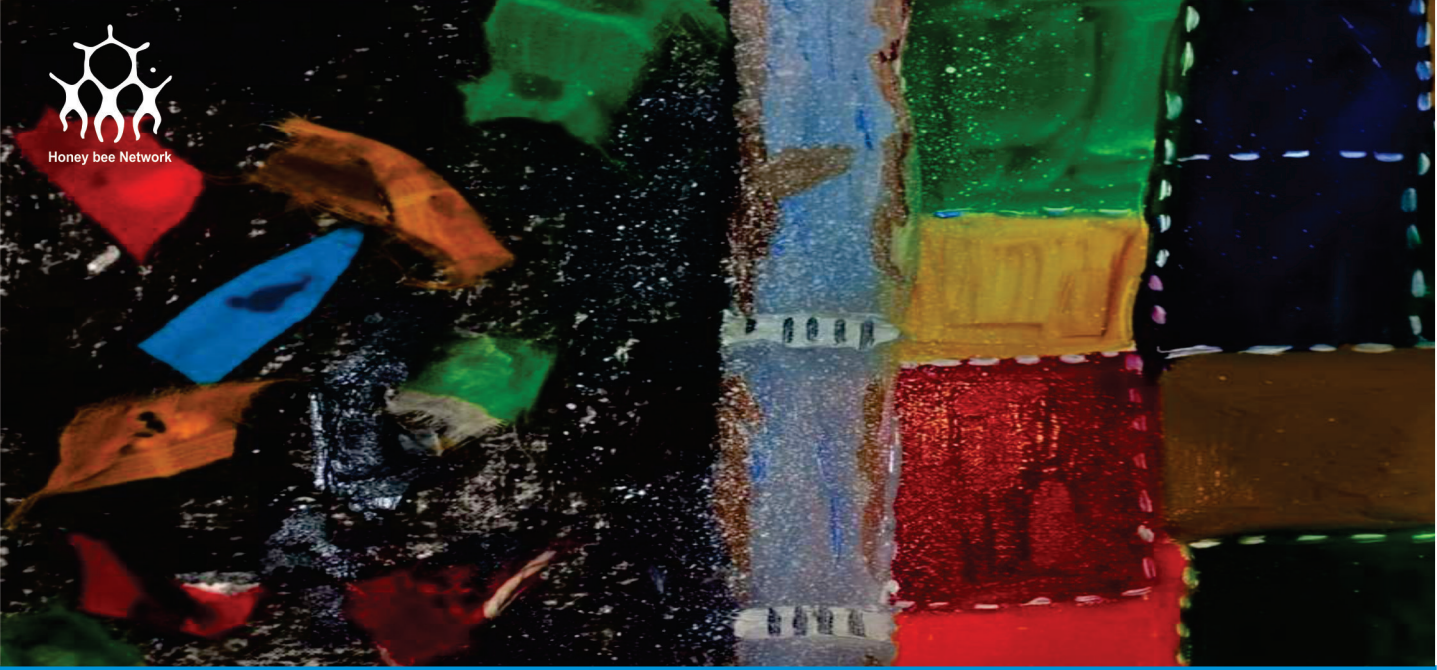

Weaving a Quilt Out of Technological Patches

GYTI 2023

Gandhian Young Technological Innovation Awards

TECHNOLOGICAL INNOVATION

by Young Creative Minds

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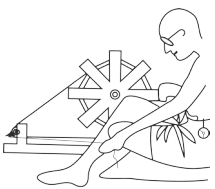

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Gandhian Young Technological Innovation Awards

GYTI - 2023

Gandhian Young Technological Innovation Awards (GYTI)

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Foreword

I am a great admirer of the phenomenal contributions Honey Bee Network has made to national and international dialogue on development of inclusive innovation ecosystems worldwide over the last four decades.

I have mentored and championed various initiatives, particularly since the mid 90s. I have experienced the amazing role played by SRISTI, GIAN and the National Innovation Foundation with which I have been privileged to be associated for almost two decades.

SRISTI has created new benchmarks in developing open databases of farmers' innovations as well as innovations by technology students and children. The evolution of GYTI awards as a point of reference in the technical higher education system of the country is an unprecedented initiative.

Earlier as the chair of the management committee of the SITARE program of the Department of Biotechnology, I had the privilege to witness the rigour with which entries were reviewed and outstanding scholars were supported by BIRAC. What I admire even more is that even after the unfortunate discontinuance of funding by BIRAC, the rigour and relevance of GYTI awards has not dimmed the slightest bit.

I am confident that the most inspiring SRISTI team will continue with the support of Honey Bee Network volunteers to recognise the students and encourage them to push the technological frontier on one hand and the social and MLM (More from Less for Many) frontier on the other.

India has been a pioneer in transcending the frontier of frugality in various fields of technology without compromising on excellence and relevance. I am so happy to see the majority of the awardees and the appreciated students continuing this effort.

I thank the PSA Dr. Ajay Sood, a dear friend, an outstanding science leader of our country for doing us the honours. Encouragement by him will be a lifelong memory for the students and their guides.

I wish to put on record my deep appreciation for the guides of these students without whose mentoring these students might not have achieved such a distinction.

Dr. RA Mashelkar, FRS
Chair (Research Advisory Committee, Honey Bee Network) and
Former DG, CSIR

Acknowledgements:

We extend our heartfelt congratulations to all the awardees and student innovators who have achieved remarkable distinction in this highly competitive and rigorously reviewed competition. Your exceptional achievements are a testament to your dedication, creativity, and relentless pursuit of excellence. The recognition you have earned reflects not only the quality of your innovative ideas but also the hard work and perseverance you have demonstrated throughout the process. We also congratulate the students who have submitted ideas and innovations but have not been awarded. Honey Bee Network and SRISTI extend their best wishes to each of them and wish them all the best in their future endeavours.

The review process was conducted entirely online. Each entry was evaluated by multiple subject matter experts by the Techpedia team of SRISTI. The final round of evaluation of the shortlisted entries was undertaken by experts at IIT Delhi. We are grateful to the esteemed experts who contributed to the evaluation process, including, Dr. Atul Bhargava (Senior Researcher, STMicroelectronics), Dr. Priya Vashishth (Assistant Professor, IIT Delhi), Dr. Deepak Joshi (Associate Professor, IIT Delhi), Dr. Jitendra Khatait (Associate Professor, IIT Delhi), Dr K. K. Deepak (Visiting Professor, IIT Delhi), Prof. Ravikrishnan Elangovan Professor, IIT Delhi), Dr. Richa Gupta (Assistant Professor, IIIT Delhi), Dr. Srinivas Venkataraman (Assistant Professor, IIT Delhi), Dr. Aakash Johry (Assistant Professor, IIT Delhi), Prof. Pramod Khadilkar (Professor, IIT Delhi), Prof. Amit Shukla (Professor, IIT Delhi), Dr. Jainendra Shukla (Assistant Professor, IIIT Delhi), Dr. Jay Dhariwal (Assistant Professor, IIT Delhi) and Dr. Avijit Bansal (AIIMS, New Delhi).

A special mention is extended to Prof. V. Ramgopal Rao (Vice-Chancellor, BITS Pilani), Prof. P.V.M. Rao (Professor, IIT Delhi), Prof. T. Pradeep (Professor, IIT Madras), Prof. R. Pradeep Kumar (Director, CSIR-CBRI), Prof. Aniruddha B. Pandit (Vice-Chancellor, ICT, Mumbai), Prof. Vandana Patravale (Professor, ICT, Mumbai), Prof. Mahesh Chhabaria (Principal, L. M. College of Pharmacy), Prof. B. K. Chakravarthy (Professor, IIT Bombay), Prof. B. Ravi (Director, NIT Surathkal) and Prof. Uday B. Desai (Emeritus Professor, IIT Hyderabad) for their continuous encouragement and unwavering support.

We are also grateful to all the SRISTI team members who worked tirelessly day and night throughout the process of GYI review till the award ceremony including Dr. Swasti Dhagat, Mr. Chetan Patel, Mr. Ankit Mudpe, Mrs. Sumitra Patel, Mr. Ramesh Patel and volunteers (Mr. Digvijay Singh Rajpurohit, Mr, Sagar Panchal and Ms. Venushree Patel). All other colleagues at SRISTI also deserve an appreciation for their unconditional support.

Additionally, we are also grateful to all the reviewers who participated in the GYTI-2023 review process by reviewing and providing valuable inputs online. Their time and patience were instrumental in the smooth execution of the award.

Introduction

The Honey Bee Network has been able to recognise innovations by technology students since 2012 in various disciplines of engineering and life sciences. With the launch of techpedia.in, a platform was created to promote originality and lateral linkages not only among students but also students and industry in 2009. In the absence of such a platform, it was difficult for any young student to know what has been done before because most of the projects, particularly at the B.Tech level are neither published nor shared in the public domain. Inevitably duplication may take place and originality quotient may come down. But to our surprise at least in the sample of 200,000 titles and abstracts of student projects at techepdia.in, there was not a great deal of duplication at least among the institutions and colleges which shared abstracts with us. SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions) not only hosted the platform but also tried to recognise the outstanding student projects.

Dr. RA Mashelkar, champion of inclusive innovations globally, a very valued patron and well-wisher of Honey Bee Network did the honours with the first awards onwards in 2012. Within a very

Table 1: GYTI Progress Report 2012 - 2021

Year	Awards (A)	Appre-ciation (B)	Total Recogni-tions (A+B)	Patent Granted/ Filled	Patent Under Process	Publica-tions	Major Awards & achievements after GYTI	Enterprise Set-up	Grant & Invest-ment mobilized (In Lakh)	Employ-ment/jobs Generated
2021	19	33	52	21	13	230	49	6	20.0	9
2020	21	26	47	15	13	56	17	7	38.0	27
2019	21	23	44	20	24	241	65	23	84.6	72
2018	23	29	52	40	19	209	108	33	3754.0	11
2017	23	17	40	29	6	447	109	13	242.0	10
2016	20	20	40	44	8	209	95	20	1275.0	260
2015	17	27	44	39	4	184	85	9	301.6	-
2014	13	27	40	44	10	178	63	6	548.9	-
2013	22	24	46	4	2	17	30	1	-	-
2012	14	-	14	7	-	38	10	1	4.0	-
Total	**193**	**226**	**419**	**263**	**99**	**1809**	**631**	**119**	**6268.1**	**389**

short period of time, GYTI awards built a reputation because of the very rigorous screening process by academic volunteers of the top institutions of the country. From 2015-21 BIRAC (Biotechnology Industry Research Assistance Council) joined hands with SRISTI and Honey Bee Network to provide a grant of Rs. 15 lakhs to the awarded scholars, generally pursuing doctoral studies but in exceptional cases we also included master's and B.Tech students. Another 100 grants of Rs. 1 Lakh were to be given to undergraduate students to pursue their projects as a part BIIS (Biotechnology Innovation Ignition School) project. However, the partnership with BIRAC concluded after the awards of 2021. From 2023 onwards with a break of 2022 due to Covid-19, Honey Bee Network and SRISTI have pursued the process on their own without any outside help so far. We are very keen to build partnerships with various public and private institutions which believe that early-stage recognition of bright students can play a very important role in strengthening the ecosystem for inclusive innovations and pushing the technological frontier.

We are grateful to the Principal Scientific Advisor to the Government of India, for kindly agreeing to give away the awards and appreciation this year. The award function is being chaired by Dr. RA Mashelkar, a lifelong patron of the Network activities. The program has led a large number of publications, patents and start-ups. The impact of GYTI awards is evident from Table 1.

During the last year, we received 514 entries of which 381 were eligible in different disciplines of life science and engineering. Maximum entries (61) were in biomedical engineering, the coverage included 128 universities and institutions from 25 states and Union Territories of the country. These entries were sent to three to five reviewers to ensure that a rigorous peer review process is followed to recognise the budding talent in a most fair and transparent manner. After the online review, another round of offline review was held at IIT Delhi, like in previous years thanks to the extraordinary support from Prof. PVM Rao, Dean, IIT Delhi. We received the active cooperation of 272 reviewers from 104 institutions, universities and some industries as well. We are grateful to the reviewers for sharing their recommendations in an objective manner. The conflict of interest was completely avoided.

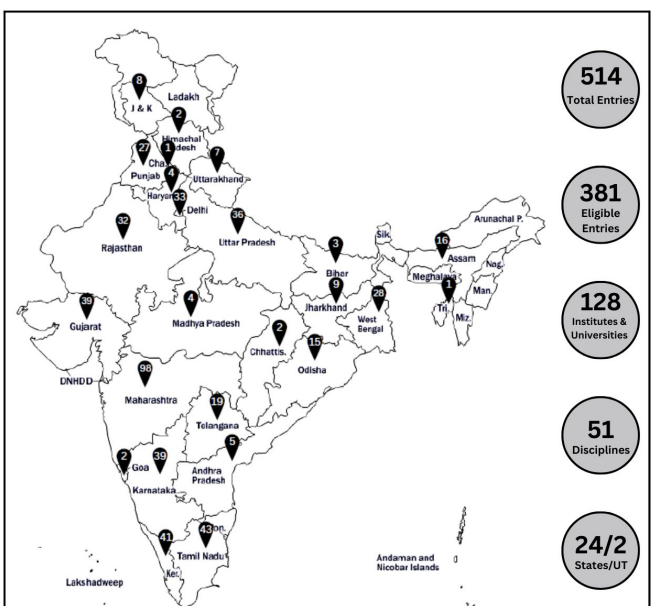

Figure-1

Data for State wise Entries

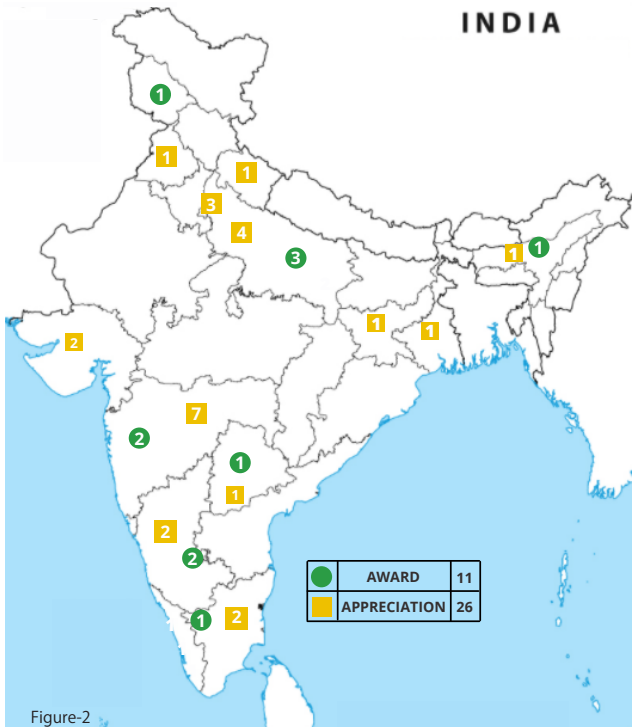

Figure-2

State wise Award

It is our hope that all the awarded and appreciated scholars and their guides will continue their excellent pursuits in future. We also hope that the incubation and acceleration ecosystem of the country will provide support to these scholars to help those who intend to set up a start-up. SIIE (Sanctuary of Innovation, Incubation and Entrepreneurship) BioNEST Incubation at SRISTI Innovation will be happy to co-incubate them and other innovations. I appeal to those scholars who do not wish to set up a start-up to assign their solutions at mutually agreed terms to other students or start-ups who wish to take these forward. It will be a pity if many of the commercialisable solutions and technologies or DIY solutions remain on the shelf of the faculty. The leaders of higher education in technology may like to advise students who don't wish to take their projects forward to assign them to others so that society benefits from the painstaking work of these scholars and enormous entrepreneurial energy is unleashed in the country.

