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

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

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 Bhavesh 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	Avisek Barla Abrar Ali Khan Sameer Sharma Vijay Anand Nitish Kumar Singh	Dr Vignesh Muthuvijayan	Indian Institutes of Technology, Madras	GYTI Appreciation

	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 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

GYTI 2018 Awardee

Sr. No.	Title	Student Name	Supervisor Name	college/Institute
1	Point of Care Nano Diagnostic Kit for Brucellosis	Rohit Shivaji Pawar	Prof. Vandana B. Patravale	Institute of Chemical Technology
2	Miniaturized Fluorescence adapter for Fluorescence Sputum Smear Microscopy using bright-field microscope	Vikas Pandey	Dr. Ravikrishnan Elangovan	Indian Institutes of Technology Delhi
3	A multipurpose low cost biological air purifier	Mrs. Neeta Ganesh Wagle	Prof. Neelu N. Nawani	Dr. D.Y. Patil Vidyapeeth
4	NanoSpermviricide: A Dual Acting Aid for Prevention of Unintended Pregnancy and Unprotected Sexual Intercourse Associated HIV	Amit Mirani	Prof. Vandana B. Patravale	Institute of Chemical Technology
5	A Low-Cost Disposable Microfluidic Biochip for malaria diagnosis	Brince Paul K	Dr. Shiv Govind Singh	Indian Institutes of Technology Hyderabad
6	Smartphone-based impedimetric disposable biosensor for detection of cardiac biomarkers	Debasmita Mondal, Sourabh Agrawal	Prof. Soumyo Mukherji	Indian Institutes of Technology Bombay
7	Decellularized corneal matrix (DCM) based injectable hydrogel for strengthening cornea matrix in severe Corneal Keratoconus	Shibu Chameettachal	Dr. Falguni Pati	Indian Institutes of Technology Hyderabad
8	Super resolution Ultrasonic Imaging (SUI)	Amireddy Kiran Kumar	Prof. Krishnan Balasubramaniam and Dr. Prabhu Rajagopal	Indian Institutes of Technology Madras
9	Understanding the design principles of protein nanosensor to combat multidrug resistant enterobacteriaceae	Abhishek Narayan	Dr. Athi Narayanan N	Indian Institutes of Technology Madras

10	A novel strategy to block malaria transmission	Divya Beri	Prof. Utpal Tatu	Indian Institute of Science
11	Design and development of Phase Change Material (PCM) based Milking cum Cooling Pail	Ravi Prakash	Dr Menon Rekha Ravindra	National Dairy Research Institute
12	An Alternative Technology to Produce Biomass-Based Food Grade Flavors, Fuels and Value Added Chemicals	shelaka gupta	Dr. M. Ali Haider	Indian Institutes of Technology Delhi
13	Nano based soil conditioner for agricultural application	Pallabi Das and Kasturi Sarmah	Dr. Sanjay Pratihari and Dr. Satya Sundar Bhattacharya	Tezpur University
14	SNAP - A RAW images' based setup that can calculate nutrient concentration in leaves	Ekdeep Singh Lubana	Dr. Maryam Shojaei Baghini	Indian Institutes of Technology Roorkee
15	Rolling Water Purifier - Roll Pure	Ramesh Kumar	Prof. T. Pradeep	Indian Institutes of Technology Madras
1	A Non-contact Optical Device for Online Multiplexed Monitoring of Diseases of Military Importance in Fragile and Conflict-Affected Settings	Probir Kumar Sarkar	Prof. Samir Kumar Pal	University of Calcutta
2	Performance Evaluation and Process Optimization for Production of Ready-to-Eat Therapeutic Food Paste in Pilot Scale Unit	Rakesh Kumar Raigar	Professor H N Mishra	Indian Institutes of Technology Kharagpur
3	3D-NuS: A Web Server for Automated Modeling and Visualization of non-canonical 3-Dimensional Nucleic Acid Structures	L Ponoop Prasad Patro	Dr Thenmalarchelvi Rathinavelan	Indian Institutes of Technology Hyderabad

1	ECO-FRIENDLY WATER RETENTION NATURAL POLYMER	Narayan Lal Gurjar	Prof. S. M. Mathur	Maharana Pratap University of Agriculture & Technology
2	New generation periscope fruit picking device	Tania Dutta	none	Birla Institute of Technology & Science
3	Nano-biosensor and methods for detecting potassium ion concentration	Jaymin Kanubhai Jadav	Dr. B. A. Golakiya	Junagarh Agricultural University
4	Development of Graphene Coated Conductive Fabrics based Smart Wearable Body Warmers for Defense and Medical Applications	Nagarjuna Neella	Prof. K.Rajanna	Indian Institute of Science Bangalore
1	Smartphone based portable low-cost continuous wave Doppler Ultrasound system	Biswabandhu Jana	Prof Swapna Banerjee and Prof. Goutam Saha	Indian Institutes of Technology Kharagpu
2	Battery-less IoT Sensing Nodes	Anandarup Mukherjee	Dr. Sudip Misra	Indian Institutes of Technology Kharagpur
3	Road Accident Detection using Perceptual Attributes of Video	Dr. Sinnu Susan Thomas	Prof. Sumana Gupta/ Prof. Venkatesh K S	Indian Institutes of Technology Kanpur
4	Feasibility Study of Wireless Power Transfer Using Metamaterial	Amit kumar baghel	Ssir Kumar Nayak	Indian Institutes of Technology Guwahati
5	Design of Low Cost Infrared Vein Detector	Trivikram A	Chakravarthi B K	Indian Institutes of Technology Bombay
6	Design of Window Solar Cooker	Avinash Prabhune	Chakravarthi B K	Indian Institutes of Technology Bombay
7	Magnetic tool for nano finishing the holes, vertical and horizontal surfaces	Girish Chandra Verma	Prof. Pulak Mohan Pandey	Indian Institutes of Technology Delhi
1	BUZZING BAND	SAKA NAVEENA	RAVURI VISWANADHAM	Jawaharlal Nehru Technological University

2	Brain wave nerve excitation for physically disabled	Dr Sunil Jacob (SCMS School of Engineering and Technology)	Prof M Madhavan	A.P.J. Abdul Kalam Technological University
3	A computational alternative to analyze and understand Ebola virus pathogenesis in human	Abantika Pal	Dr. Pralay Mitra	Indian Institutes of Technology Kharagpur
4	Open Source Augmented Reality Wearable Smart Assist Device for Blind	Sarang Nerkar	Prof. Steve Mann	University of Toronto
5	WhiteCane - A Virtual Assistant for the Visually Impaired	Barnopriyo Barua	none	Indian Institutes of Technology Kharagpur
6	Ionic movement based desalinators	L.R.Ravindranath	S.Anbumalar	Pondicherry University
7	RAPID CERVICAL CANCER DETECTION USING NEUROMORPHIC HARDWARE	NARAYANI BHATIA	DR. MANAN SURI	Indian Institutes of Technology Delhi
8	Project Title: 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	Prof. Bhim Singh	Indian Institutes of Technology Delhi
9	Cerium impregnated activated carbon composite as a filtering material for fluoride removal from groundwater	Mahipal	Dr. Trishikhi Raychoudhury	Indian Institutes of Technology Patna
10	Loco-Pilot Vision Enhancement System: TRINETRA (Third eye) for Indian Railways	ANAND KUMAR K S	Dr. R.K.Saket and Dr. R.Rajendran	Indian Institutes of Technology (BHU) Varanasi

11	Katha	ritika singh	Koumudi Patil	Indian Institutes of Technology Kanpur
12	TULO –Automated Mandibular Advancement Device for the treatment of obstructive sleep apnea.	Vimal C	Prof. Dr. J. Ramkumar	Indian Institutes of Technology Kanpur
13	Augmentative Rehabilitation of SCI and Stroke Patients	Kashif Islam Khan Sherwani	Dr. Neelesh Kumar	Indian Institutes of Technology Indore
14	Detection of hydrocarbons by laser assisted paper spray ionization mass spectrometry (LAPSI MS)	PALLAB BASURI	Prof. T. Pradeep	Indian Institutes of Technology Madras
15	An indigenous technology for development of cost-effective and energy-efficient engine intake air filters	Ajay Kumar Maddineni	Prof. Dipayan das	Indian Institutes of Technology Delhi

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