I and my colleagues in Honey Bee Network, SRISTI and GIAN compliment all the winners and the appreciated students and hope that they will let their solutions be pursued further in a relay/kho-kho model.

I wish to put on record enormous effort put in by Dr. Swasti Dhagat, Coordinator of SRISTI Natural Product Lab, Chetan Patel, Secretary, SRISTI and Ramesh Patel, President, SRISTI Innovations for accomplishing a mammoth task of mobilising, reviewing and finally bringing entries to the present status.

Prof. Anil K Gupta
CSIR Bhatnagar Fellow 2018-21
Founder, Honey Bee Network, SRISTI, GIAN & NIF
Visiting Faculty, IIMA & IITB, Academy Professor, AcSIR

Highlights:

The Gandhian Young Technological Innovation (GYTI) Award 2023 saw an overwhelming response with approximately 370 entries spanning 37 branches of engineering and life sciences. This year, participation was open to undergraduate, postgraduate, and research scholars in life sciences and engineering. Entries were received from institutions across the country, including 172 from various Indian Institutes of Technology (IITs), 13 from Indian Institute of Science (IISc) Bengaluru, 21 from Birla Institute of Technology and Science (BITS)-Pilani, 32 from APJ Abdul Kalam Technological University, 22 from Nagpur University, 11 from Gujarat Technological University, 8 from Jawaharlal Nehru Technological University, and 5 from Savitribai Phule Pune University. Students from various National Institute of Technology (NITs), Institute of Chemical Technology, Jawaharlal Nehru Centre for Advanced Scientific Research, CSIR laboratories and engineering college across the country applied for the award.

After a thorough review by experts (professors and scientists) from premier institutes, 11 proposals were selected for the award and 26 proposals for appreciation. The majority of awards and recognitions went to innovators from IITs, IISc, and Birla Institute of Technology & Sciences. This year, the awards were given to innovative students from various disciplines of engineering and life sciences.

Awards:

Agriculture:

Abhishesh Pal from BITS-Pilani, Hyderabad developed an ultraportable device for soil nutrient quantification. It leverages capillary forces for sample processing and sensing on a compact 7x10 mm chip. Users can place a soil suspension drop on the chip to directly view macronutrient content on a screen. This innovation eliminates the need for centrifugation and filtration, enhancing efficiency and sensor longevity.

Biological Science and Bioengineering:

Mechanical injuries to skeletal muscles impact athletes and defense personnel by reducing active work hours. Conventional treatments like ultrasound therapy, cryotherapy, and NSAIDs offer limited recovery benefits. To address this, Niranjan Chatterjee of IIT Kanpur developed MusCAMLR, a musculo-responsive polymer-carbon composite. It integrates passivated carbon nanoparticles within a temperature-sensitive hydrogel, providing a non-drug therapeutic solution for faster muscle recovery.

Apurva Dahake and her team at IISc, Bengaluru have developed a bimodal intraoperative probe combining ultrasound and Diffuse Reflectance Spectroscopy (DRS) to enhance breast cancer diagnosis and surgery. This real-time probe helps surgeons accurately assess tumor boundaries, improving precision in tissue removal, patient outcomes, and reducing healthcare costs while advancing medical technology and interdisciplinary collaboration.

Uddipta Singha and his team from IIT Bombay developed a novel device to extract plasma from micro-volumes of blood using a sphere-on-flat, lifted Hele-Shaw cell. The setup includes a movable spherical top plate and a flat bottom plate with a micro-filtration unit and outlet channel. By radially stretching and contracting the blood film on the membrane, it maximizes filtration efficiency.

Sudip Mukherjee and his team from JNCASR, Bengaluru developed an antimicrobial hemostatic sponge using cellulose dialdehyde and gelatin bonded to form the Cel-Gel composite. Enhanced with ACM-AHex, an amphiphilic cationic macromolecule, the sponge offers superior fluid absorption, seals deep wounds, and prevents

microbial colonization, addressing uncontrolled hemorrhage and infection risks in traumatic injuries.

Healthcare Devices and Diagnostics:

Natish Kumar and his team from IIT Jammu developed a cost-effective, modular device for detection of RNA viruses, including SARS-CoV-2. The portable, paper-based microfluidic device integrates the steps of extraction, amplification, and detection into one device and provides an affordable, scalable, and user-friendly solution for timely RNA virus detection.

Shantanu Sen and his team at IIT Kanpur developed a chemically modified insulin with aggregation-induced emission (AIE) properties to detect early insulin degradation. This innovation allows real-time quality monitoring, with fresh insulin appearing cyan and degraded insulin turning green under UV light, helping prevent financial losses and health risks from using improperly stored insulin.

Divya from IIT(BHU) Varanasi developed a bioengineered cellulosic paper device for the quantification of creatinine and albumin in physiological samples for timely diagnosis of Chronic Kidney Disease (CKD). The paper surface was activated and antibodies specific to targeted biomarker was immobilized on engineered paper surface. After adding the sample on the bioengineered paper, the antigen-antibody reaction takes place which eventually leads to generation in optical signal.

Biomedical Engineering:

A Arjun and his team at Government Engineering College Barton Hill (APJ Abdul Kalam Technological University) developed an adaptive trolley E-drive in collaboration with Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Thiruvananthapuram. It is a universally connectable electric powered drivable machine, which could be connected to any kind of patient stretcher and convert it to an electrically powered one. It enhances easy and safer patient-transportation in the hospital premises.

Environmental Engineering:

Najmul Haque Barbhuiya and his team at IIT Bombay demonstrated the ability of electroconductive laser-induced graphene-based filters and UF electroconductive membranes for emerging contaminant ciprofloxacin (CIP) removal with the combination of persulfate-AOP in crossflow filtration mode. Their study concluded that the synergistic effect of CIP-electroconductive membrane interaction, regeneration of ferrous ions at the cathode, and generation of reactive radicals are the major reasons for the removal of CIP.

Food Technology:

Monica Yumnam from Tezpur University developed a smartphone-based portable optical device to detect fish spoilage in the field. Polyaniline (PANI) was coated on a polystyrene sheet, and the optical system was 3D-printed using biodegradable PLA, integrating LED lights, lenses, and diffraction grating. The smartphone captures sensor responses to volatile amines from spoiled fish, enabling easy and efficient analysis.

Appreciation:

Biological Science and Bioengineering:

Satarupa Sarkar and her team at IIT Ropar developed an innovative lyopreserved, acellular placental graft to significantly expedite

the healing of chronic diabetic ulcers, reducing healing time. Tissue processing technology involved decellularization, trehalose lyopreservation, and lyophilization, preserving the graft's extracellular matrix and mechanical integrity. The final product is sterilized via gamma irradiation, ensuring safety for clinical use.

Kirti Wasnik and her team at IIT(BHU) Varanasi designed a novel polymeric hydrogel for vasculogenesis-assisted neuroregeneration without using conventional medicine. This nanohydrogel provides biological cues and a stable 3D extracellular environment to promote neuronal regeneration, cellular adhesion, actin filament stabilization and neuronal differentiation under oxidative stress.

Roshan Keshari of IIT Bombay developed a therapeutic approach for psoriasis using nanotechnology. He encapsulated eugenol (EU) in soya phosphatidylcholine (SPC) nanoparticles (EUNPL) which effectively penetrated the skin and suppressed keratinocyte hyperplasia, a key factor in psoriasis. This novel nanoparticle-enhanced hydrogel improves ROS scavenging, cellular uptake, skin penetration and retention.

Deepa Dehari and her team at IIT(BHU) Varanasi developed bacteriophage-chitosan microparticles for treating multidrug-resistant bacterial infections in burn wounds. The formulation enhances wound healing, reduces inflammation, and increases oxygen saturation, with sustained bacteriophage release enhancing antibacterial activity.

Tejal Dube of IIT Delhi developed a simple and rapid impedance-based assay that can detect cancer cfDNA in under 5 min without the need for any molecular labelling, electrode modification, signal amplification, or target enrichment steps. The innovation leverages differences in methylation content between cancerous and healthy cfDNA, affecting their solvation behavior and electro-physicochemical properties.

Namrata Baruah at IIT Kanpur developed an affordable vaccine for drug-resistant diarrhoea by stabilizing IpaC protein (conserved immunogenic protein of Sd1). The vaccine demonstrated improved stability at various storage temperatures and showed protection against multiple Shigella strains, thereby, increasing its cost effectiveness and safety.

Biomedical Engineering:

Amanpreet Singh from IIT Delhi has designed a robotic manipulator for minimally invasive surgery. His work improves the design of remote centre-of-motion (RCM) mechanisms, addressing manufacturing constraints and enhancing precision.

Ankita Raghuvanshi and her team at IIT Gandhinagar developed PRAGAtI, a wearable device with instrumented shoes and AI-enabled Strategy Generator offering various cues for gait monitoring. The system predicts freezing-of-gait (FoG) episodes in real-time and assists users based on individualized needs.

Ashish Siddharth and his team at IIT(ISM) Dhanbad developed EEG signal-controlled pneumatic medical bed for patients with severe motor disabilities. Using machine learning (ML) to interpret EEG signals, the bed adjusts position and speed based on patient intent.

The treatment of irregular-shaped and critical-sized bone defects poses a clinical challenge. Shape memory polymer composites present a promising solution, as they can be implanted using minimally invasive techniques and recovered to their original shapes upon suitable stimulation. Toward this, Saswat Choudhury and his team of IISc Bengaluru fabricated NIR-responsive shape-memory polymer scaffolds using 3D printing. These scaffolds recover their original shape upon NIR stimulation and demonstrate high osteogenic potential.

Sampad Laha and his team at IIT Kharagpur developed electrophysiology-on-a-chip device to study electrical field modulation in cancer metastasis. The device features

microchannels coated with collagen, mimicking in-vitro conditions for tumour cell behaviour.

Komal Shah of IISc, Bengaluru created an adaptive stimulation system for the treatment of urinary incontinence. This system integrates surface electrical stimulation (SES) with real-time body dynamics, ensuring effective muscle engagement. The adaptable design enhances the efficiency of the treatment, offering a personalized approach to muscle strengthening.

Pharmacy, Healthcare Devices and Diagnostics:

Maheshwari Behere and her team at CSIR-Central Salt & Marine Chemicals Research Institute developed a U-AST kit for detecting urinary tract infections and bacterial antibiotic resistance. The kit provides results quickly and does not require specialized labs or personnel.

Sopan Nangare from H. R. Patel Institute of Pharmaceutical Education and Research, Shirpur (affiliated with North Maharashtra University) developed graphene oxide nanocomposites for Alzheimer's prognosis. The composites detect beta-amyloid (A β 1-42) and Tau-441, achieving high sensitivity through SPR biosensors.

Ankit Ganeshpurkar from IIT (BHU) Varanasi identified sulfonamide derivatives as butyrylcholinesterase (BChE) inhibitors, which play a role in Alzheimer's disease, using a machine-learning-based gradient boosting model. These compounds demonstrated permeability across the blood-brain barrier and showed cell viability in neuroblastoma SH-SY5Y cells. Furthermore, a web application named "Alzleads" was developed to identify potential anti-Alzheimer's compounds using advanced ML models.

Vikas Choudhary and his team at Ideal College of Pharmacy and Research, Kalyan (affiliated with University of Mumbai), developed a disposable polymeric tooth cover for acute toothache and inflammation. This product offers temporary relief by incorporating clove oil for analgesic effects and peppermint oil for anti-inflammatory and soothing benefits. The dental cap features an outer sustained-release layer and an inner immediate-release layer, distinguishing it from conventional drug delivery systems.

Design:

Gurdeep Singh of IIT Guwahati developed a context-specific tool to enhance worker safety and occupational health during the rework of faulty pouches/ sachets on the FMCG shopfloor. The equipment, which was developed and factory-tested, was assessed for productivity increase and user compatibility from multiple human aspects viewpoints.

Environmental Engineering:

Sreerama Amrutha of BITS-Pilani, Hyderabad Campus developed a compact and affordable solution for detecting heavy metals in water. This innovation offers a portable detection setup, capable of identifying Cadmium, Lead, Copper, and Mercury. The fabrication process is completed efficiently in just 20 minutes. This approach miniaturized the system to 1/200th of its original size, achieving rapid detection within 2 minutes.

Tathagata Pal and his team at IIT Bombay created an inexpensive chemosensing assay to detect fluoroquinolone in various environmental matrices and urine, identifying it as a biological contaminant. The assay was also transformed into a filter paper-based device with a hydrophobic boundary that instantly produces a yellow color visible to the naked eye upon exposure to the analyte.

Hemant Goyal from IIT Roorkee developed a cost-effective technology for the simultaneous removal of arsenic and fluoride

from groundwater for safe community drinking water. The electrocoagulation technology was scaled up gradually, starting from laboratory studies to intermediate pilot-scale tests and ultimately real-world applications for community use.

Amrita Preetam from IIT Delhi developed a sustainable method to address the e-waste problem, supporting the "Swachh Bharat Abhiyan" and "Waste to Wealth" missions. She designed a novel, porous, nanofibrous polymer to recover gold from heterogeneous e-waste. The process involves four stages: feed preparation, supercritical fluid (SCF) pre-treatment, base metal recovery, and precious metal recovery, yielding approximately 1250 mg/g of gold.

Chemical Engineering:

Akhil Kongara and his team from IIT Madras demonstrated the potential of zinc-air batteries as an alternative technology for large-scale, long-duration energy storage. Their approach decouples the charging and discharging processes, enabling simultaneous operation. A zinc charging station was built to recycle zinc oxide from the discharged batteries using renewable energy. The zinc is stored safely as compact plates for over a year with minimal self-discharge, facilitating efficient storage of excess renewable energy.

Keratin waste, an environmental pollutant from poultry farms, slaughterhouses, and leather industries, poses public health risks and contributes to greenhouse gas emissions. Payal Yelne at ICT, Mumbai, has developed a sustainable solution through advanced oxidation and hydrodynamic cavitation. This process transforms keratin waste into valuable products such as liquid fertilizers and amino acid-rich growth stimulants, supporting waste management and generating additional income for poultry processors.

Electronics and Instrumentation Engineering:

Dhruva is an indigenous navigation receiver RF front-end integrated circuit (RFIC) developed by Vijaya Kumar and his team Kanchetla at IIT Bombay for civilian positioning services via NavIC and GPS. This chip isolates weak navigation signals while eliminating interference, amplifying them by approximately 400,000 times. It converts the amplified signals to digital bits using on-chip analog-to-digital converters (ADCs) for accurate location determination.

Velmurugan S at IIT Madras designed and developed a wearable assistive and rehabilitation device for individuals with hearing impairments. Their device employs EdgeML, enabling machine learning tasks to be performed locally on the device rather than relying on cloud-based services. This approach reduces latency and enhances privacy, helping users navigate their surroundings safely and confidently, promoting independence, and improving mental health.

Mechanical Engineering:

Neel Kamal Gupta and his team at IIT Bombay developed a cutting-edge Multi-Station Multi-Axis Hybrid Layered Manufacturing (MSMA-HLM) system. The system features multiple stations and a five-axis setup, enhancing precision and flexibility, making it ideal for aerospace, automotive, and medical industries. Additional functionalities, such as preheating, hammering, and inspection units, ensure the production of high-quality, defect-free components.

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GYTI APPRECIATION 2023

Annexures

GYTI 2023 AWARDS

Abhishesh Pal

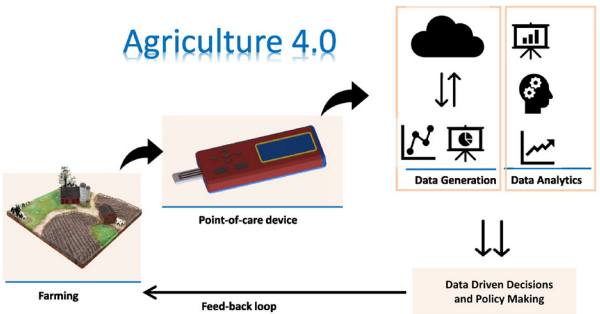
Ultraportable device for soil nutrient quantification

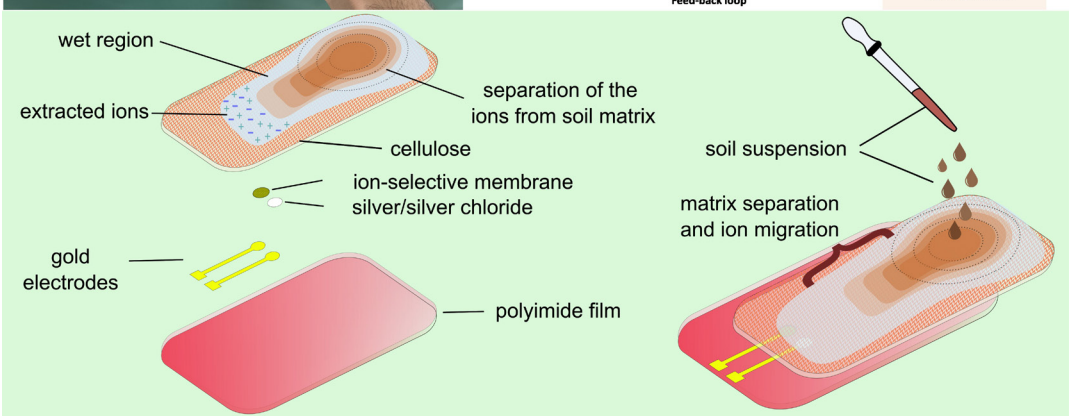
Abhishesh Pal
Birla Institute of Technology and Sciences
Pilani, Hyderabad Campus

Guides:
Prof. Satish Kumar Dubey
Prof. Sanket Goel

The patented technology (IN App No: 202311042662) introduces an innovative, cost-effective portable device for on-site soil macronutrient assessment, aimed at advancing Agriculture 4.0 practices. It eliminates the need for complex, multi-step soil sample pre-processing through the smart use of capillary forces in porous materials, offering a solution for truly portable and standalone devices to quantify soil nutrients. The device utilizes capillary forces to perform both sample processing and sensing on a 7 mm × 10 mm chip, allowing users to drop a soil suspension mixture onto the chip and obtain macronutrient content readings directly on a screen. The key innovation of the device is its single-step nutrient determination, bypassing centrifugation and filtration, while prolonging the lifespan of the sensing element capable of delivering accurate results for at least 60 measurements without frequent calibration. Each test costs as little as Rs. 5. The system includes a replaceable electrode and a low-cost sample processing mechanism, minimizing surface fouling and enhancing sensor longevity. The device operates with minimal fluid (70 µL), and demonstrates excellent stability and repeatability, with detection ranges of 0.1–21 mM for potassium and 0.2–1.4 mM for nitrate, and detection limits of 0.052 mM and 0.031 mM, respectively.

This technology holds broader implications for agriculture, offering farmers, governments, and environmentalists a tool to promote data-driven farming, optimize resource use, and formulate policies. At 18 times the cost savings compared to existing commercial products, it can significantly penetrate rural markets, boosting agricultural productivity and contributing to economic growth. By generating real-time data, the device also enables future trend predictions, enhancing sustainable agriculture practices. Key benefits include portability, minimal sample pre-processing, specific and accurate results, and affordability.


Agriculture 4.0
Point-of-care device
Data Generation
Data Analytics
Farming
Feed-back loop
Data Driven Decisions
and Policy Making


wet region
extracted ions
separation of the
ions from soil matrix
cellulose
ion-selective membrane
silver/silver chloride
gold
electrodes
polyimide film
soil suspension
matrix separation
and ion migration

Niranjan Chatterjee

Nanocarbon enforced anisotropic musculo-responsive polymer carbon composite (MusCAMLR) for quick recovery of mechanically damaged skeletal muscles

Niranjan Chatterjee
Indian Institute of Technology, Kanpur

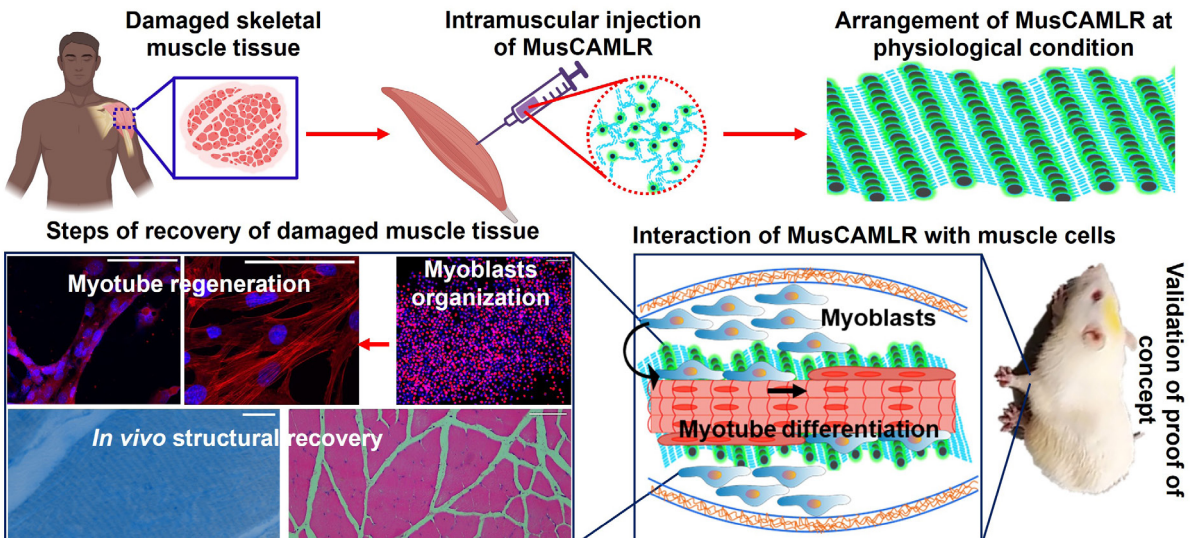
Guide:
Prof. Santosh K. Misra

Skeletal muscles, as a predominant organ of the body, are frequently exposed to various mechanical traumas during activities such as skiing, mountaineering, battlefield operations, and sports events. These mechanical damages are detrimental, leading to a loss of active work hours for individuals like athletes and defense personnel, as well as imposing an economic burden on associated organizations. Mechanical trauma to skeletal muscles is characterized by several biological events, including extracellular matrix damage, pain, inflammation, and disruption of sarcomere structure, which result in functional impairments.

Conventional treatment strategies, such as ultrasound therapy, cryotherapy, and the use of non-steroidal anti-inflammatory drugs (NSAIDs), have shown limitations for muscle recovery. These treatments exhibit minimal influence on relevant gene expression and may cause drug-induced toxicity to other organs. To address these challenges, we have developed a musculo-responsive polymer-carbon composite (MusCAMLR) as a non-drug therapeutic alternative for the rapid recovery of mechanically damaged skeletal muscles. This system incorporates smartly passivated carbon nanoparticles within a temperature-responsive Poly(N-isopropylacrylamide) hydrogel.

Experimental investigations revealed that MusCAMLR supports the differentiation of myoblasts through mechanically compatible interactions. Additionally, in vivo application of MusCAMLR in an animal model with mechanically damaged skeletal muscles demonstrated significant recovery within 72 hours. Evidence of recovery included normalization of serum creatine kinase levels, restoration of muscle cross-sectional area, and reorganization of sarcomeres within muscle fibers.

Based on these promising experimental results, it is believed that further validation of MusCAMLR in large-scale preclinical models will provide deeper insights into its translational potential. The successful validation of this material will establish MusCAMLR as a non-drug therapeutic approach for efficient and accelerated recovery of damaged skeletal muscles in athletes, defense personnel, and other individuals exposed to mechanical trauma.


Damaged skeletal muscle tissue
Intramuscular injection of MusCAMLR
Arrangement of MusCAMLR at physiological condition
Steps of recovery of damaged muscle tissue
Myotube regeneration
Myoblasts organization
In vivo structural recovery
Interaction of MusCAMLR with muscle cells
Myoblasts
Myotube differentiation
Validation of proof of concept

Natish Kumar

Monika Kumari

A Portable microfluidic device for detecting infectious diseases (SARS-CoV-2) and a method thereof

Natish Kumar, Monika Kumari
Indian Institute of Technology, Jammu

Guides:
Dr. Ravi Kumar Arun
Dr. Asha Chaubey

This innovation introduces a portable, paper-based microfluidic device for the detection of RNA viruses, including SARS-CoV-2. The device integrates three essential layers: (1) RNA extraction, purification, and amplification, (2) temperature control during amplification, and (3) detection and visualization of results.

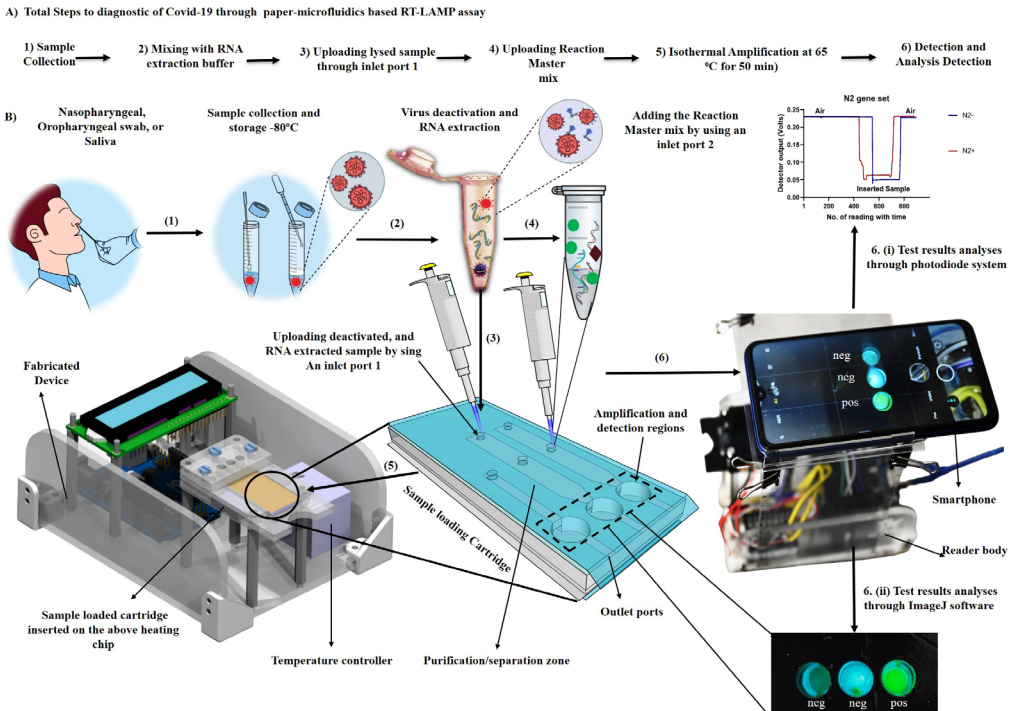
The RNA extraction layer uses buffer solutions and solvents such as ethanol to purify RNA, which is then amplified using reverse transcription loop-mediated isothermal amplification (RT-LAMP). Capillary action drives the sample through porous membranes, enabling seamless sample processing.

The temperature control layer contains a micro-heater chip made with conductive ink, maintaining a stable temperature of 65°C for amplification. The power system, operating at 16–20 V, is isolated from the extraction layer to ensure safety.

Detection occurs via a UV microchip emitting 340–380 nm radiation to visualize fluorescence from SYBR Green dye, with results captured by a camera. The dye binds to the amplified nucleic acids during RT-LAMP, and the fluorescence intensity varies based on the presence or absence of viral RNA. In positive samples, the dye emits a strong fluorescent signal, while in negative samples, the signal remains weak. This fluorescence is detected by a UV LED-photodiode system, which converts the intensity into electrical signals for accurate measurement.

This fully integrated, sample-to-answer platform eliminates the need for complex laboratory setups, offering rapid and precise RNA virus detection at the point of care. Its low-cost and modular design ensures easy replacement of components, making it especially suitable for low-resource settings where quick and accessible diagnostics are critical.

By integrating all essential steps—extraction, amplification, and detection—into a single device, this technology provides an affordable, scalable, and user-friendly solution for timely RNA virus detection, with a focus on SARS-CoV-2. The device holds significant potential for use in decentralized healthcare settings, enhancing disease surveillance and management in underserved areas.


A) Total Steps to diagnostic of Covid-19 through paper-microfluidics based RT-LAMP assay
1) Sample Collection
2) Mixing with RNA extraction buffer
3) Uploading lysed sample through inlet port 1
4) Uploading Reaction Master mix
5) Isothermal Amplification at 65 °C for 50 min)
6) Detection and Analysis Detection
B)
Nasopharyngeal, Oropharyngeal swab, or Saliva
Sample collection and storage -80°C
Virus deactivation and RNA extraction
Adding the Reaction Master mix by using an inlet port 2
N2 gene set
Air
Air
N2-
N2+
Detector output (Volts)
Inserted Sample
No. of reading with time
(1)
(2)
(3)
(4)
(5)
(6)
6. (i) Test results analyses through photodiode system
Uploading deactivated, and RNA extracted sample by sing An inlet port 1
Fabricated Device
Amplification and detection regions
neg
neg
pos
Smartphone
Reader body
Sample loading Cartridge
Outlet ports
6. (ii) Test results analyses through ImageJ software
Sample loaded cartridge inserted on the above heating chip
Temperature controller
Purification/separation zone
neg
neg
pos

Shantanu Sen

Rafat Ali

See your insulin: proposing a self-investigated insulin quality monitoring method

Shantanu Sen, Rafat Ali
Indian Institute of Technology Kanpur

Guide:
Prof. Sandeep Verma

Unintentional purchases of improperly stored, degraded, or fibrillated insulin present financial losses and life-threatening risks. Detecting early-stage degraded insulin is particularly challenging due to its visual similarity to fresh insulin. Prefibrillar insulin populations, which form in the early stages of insulin degradation, are highly cytotoxic and can result in severe pathophysiological conditions. Therefore, it is crucial to monitor these degraded populations to ensure the quality and safety of insulin before use.

This study introduces chemically modified human insulin with aggregation-induced emission (AIE) properties for real-time quality monitoring. The insulin exhibits a bathochromic shift in fluorescence spectra, producing a distinct visual transition from cyan-colored fresh insulin to green-colored degraded insulin under a UV torch. This shift is facilitated by the presence of a conjugated fluorescent moiety—3-(2-Benzothiazolyl)-tyrosine—whose spatial arrangement significantly influences the photophysical properties of the modified insulin, allowing users to assess its quality directly.

This technique enhances consumer safety and dosage reliability, particularly benefiting diabetic patients in low- and middle-income countries, where access to advanced refrigeration for insulin storage may be limited. By enabling users to check insulin quality before injection, this innovation helps prevent life-threatening complications and supports informed decision-making in diabetes management. Ultimately, patients can ensure the effectiveness of their insulin, safeguarding their health and minimizing potential risks.

Other Contributors:
Harminder Singh, Akanksha Onkar,
Pratibha Bhadauriya, Subramaniam Ganesh

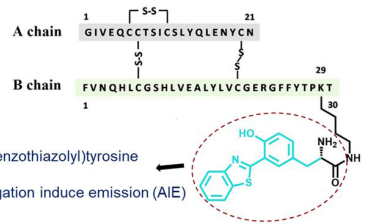
This technique

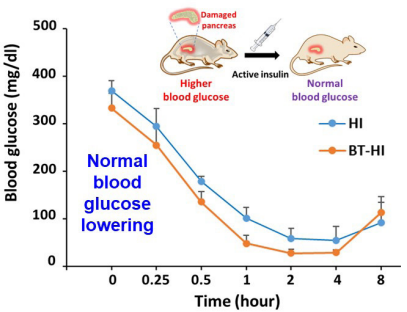
Degraded commercial Human Insulin

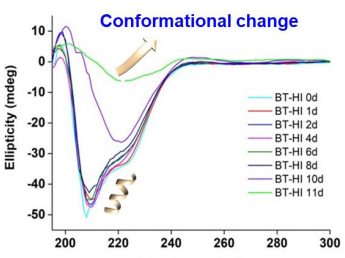
Visually indistinguishable

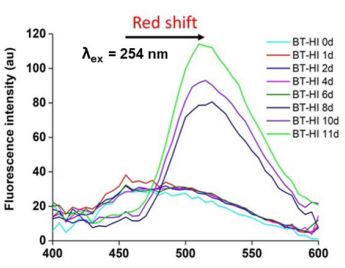
Human Insulin modification

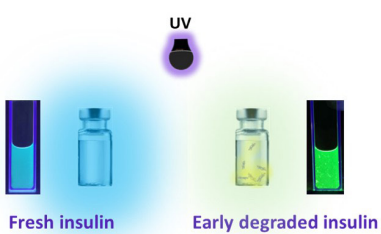
BT-Insulin (BT-HI)











Divya

Paper-based point of care device for chronic kidney disease diagnosis

Divya
Indian Institute of Technology (BHU), Varanasi

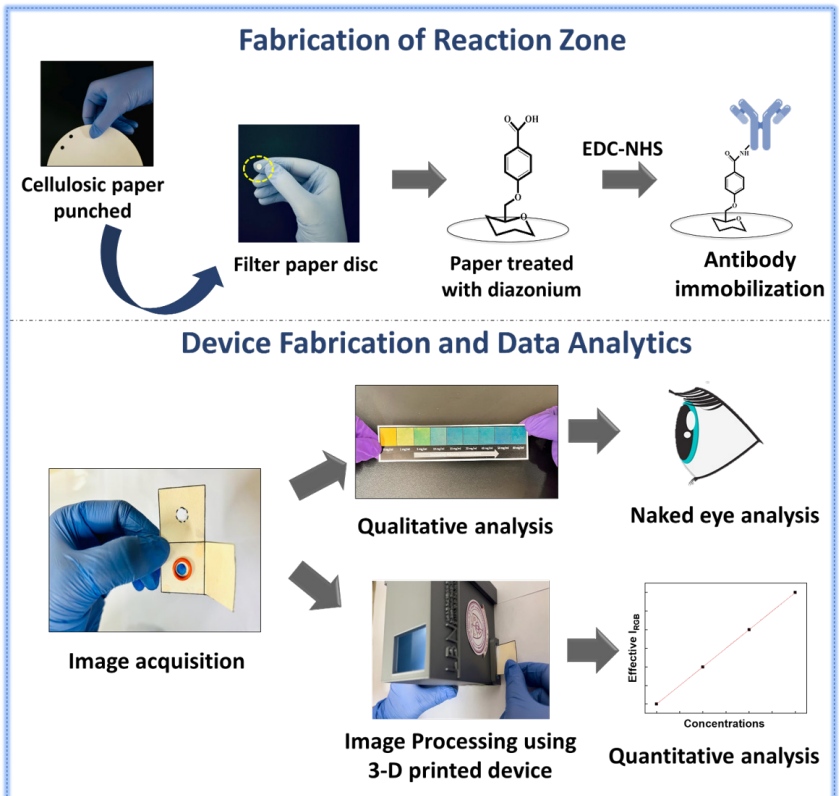
Guide:
Prof. Pranjal Chandra

Chronic Kidney Disease (CKD) is one of the most prevalent health conditions, affecting more than 10% of the global population, equivalent to over 800 million people. In the last two decades, there has been an exponential surge in CKD-related deaths, with a 42% increase worldwide. It is also projected to become the fifth leading cause of death by 2040. Additionally, CKD has a higher prevalence among women compared to men. Timely diagnosis and treatment are critical to managing this disease and preventing its progression.

To address this need, the team has developed a bioengineered cellulosic paper device for the quantification of creatinine and albumin in physiological samples. The paper surface is activated to immobilize antibodies specific to the target biomarkers. When the sample is added to the device, an antigen-antibody reaction occurs, resulting in the generation of an optical signal. Testing in both buffer solutions and real samples demonstrated that this sensing device accurately quantifies creatinine and albumin concentrations within clinical ranges, aiding in the diagnosis of CKD.

To facilitate use in resource-limited settings and primary healthcare centers, we designed a simple, modular testing setup with two components: A paper-based microfluidic device for biomarker detection and a 3D-printed cascaded imaging device for capturing and analyzing optical signals.

This user-friendly diagnostic platform enhances accessibility to routine testing at the primary healthcare level, increasing the likelihood of early CKD detection. With earlier diagnosis, patients can receive more effective treatments, potentially leading to better outcomes and improved life expectancy for those living with kidney disease.


Fabrication of Reaction Zone
Cellulosic paper punched
Filter paper disc
Paper treated with diazonium
EDC-NHS
Antibody immobilization
Device Fabrication and Data Analytics
Image acquisition
Qualitative analysis
Naked eye analysis
Image Processing using 3-D printed device
Effective Ncts
Concentrations
Quantitative analysis

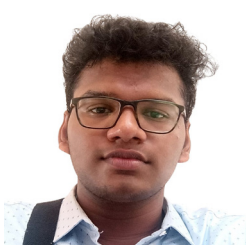
Revolutionizing hospital mobility: The adaptive trolley E-drive system

A Arjun, Goutham Sai Krishna, Jayakrishnan C, Aparna Govind, Ayush Arun
Government Engineering College Barton Hill, Thiruvananthapuram

Guides:
Dr. Anish K John
Dr. Smita V
Dr. Arun Anirudhan V

A Arjun

Goutham Sai Krishna



Jayakrishnan C

Aparna Govind

Ayush Arun

The Adaptive Trolley E-Drive is an innovative system developed by Government Engineering College Barton Hill (GECBH) in collaboration with the Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Thiruvananthapuram. It is a universally connectable, electric-powered drivable machine designed to attach to any patient stretcher, instantly converting it into an electrically powered unit. This system ensures safer, easier patient transportation within hospital premises.

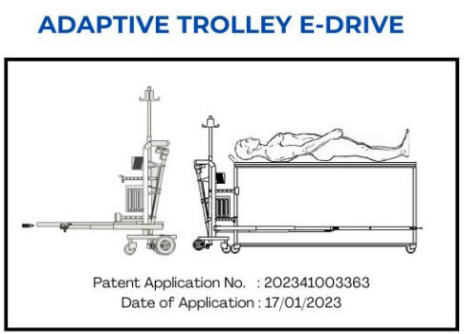
Engineered with precision and following modular design principles, the Adaptive Trolley E-Drive features a user-friendly universal attachment mechanism, making it compatible with any stretcher currently in use at hospitals. This adaptability addresses the economic challenges posed by conventional electric trolleys by offering a more cost-efficient, versatile solution for patient transport.

The system is powered by 1 HP hub motors, capable of transporting loads of up to 250 kg, even over steep hospital ramps. It incorporates an electronic accelerator connected to an Electronic Control Unit (ECU) to limit the maximum speed and support reverse movement. Wire brakes on the handlebar provide easy control over the system's speed and movement, ensuring safety. The system is started with an ignition switch, and the rechargeable

Other Contributors:
Sreelal S, Sreekanth P, Prasanta Kumar Dash, Subin Sukesan, Rajeev Rajan, Dinesh Gopinath

battery pack not only powers the trolley but can also supply power to life-support devices and electronic vital data monitors during patient transport.

This technology reduces delays and enhances safety, making it highly suitable for the Indian healthcare scenario. A joint patent (Application Number: 202341003363, dated 17-01-2023) has been filed by SCTIMST and GECBH. After a successful usability study by the Biomedical Technology Wing of SCTIMST, the technology was transferred to M/s Quasys Pvt. Ltd., Trivandrum for further development and commercialization.



Apurva Dahake

Arif Mohd Kamal

Development and clinical validation of a multimodal probe for breast cancer margin assessment

Apurva Dahake, Arif Mohd Kamal
Indian Institute of Science, Bengaluru

Guide:
Prof. Hardik Jeetendra Pandya

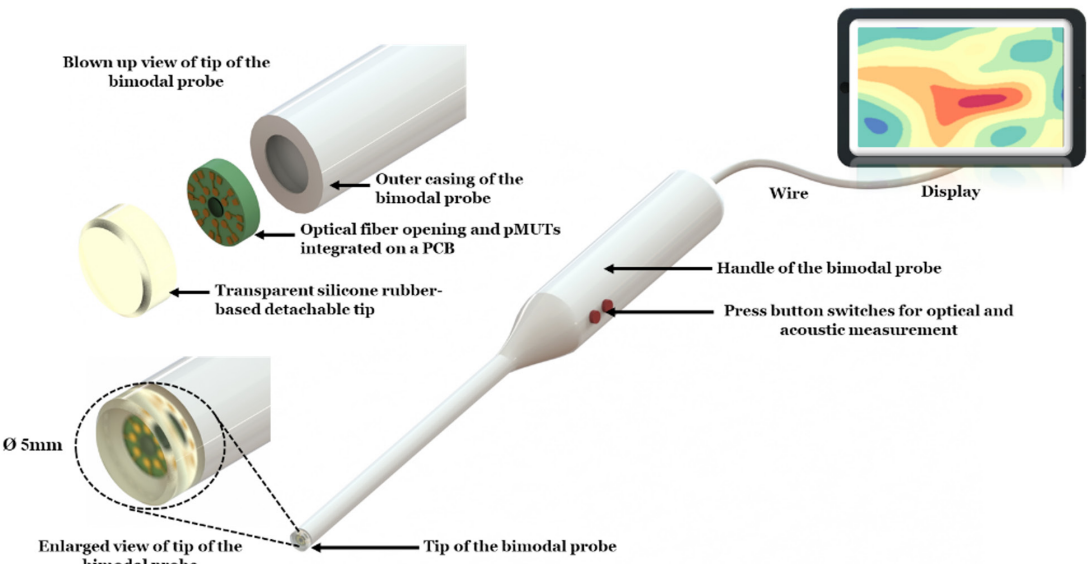
Breast cancer accounts for 11.7% of all cancer cases, with an equal mortality rate. Early detection boosts survival rates to 99%, while effective removal of late-stage tumors and preventing metastasis are crucial for prognosis. Current diagnostic tools, such as mammography and histopathological analysis of biopsy specimens, along with cytology-based biomarker studies using biosensors, help determine cancer extent and plan treatment. However, these techniques are limited in intraoperative assessment and surgical planning for precise tumor removal.

During breast cancer surgery, MRI helps locate tumors, followed by surgical resection and frozen section examination. Missing the tumor boundary during surgery raises the risk of recurrence, often requiring additional surgeries. To address this, a bimodal intraoperative probe combining Diffuse Reflectance Spectroscopy (DRS) and ultrasound imaging has been developed.

Ultrasound is widely used for breast imaging but struggles with high sensitivity and specificity for detailed tissue structures. DRS complements ultrasound by providing optical properties and tissue composition with high specificity, though its penetration depth is limited. By merging these two techniques, the probe offers real-time feedback on tumor boundaries and tissue extent, helping surgeons make more accurate decisions about resection margins.

This innovative probe can improve surgical outcomes, lower recurrence rates, reduce healthcare costs, and promote interdisciplinary advancements in medical technology.

Other Contributors:
Kirteyman Singh Rajput, Niharika P. V.


Blown up view of tip of the bimodal probe
Outer casing of the bimodal probe
Optical fiber opening and pMUTs integrated on a PCB
Transparent silicone rubber-based detachable tip
Ø 5mm
Enlarged view of tip of the bimodal probe
Tip of the bimodal probe
Handle of the bimodal probe
Press button switches for optical and acoustic measurement
Wire
Display

Najmul Haque Barbhuiya

Utkarsh Misra

Bhavana Kanwar

Persulfate enhanced ciprofloxacin removal from water by laser-induced graphene-based electroconductive ultrafiltration membrane

Najmul Haque Barbhuiya, Utkarsh Misra, Bhavana Kanwar
Indian Institute of Technology, Bombay

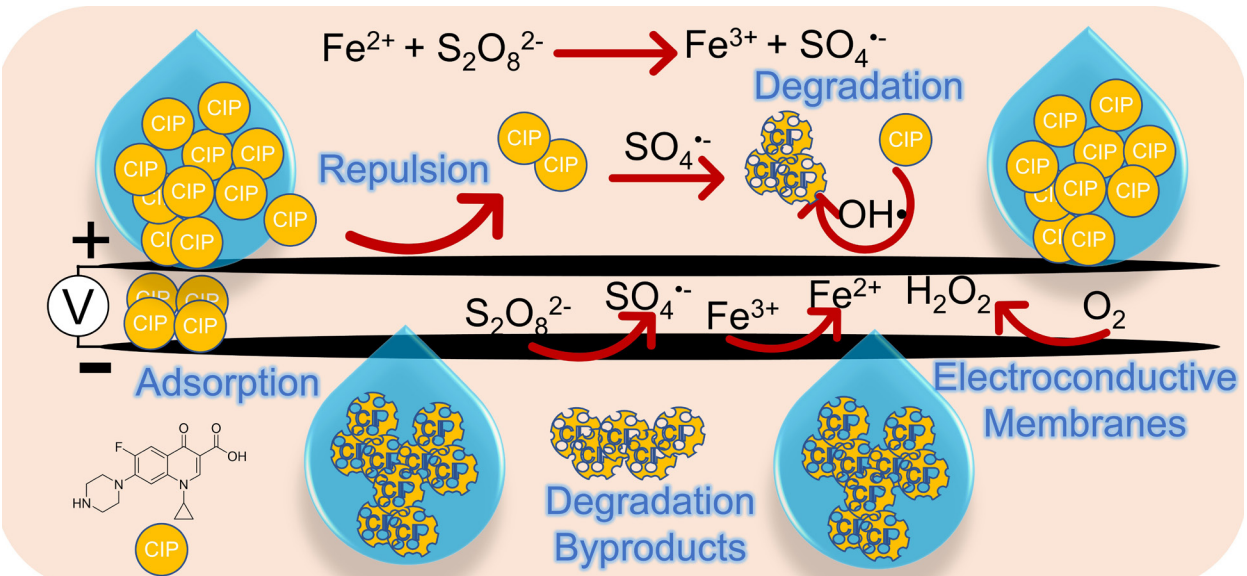
Guide:
Prof. Swatantra P. Singh

The ineffective removal of emerging pollutants by conventional treatment plants has necessitated the adoption of advanced treatment techniques, such as electroconductive membranes. High-pressure-driven nanofiltration (NF) and reverse osmosis (RO) can achieve approximately 50-99% removal of emerging contaminants; however, these processes are energy-intensive, require pre-treatment, and are more susceptible to fouling. In contrast, microfiltration (MF) and ultrafiltration (UF) are inadequate for removing emerging contaminants, yielding only minor reductions.

Electrochemical interactions with charged surfaces and the incorporation of advanced oxidation processes (AOPs) can significantly enhance the removal of these pollutants. This study demonstrated the use of electroconductive laser-induced graphene-based filters and UF electroconductive membranes for the removal of the emerging contaminant ciprofloxacin (CIP), combined with persulfate-AOP in a crossflow filtration mode.

It investigated the effects of applied voltage, initial solution pH, and varying concentrations of persulfate and ferrous sulfate on CIP removal. All crossflow filtration tests conducted at 2.5 V demonstrated approximately 90% CIP removal in the permeate, comparable to conventional NF. The major factors contributing to CIP removal include the synergistic effects of CIP-electroconductive membrane interactions, regeneration of ferrous ions at the cathode, and the generation of reactive radicals.

Tests with CIP-spiked synthetic wastewater also showed effective removal, even at a lower concentration of 500 µg/L. Additionally, we proposed degradation pathways for both the electro-persulfate-ferrous and electro-persulfate systems, reporting a by-product with m/z = 160 for the first time. Our results indicate that the combined effects of electroconductive membrane separation and AOPs can effectively address emerging contaminants, including pharmaceuticals.


$Fe^{2+} + S_2O_8^{2-} \rightarrow Fe^{3+} + SO_4^{\bullet-}$
Degradation
Repulsion
$SO_4^{\bullet-}$
OH•
+
V
−
$S_2O_8^{2-}$
$SO_4^{\bullet-}$
Fe^{3+}
Fe^{2+}
H_2O_2
O_2
Adsorption
Electroconductive Membranes
Degradation Byproducts
CIP

Monica Yumnam

Customer friendly smartphone-based portable optical device for determination of chemical spoilage of fish suitable for field analysis

Monica Yumnam
Tezpur University, Tezpur

Guides:
Prof. Poonam Mishra
Prof. Pabitra Nath

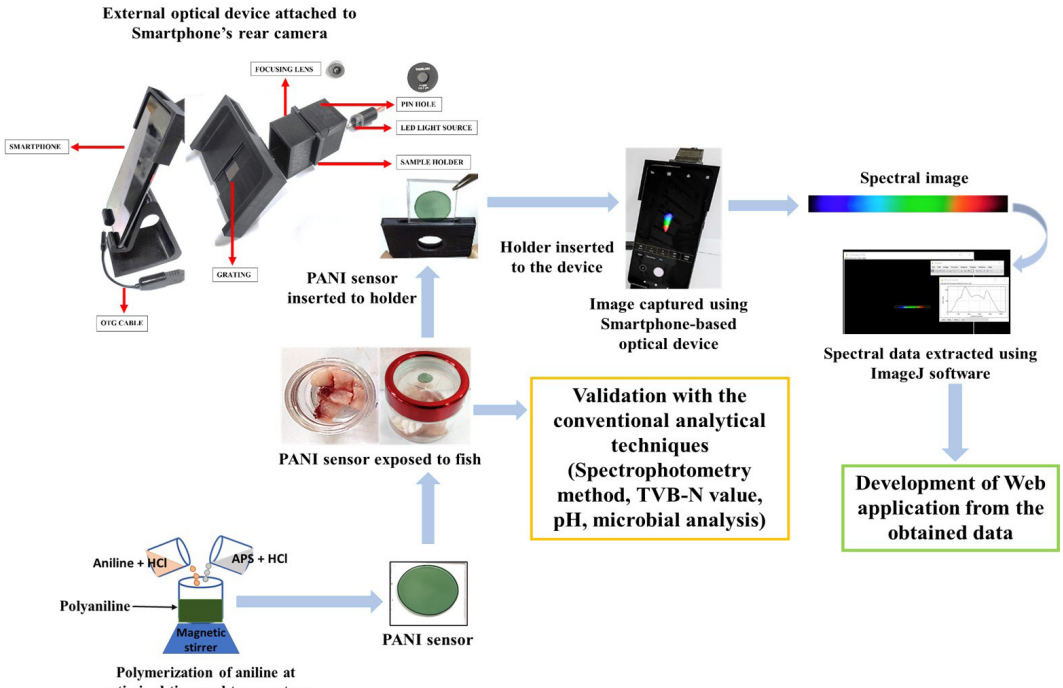
Fish is a highly perishable commodity, leading to significant post-harvest losses, particularly in India, where annual losses amount to Rs. 61,000 crores. Globally, fish losses are estimated to be 30-35%, underscoring the need for early-stage spoilage detection. Existing methods are often expensive and impractical for widespread use by fishermen and retailers.

To address this, a smartphone-based optical device equipped with a polyaniline (PANI) sensor was developed for rapid and cost-effective spoilage detection. This portable device combines colorimetric sensors with smartphone technology to accurately monitor fish spoilage in real-time. Chemically synthesized PANI was deposited onto an optically inactive polystyrene sheet and characterized. The optical system was 3D-printed using biodegradable polylactic acid (PLA), integrating key components such as LED lights, lenses, and diffraction grating.

This setup, combined with the PANI sensor and smartphone, allowed for the detection of volatile amines emitted during fish spoilage. The smartphone captured images of the sensor's response, which were then analyzed. Calibration was based on standard ammonia concentrations, enabling real-time spoilage detection. The sensor exhibited a detection limit of 3.83 ppm with high accuracy (0.14% bias) and precision (1.87% RSD), achieving recovery rates between 94-108%.

Testing on freshwater fish fillets demonstrated effective spoilage detection compared to conventional methods such as spectrophotometry, total volatile basic nitrogen (TVBN), pH, and microbial analysis, with deviations of only 0-5%. The sensor remained stable across varying humidity and temperature conditions and maintained functionality through multiple regeneration cycles. Additionally, a web application was developed to facilitate quick spoilage detection.

This portable, low-cost sensor provides a practical solution for the fisheries industry, enabling real-time fish freshness monitoring, reducing spoilage, and improving food safety.


External optical device attached to Smartphone's rear camera
FOCUSING LENS
PIN HOLE
LED LIGHT SOURCE
SAMPLE HOLDER
SMARTPHONE
GRATING
OTG CABLE
PANI sensor inserted to holder
Holder inserted to the device
Image captured using Smartphone-based optical device
Spectral image
Spectral data extracted using ImageJ software
Development of Web application from the obtained data
PANI sensor exposed to fish
Validation with the conventional analytical techniques (Spectrophotometry method, TVB-N value, pH, microbial analysis)
Aniline + HCl
APS + HCl
Polyaniline
Magnetic stirrer
PANI sensor
Polymerization of aniline at optimized time and temperature

Uddipta Singha

Novel method of plasma extraction from blood droplet

Uddipta Singha
Indian Institute of Technology, Bombay

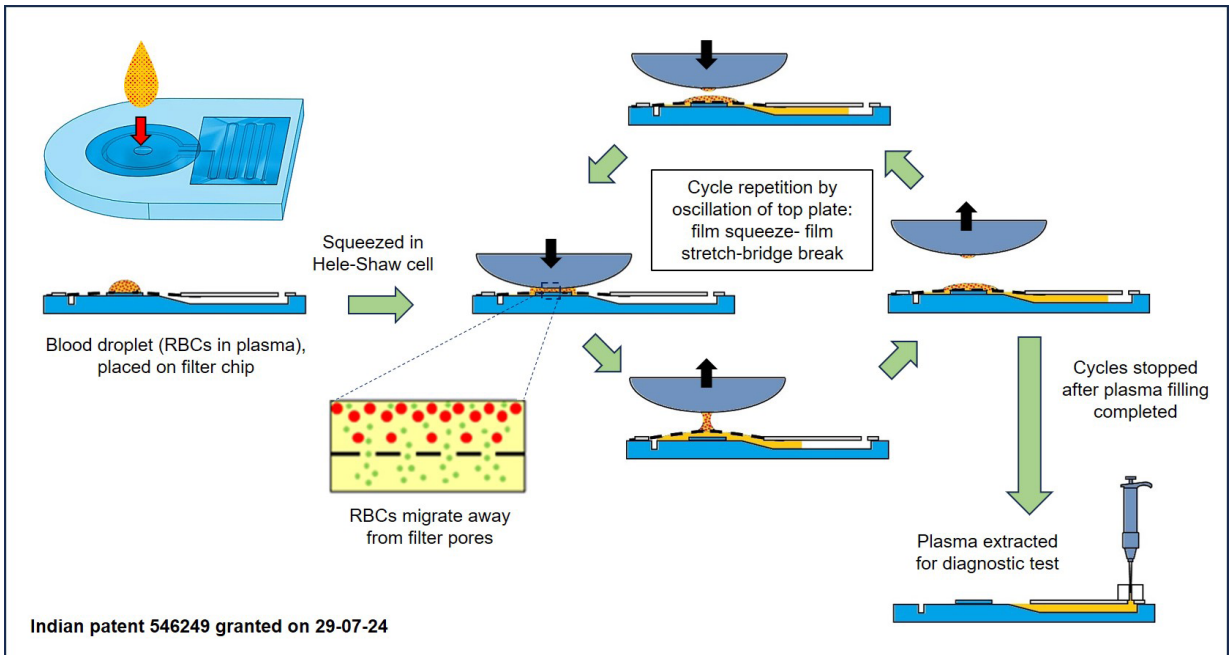
Guide:
Prof. Prasanna S. Gandhi

Blood contains nearly all biomarkers needed to assess an individual's pathological state. Blood-plasma separation is essential because red blood cells (RBCs) interfere with subsequent disease detection methods. We present a novel technology and device for plasma extraction from micro-volumes of blood, where a droplet is confined within a sphere-on-flat, lifted Hele-Shaw cell. The device consists of two plates: a movable spherical top plate and a flat bottom plate containing the micro-filtration unit and an outlet microfluidic channel.

The blood droplet is re-circulated by stretching and contracting the film radially across the filter membrane, maximizing the filtration area. A combination of dead-end and tangential micro-filtration is employed to leverage the advantages of both. Shear-induced cell migration lifts RBCs off the membrane surface, reducing filter clogging and filter cake formation. Plasma seeps through the membrane with minimal analyte loss and is guided into the outlet microchannel by capillary action. The extracted plasma is collected for immuno-diagnostic assays to detect various biomarkers.

The prototype reliably extracts plasma from an 80-microliter droplet of diluted blood, achieving an average yield rate of approximately 55%. Plasma quality was validated by comparison with centrifuged plasma (the gold standard) using a thyroid-stimulating hormone (TSH) assay. TSH detection was performed through an immunofluorescence-based hydrogel assay developed in collaboration with Achira Labs Pvt. Ltd., Bengaluru. The team is now working to demonstrate the clinical potential of this technology for pediatric sepsis diagnosis by detecting two biomarkers—C-reactive protein (CRP) and procalcitonin (PCT)—using lateral flow assays.

Other Contributors:
Dhananjaya Dendukuri, Pradhap Mohan



Indian patent 546249 granted on 29-07-24

Sudip Mukherjee

Antimicrobial hemostatic sponge: Point of care technology to cease haemorrhage and cure infection in traumatic injuries

Sudip Mukherjee
Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru

Guide:
Prof. Jayanta Haldar

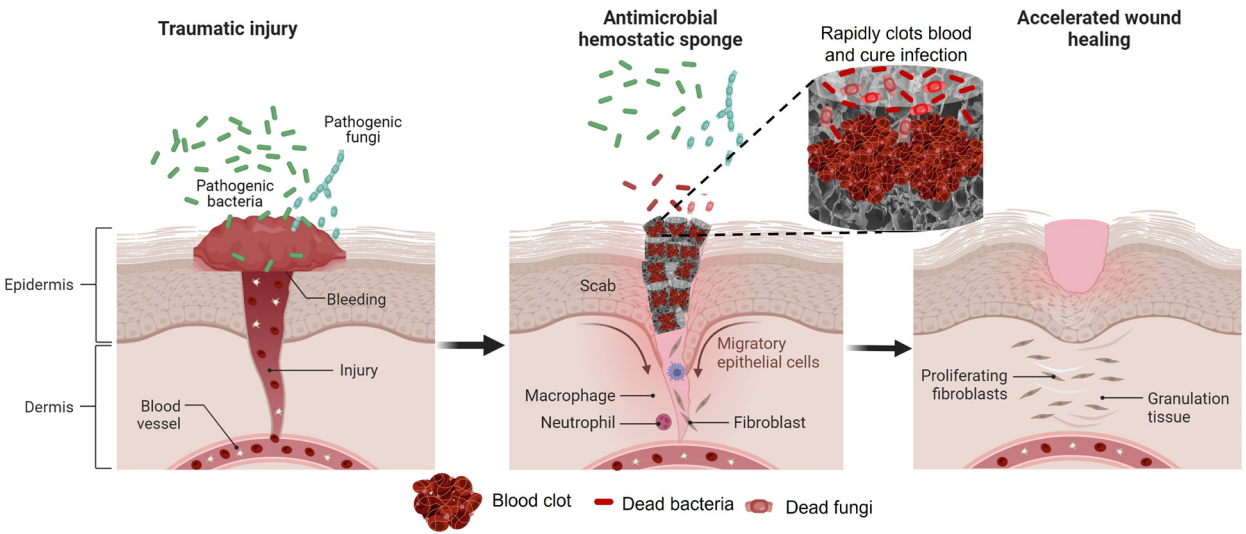
Uncontrollable hemorrhage at traumatic injury sites presents a critical challenge, often exacerbated by colonization with multidrug-resistant pathogens. While traditional wound dressings such as hemostatic gauze, cotton, and sealants are useful in surgical settings, they are ineffective in managing massive bleeding in austere environments, lack antimicrobial properties, and often serve as niches for microbial colonization.

To address this, the team has developed a novel antimicrobial hemostatic sponge using a simple fabrication strategy that couples cellulose dialdehyde and gelatin through imine bonds to form a Cel-Gel composite. To impart antimicrobial activity, an amphiphilic cationic macromolecule (ACM-AHex) was intercalated through electrostatic and hydrogen bonding interactions. The sponge's interconnected microporous structure facilitates excellent swelling and fluid absorption, effectively sealing deep wounds and serving as a physical barrier to blood loss. Its robust mechanical strength, elasticity, and shape memory properties allow it to function as a hemostatic plug for non-compressible and irregularly shaped wounds.

The sponge exhibits immediate blood clotting by concentrating and activating blood cells, such as red blood cells (RBCs) and platelets. It demonstrates rapid, broad-spectrum antimicrobial activity against various drug-resistant bacteria and fungi, achieving >5 log reduction in pathogen count within 6 hours. In vivo studies in mouse models of liver puncture and femoral vein injury showed instantaneous blood clotting and safe removal without further damage to the injury site. Most importantly, the sponge is biocompatible and significantly reduced bacterial burden (>95%) in an MRSA wound infection model, while also diminishing the inflammatory response in infected tissues.

These findings highlight the potential of this hemostatic sponge as an advanced wound dressing for both everyday use and clinical applications.

Other Contributor:
Nandini Saha


Traumatic injury
Antimicrobial hemostatic sponge
Rapidly clots blood and cure infection
Accelerated wound healing
Pathogenic fungi
Pathogenic bacteria
Epidermis
Dermis
Bleeding
Injury
Blood vessel
Scab
Migratory epithelial cells
Macrophage
Neutrophil
Fibroblast
Proliferating fibroblasts
Granulation tissue
Blood clot
Dead bacteria
Dead fungi

Innovations matter; inclusive innovations matter more

GYTI 2023 APPRECIATION

Satarupa Sarkar

Development of "off the shelf" lyopreserved placental graft for diabetic foot ulcer management

Satarupa Sarkar
Indian Institute of Technology, Ropar

Guide:
Dr. Atharva Poundarik

Diabetic foot ulcers (DFUs), affecting approximately 6.3% of diabetics globally, are a leading cause of non-traumatic amputations. In India, 25% of the 62 million diabetic population develops DFUs, resulting in around 100,000 leg amputations annually. The economic burden is significant, with treatment costs averaging 1,960 USD per patient, often beyond the reach of the average income earner. Current standard-of-care (SOC) treatments are inadequate, with limited availability of indigenously developed, cost-effective advanced dressings that can be scaled to meet the needs of a large population.

Human placental membranes, typically discarded as biomedical waste, offer a promising solution due to their anti-inflammatory, angiogenic, and growth factor-rich properties. Clinical studies have shown that placental grafts can significantly accelerate the healing of chronic diabetic ulcers, reducing recovery time. However, India faces challenges in adopting placental allografts clinically due to high costs and limited availability of off-the-shelf grafts.

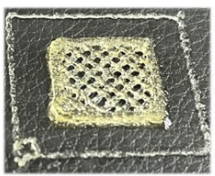
To bridge these gaps, an innovative lyopreserved, acellular placental graft has been developed, currently at Technology Readiness Level (TRL) 5/6. The tissue processing technology used includes decellularization, trehalose lyopreservation, and lyophilization, preserving the graft's extracellular matrix and mechanical integrity. A unique combination of non-ionic surfactants ensures effective decellularization without damaging the membrane, while trehalose stabilizes protein content during lyophilization. The final product is sterilized through gamma irradiation, ensuring clinical safety.

This advanced graft serves as a platform for regenerative therapies, offering an affordable, scalable, and effective solution for chronic wound care, particularly in diabetic populations. Its large-scale manufacturing potential makes it a critical innovation in the medical device sector, addressing the unmet clinical need for accessible and bioactive wound-healing products.

Other Contributors:
Jay Hind Rajput, Madhurima Gupta

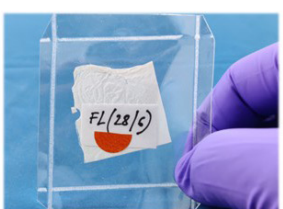
Decellularized lyopreserved placental graft

Amnion powder



3D printed amnion dressing

DIABETIC FOOT ULCER MANAGEMENT



Gamma sterilised processed amnion graft

Amnion gel

Bioactive placenta based hybrid dressing

Amanpreet Singh

Design of a robotic manipulator for minimally invasive surgery

Amanpreet Singh
Indian Institute of Technology, Delhi

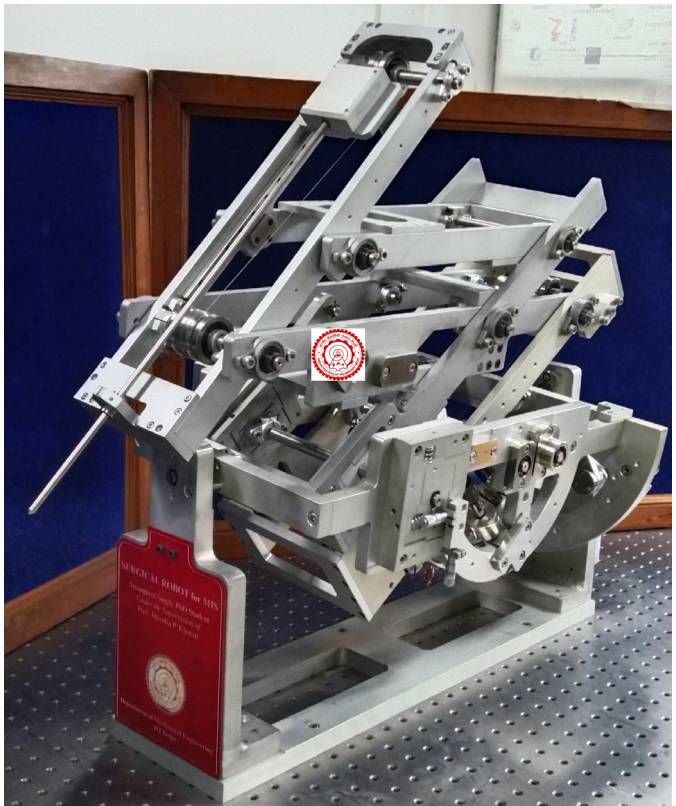
Guides:
Dr. Jitendra P. Khatait

The integration of Minimally Invasive Surgery (MIS) and robotics has significantly enhanced surgical capabilities compared to MIS alone. A double parallelogram-based remote center-of-motion (RCM) mechanism is widely used in MIS robots. However, this research highlights that the mechanical design of such devices requires further improvement to address challenges arising from manufacturing and assembly constraints, as well as to optimize transmission design.

Classically, when modeling the kinematics of these mechanisms, it is assumed that the opposite sides of the parallelograms are equal. This simplification makes the modeling process easier and ensures that the RCM remains fixed during in-plane motion. It also implies that the surgical instrument exerts no force on the incision site. However, due to inevitable constraints during manufacturing, these assumptions do not hold. This results in RCM deviations, which lead to tip deviations of the surgical instrument and a non-zero force at the entry point into the patient's body, compromising patient safety.

While control-based RCM mechanisms allow for RCM adjustments through control strategies, mechanically constrained RCM devices lack this flexibility. In such devices, errors are built into the closed-loop physical structure, making real-time adjustments impossible. Additionally, the literature lacks studies on the combined use of spring and screw elements in tendon-based actuation systems for these devices. The concept of invariant tendon length also requires investigation to quantify the effects of manufacturing constraints.

Moreover, there is a strong need for cost-effective design techniques without compromising essential device features. This study systematically addresses these challenges and proposes solutions to improve mechanical design, enhance safety, and provide multiple pathways to achieve economical yet high-performance devices.


SURGICAL ROBOT for MIS

Ankita Raghuvanshi

Priya Pallavi

PRAGAtI-Parkinson's rehabilitation and assistance for gait using artificial intelligence

Ankita Raghuvanshi, Priya Pallavi
Indian Institute of Technology, Gandhinagar

Guide:
Prof. Uttama Lahiri

Parkinson's Disease (PD) affects over 10 million people globally, often leading to gait impairments such as Freezing of Gait (FoG), one of the most debilitating symptoms. During FoG, individuals feel as though their feet are stuck to the ground despite intending to move, increasing the risk of falls. Despite the heterogeneity of PD, there is a Pre-FoG phase when early signs of FoG begin to manifest, detectable by sensing variability in step patterns. Research indicates that the effectiveness of pharmacotherapy diminishes in advanced stages of PD, highlighting the need for alternative solutions.

External cues have proven effective in mitigating FoG, even at advanced stages. Technology-based interventions that provide audio, visual, or tactile cues have shown promise in addressing FoG. Cue delivery can occur in two modes: 'continuous' or 'only when needed.' However, existing systems typically deliver cues continuously, regardless of the Pre-FoG phase. This continuous cueing can lead to habituation, increased cognitive burden, and reduced effectiveness.

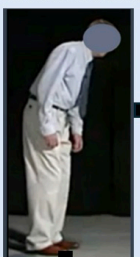
To overcome these challenges, we propose a novel wearable device, PRAGAtI, designed to deliver cues in an 'Assist-as-Needed' manner. PRAGAtI features instrumented shoes augmented with an AI-enabled strategy generator, offering personalized cues. The device can (i) quantify gait, (ii) predict upcoming FoG episodes during the Pre-FoG phase, and (iii) deliver individualized cues only when necessary, using artificial intelligence.

PRAGAtI monitors gait in real-time, analyzing parameters such as step time, cadence, and swing/stance percentages through the instrumented shoes. The AI-enabled strategy generator assesses gait variability to predict FoG within the Pre-FoG window, triggering cues only when needed. Unlike continuous cueing systems, PRAGAtI provides a personalized, adaptive solution for gait abnormalities, minimizing cognitive load and improving intervention outcomes.

Other Contributors:
Paromita Mitra, Vaibhav Ramprasad Yadav, Manasi Kanetkar

PRAGAtI -Parkinson's Rehabilitation and Asssistance for Gait using Artificial Intelligence

In individuals with Parkinson's Disease, Freezing of Gait is a debilitating motor deficit

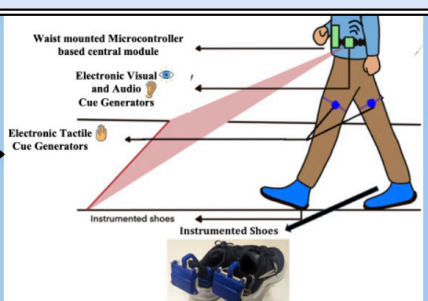


Shuffling Gait leading to FoG

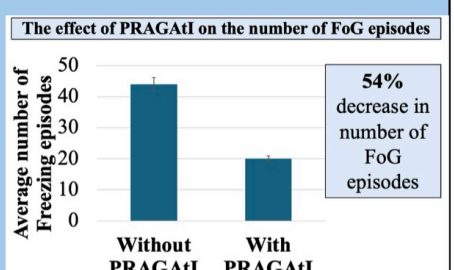
May lead to Fall!!

Conventional Solutions

Technology Assisted Solution(PRAGAtI)



Promising results



Gurdeep Singh

Safety-enriched pouch/sachet cutter for FMCG rework

Gurdeep Singh
Indian Institute of Technology, Guwahati

Guide:
Prof. Sougata Karmakar

The Fast-Moving Consumer Goods (FMCG) manufacturing industry in industrially developing countries (IDCs) often relies on manual or semi-automatic setups, employing a large workforce. On FMCG shop floors, various non-standardized tasks pose safety risks due to repetitive motions, strenuous exertion, and awkward postures. Among these, reworking damaged pouches or sachets is particularly hazardous. The liquid content from faulty pouches/sachets is retrieved and reused, but the process exposes workers to nicks, cuts, and other injuries due to the use of non-standard tools. It involves sharp cutters or blades and prolonged manual hand-squeezing, leading to drudgery and safety concerns.

The lack of standardized tools for rework activities highlights the need for effective risk-mitigation measures. This project aims to address occupational safety issues in non-standardized rework tasks within FMCG units through an innovative product design approach. A context-specific tool was developed to enhance worker safety and occupational health during the rework of faulty pouches/sachets. The newly designed equipment, after factory testing, was evaluated for productivity improvements and user compatibility from various ergonomic and human-factor perspectives.

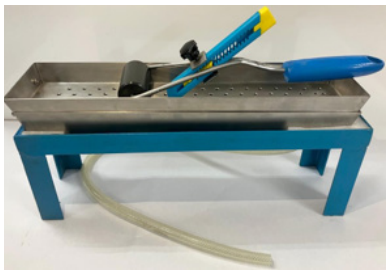
Field trials demonstrated the tool's effectiveness in mitigating safety hazards and reducing ergonomic stressors associated with FMCG rework tasks. The project resulted in the development of a manually operated, compact handheld tool as a risk-reduction solution for injury-prone rework activities. The tool eliminates the need for workers to handle sharp cutters or blades with bare, slippery hands and reduces manual squeezing efforts, without affecting task efficiency.

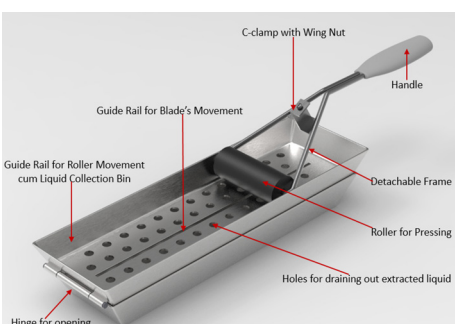
The success of the developed tool is attributed to its cost-effectiveness, enhanced safety, and drudgery reduction. This innovation offers a practical and scalable solution to improve occupational safety on FMCG shop floors, ensuring better working conditions for the workforce.

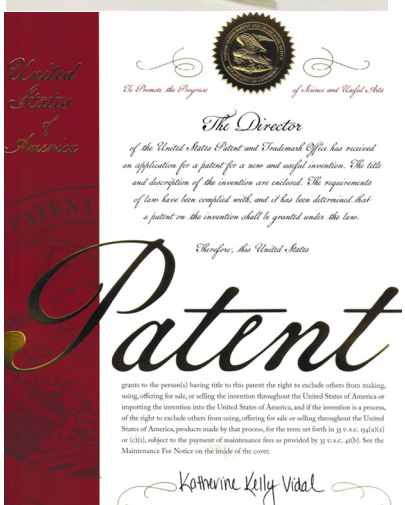
Forceful manual hand squeezing (drudgery and contamination)

Inadequate collection bins (contamination)

Sharp cutter/ blade held in bare slippery hands (prone to cuts, nicks and injuries)







Sreerama Amrutha Lahari

AI and IoT-assisted water quality monitoring system for simultaneous detection of heavy metals

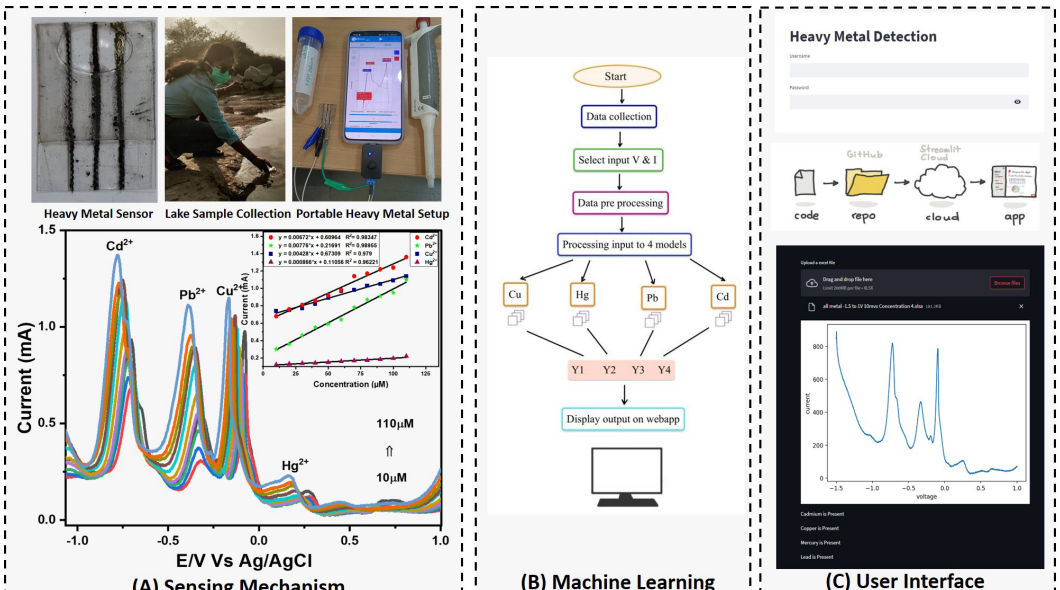
Sreerama Amrutha Lahari
Birla Institute of Technology and Sciences
Pilani, Hyderabad Campus

Guide:
Prof. R N Ponnalagu
Prof. Sanket Goel

"Water is life, and clean water is health." However, the presence of heavy metal ion complexes significantly diminishes water quality, leading to severe health effects, including cancer, kidney damage, skin ailments, and nervous system disorders. Traditional methods for detecting heavy metals, such as Atomic Absorption Spectroscopy (AAS) and Inductively Coupled Plasma techniques (ICP-OES and ICP-MS), are commonly employed by government organizations for public welfare. Unfortunately, these testing facilities are often distant and costly, making them inaccessible for rural communities.

In contrast, electrochemical analysis offers a viable alternative for onsite, real-time testing with lower operational complexity and minimal sample preparation time, albeit with slightly reduced sensitivity. This technology presents an opportunity to develop an affordable solution that could yield significant social and economic benefits for rural populations in India. The performance of electrochemical sensors is influenced by factors like substrate selection, conductive pattern techniques, and nanoparticle deposition, which are critical for detecting multiple heavy metal pollutants simultaneously.

By integrating artificial intelligence and Internet of Things (IoT) connectivity, the team enhanced prediction accuracy and provided a user-friendly data interface, facilitating timely decision-making for environmental safety. The innovative portable heavy metal detection setup identified Cadmium, Lead, Copper, and Mercury. Remarkably, the fabrication process takes just 20 minutes, and the device can detect contaminants in as little as 2 minutes. Field testing with water samples from various lakes, rivers, and wells in Goa and Hyderabad, India, confirmed the device's effectiveness and reliability.


Heavy Metal Sensor
Lake Sample Collection
Portable Heavy Metal Setup
Cd2+
Pb2+
Cu2+
Hg2+
110µM
10µM
Current (mA)
E/V Vs Ag/AgCl
Concentration (µM)
(A) Sensing Mechanism
Start
Data collection
Select input V & I
Data pre processing
Processing input to 4 models
Cu
Hg
Pb
Cd
Y1
Y2
Y3
Y4
Display output on webapp
(B) Machine Learning
Heavy Metal Detection
GitHub
Streamlit Cloud
code
repo
cloud
app
(C) User Interface

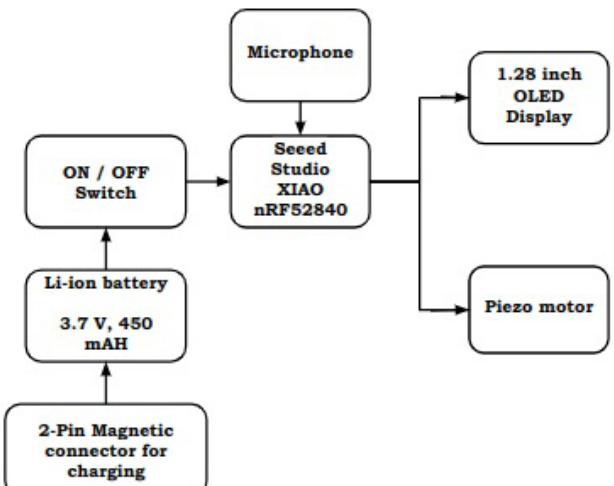
Velmurugan S

Vibe - wearable assistive and rehabilitation device for people with hearing impairment

Velmurugan S
Indian Institute of Technology, Madras

Guide:
Prof. Anil Prabhakar

Vibe, is a wearable alert system designed for people with hearing impairments. It generates alerts for surrounding sounds, addressing communication challenges and reducing accidental risks. It works based on the Machine Learning models, which are trained and deployed in the processor and will alert the hearing impaired about specific sounds, such as a doorbell, an alarm, or a crying child. It is a simple way of providing vibration for the pre-trained surrounding sounds, with each sound corresponding to a specific vibration pattern and a flash LED light alerting the user, and also, we have incorporated an OLED display to show what sound has been captured and predicted. Vibe significantly improves the quality of life for individuals with hearing impairments by providing timely notifications of specific sounds (such as baby cries, alarms, door knocks, vehicle horns, and spoken names) in their environment. Developed using EdgeML, Vibe leverages local machine learning capabilities, reducing latency and enhancing privacy compared to cloud-based solutions. This device enables individuals to navigate their surroundings safely and confidently, fostering increased independence.


Microphone
1.28 inch OLED Display
ON / OFF Switch
Seeed Studio XIAO nRF52840
Li-ion battery
3.7 V, 450 mAH
Piezo motor
2-Pin Magnetic connector for charging


Horn!!!

Maheshawari J. Behere

U-AST Kit: An easy to use, cheap, point of care method for the detection of urine infection along with antibiotic sensitivity profile

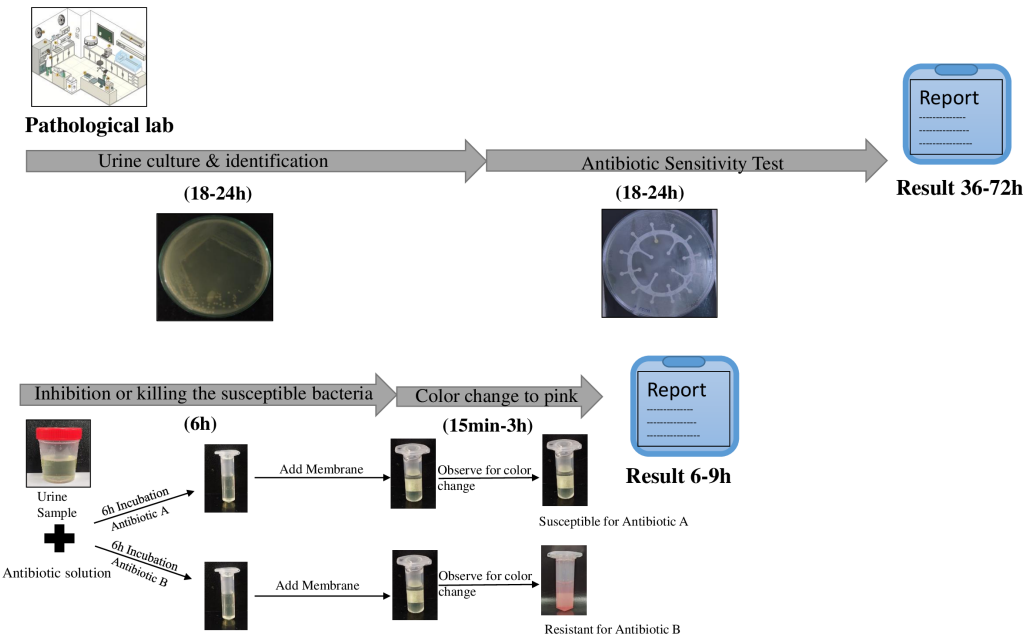
Maheshawari J. Behere
Central Salt & Marine Chemicals Research Institute (CSIR-CSMCRI), Bhavnagar

Guide:
Dr. Soumya Haldar

There is a growing demand for a quick, accessible, and cost-effective method to detect urinary tract infections (UTIs) and assess the antibiotic-resistance profiles of the bacteria responsible for these infections. To meet this need, researchers developed a urinary tract infection antibiotic-sensitivity test (U-AST) kit designed for rapid validation of bacterial infections and determination of antibiotic resistance. The U-AST kit was standardized using reference strains of bacteria, including *Escherichia coli*, *Enterococcus faecalis, Pseudomonas aeruginosa, Vibrio cholerae*, and various *Pseudomonas species*. It was further validated with 50 clinical urine samples exhibiting diverse physical and chemical characteristics, testing resistance against five important antibiotics. The results obtained from the U-AST kit showed a 100% correlation with those from the gold standard laboratory method, but with a significantly reduced turnaround time of just 9 hours, as indicated by a simple color change. In contrast, the gold standard method requires 36 to 72 hours, sophisticated techniques, and skilled microbiologists.

This innovative kit does not require specialized laboratory setups or expert personnel, making it an ideal solution for point-of-care use. The total manufacturing cost of the kit is approximately Rs. 50, compared to Rs. 1,000 to Rs. 3,000 for traditional laboratory methods. The U-AST kit represents a unique and efficient approach to rapid UTI detection and antibiotic sensitivity testing, potentially improving patient outcomes and aiding healthcare providers in their treatment decisions.

Other Contributor:
Sweta Binod Kumar


Pathological lab
Urine culture & identification
(18-24h)
Antibiotic Sensitivity Test
(18-24h)
Report
Result 36-72h
Inhibition or killing the susceptible bacteria
(6h)
Color change to pink
(15min-3h)
Report
Result 6-9h
Urine Sample
6h Incubation Antibiotic A
Add Membrane
Observe for color change
Susceptible for Antibiotic A
Antibiotic solution
6h Incubation Antibiotic B
Add Membrane
Observe for color change
Resistant for Antibiotic B

Tathagata Pal

Tennyson Mathai

Colorimetric chemosensor for rapid detection of fluoroquinolone load in environmental water bodies, urine, and counterfeit drug testing

Tathagata Pal, Tennyson Mathai
Indian Institute of Technology, Bombay

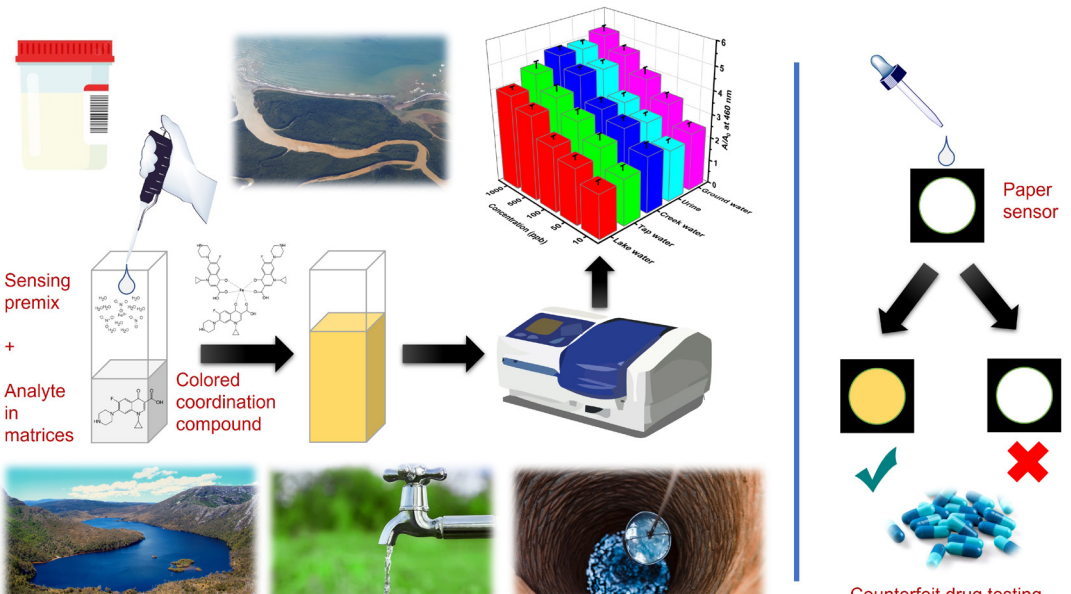
Guide:
Prof. Soumyo Mukherji

Fluoroquinolones, a widely used class of broad-spectrum antibiotics, have raised global concerns due to increasing antimicrobial resistance caused by overuse and misuse. The presence of fluoroquinolone residues in surface and groundwater—primarily due to pharmaceutical waste and excretion from animals and humans—underscores the urgent need for a cost-effective detection method.

To address this challenge, an inexpensive, highly reliable chemosensing assay was developed for detecting fluoroquinolone contamination across various environmental matrices and urine. This assay demonstrated excellent sensitivity, with a limit of detection (LOD) between 1.18 to 2.21 ppb (3.5–6.6 nM). It exhibited strong resistance to interference and operated within a linear range of 10 to 1000 ppb, achieving a high correlation (R^2 = 0.987–0.996). The assay also achieved recovery rates between 95% and 104%, ensuring accuracy and reliability.

To enhance accessibility, the assay was converted into a simple paper-based chemosensor. Using office printer toner ink to create hydrophobic barriers, the sensor allows for rapid detection of fluoroquinolone residues and counterfeit medicines. Upon exposure to the target analyte, it produces a visible yellow color, facilitating quick identification. The paper-based sensor requires minimal sample preparation and has shown excellent stability, remaining functional for over one year at room temperature.

This robust and cost-efficient solution addresses critical global challenges, including antibiotic contamination and the detection of counterfeit drugs. Its simplicity, reliability, and affordability make it especially suitable for use in resource-limited settings, offering great potential for widespread adoption.


Sensing premix
+
Analyte in matrices
Colored coordination compound
Concentration (ppb)
Ground water
Urine
Creek water
Tap water
Lake water
Paper sensor
Counterfeit drug testing

Development of EEG signal-controlled pneumatic medical bed for patients with severe motor disabilities

Ashish Siddharth, Manmohan Labh, Yalla Mark Vishal, Inampudi Sai Amith
Indian Institute of Technology (ISM), Dhanbad

Guide:
Dr. Zafar Alam

Ashish Siddharth

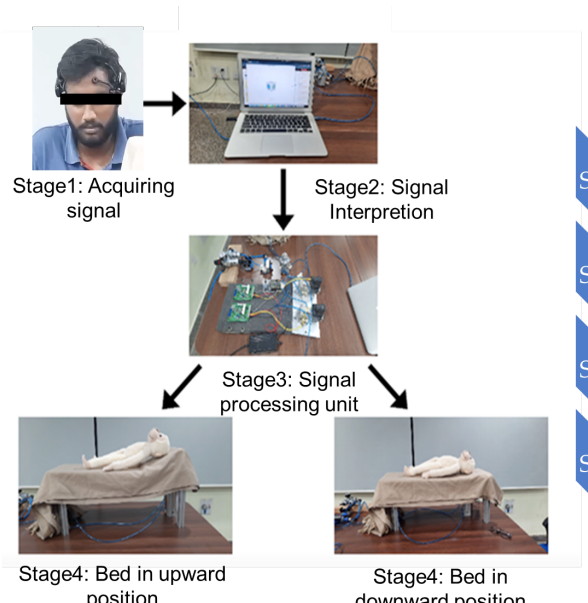
Manmohan Labh

Yalla Mark Vishal

With the rise in paralytic attacks and accidents worldwide, the number of patients experiencing severe disabilities has significantly increased. Many of these individuals are confined to their beds and unable to perform even basic tasks, such as adjusting the position of their medical beds. In response to these challenges, an innovative system has been developed to empower bedridden patients to control the movement of their beds without physical effort.

The system leverages electroencephalography (EEG) signals, which are processed using machine learning (ML) to interpret the patient's thoughts regarding raising or lowering the bed. A trained ML model recognizes these intentions, which are then relayed to a control system, enabling the bed's pneumatic actuators to adjust the position and speed as desired. This control system acts as the orchestrator, translating the intentions identified by the trained model into precise movements of the pneumatic-actuated medical bed. The pneumatic actuators provide a cushioning effect due to air compressibility, enhancing both comfort and safety. Additionally, pneumatic beds are more cost-effective than electric counterparts and can operate without electricity, making them accessible in remote areas. Beyond individual benefits, integrating such a system into hospital infrastructure promises to alleviate the workload of nursing staff. The easy installation of the system into existing infrastructures also makes it practical for household or private care settings, providing patients with greater autonomy and reducing the need for constant caregiving. This invention merges medical insights and technology to offer a practical solution, improving patient care and the quality of life for individuals with limited mobility. Moreover, the system can be installed with minimal changes to current infrastructure, enhancing the feasibility of widespread adoption and potentially revolutionizing care for individuals with limited mobility.

Inampudi Sai Amith



- **Stage1** • Acquiring the signal using the neuro headset.
- **Stage2** • Signals interpretation using machine learning.
- **Stage3** • Processing the received signal with the signal controller.
- **Stage4** • Actuation of pneumatic bed using the signal controller

Saswat Choudhury

4d Printing of smart materials for absorbable and deployable medical devices

Saswat Choudhury
Indian Institute of Science, Bengaluru

Guides:
Dr. Kaushik Chatterjee
Dr. Sonal Asthana

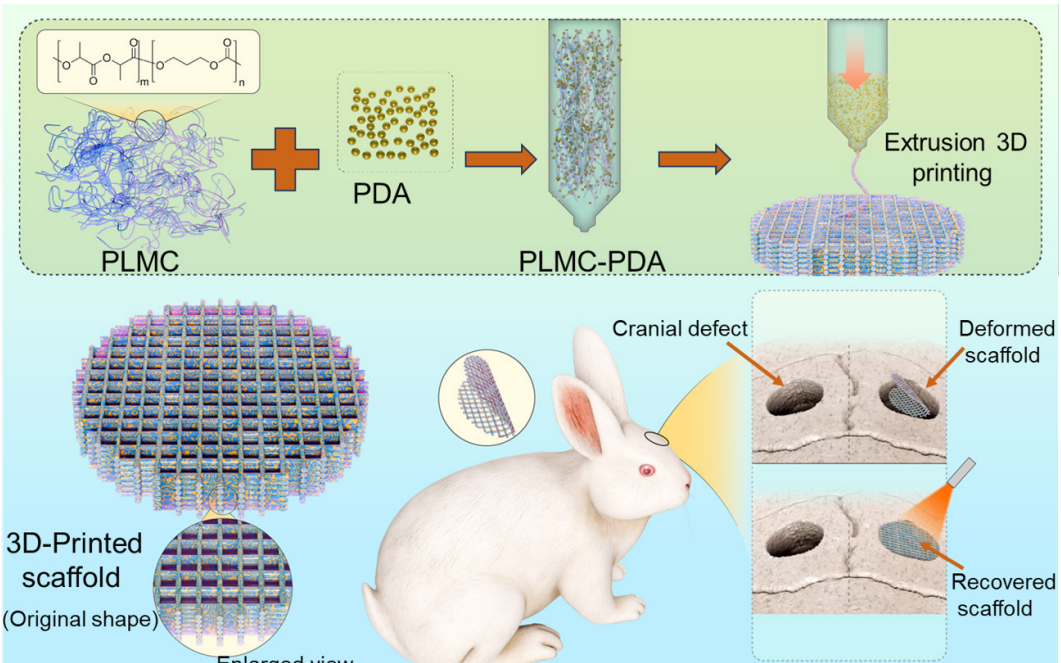
Treating irregularly shaped and critical-sized bone defects remains a significant clinical challenge. Deployable, self-fitting tissue scaffolds offer a promising solution, especially when implanted through minimally invasive procedures. Shape memory polymers and composites are ideal for such applications, as they can return to their original shapes upon stimulation. However, existing materials face limitations such as high transition temperatures and complex synthesis methods.

To address these issues, researchers developed near-infrared (NIR)-responsive, programmable polylactide-co-trimethylene carbonate (PLMC) scaffolds enhanced with polydopamine (PDA) nanoparticles. Fabricated using extrusion-based 3D printing, these scaffolds achieved rapid and tunable shape recovery (over 99%) in under 30 seconds under NIR irradiation. The PLMC-PDA composites showed superior osteogenic potential in vitro, with increased alkaline phosphatase (ALP) secretion and mineral deposition compared to pure PLMC.

The scaffolds' deployability and bone regeneration potential were validated in critical-sized cranial defects in rabbits. Compact, deformed scaffolds were implanted into defects, where they self-fit under low-intensity NIR (0.76 W/cm^2). At 6- and 12-weeks post-implantation, micro-CT analysis revealed near-complete bone regeneration in PLMC-PDA scaffolds, outperforming neat PLMC.

Further validation was achieved using ex vivo models of rabbit tibia, mandible, and tooth defects, demonstrating the scaffolds' adaptability to complex geometries. These results suggest that self-fitting, NIR-responsive scaffolds offer an innovative, minimally invasive approach to address irregular tissue defects, paving the way for effective bone tissue regeneration.

Other Contributor:
Akshat Joshi


PLMC
PDA
PLMC-PDA
Extrusion 3D printing
3D-Printed scaffold
(Original shape)
Enlarged view
Cranial defect
Deformed scaffold
Recovered scaffold

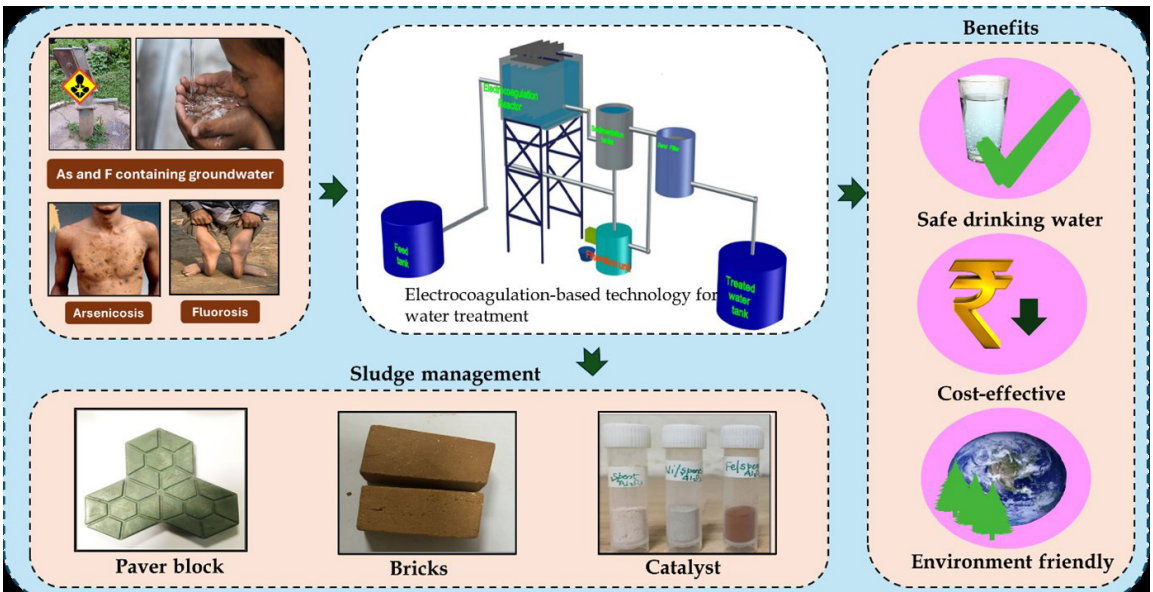
Hemant Goyal

Development of low-cost technology for simultaneous arsenic and fluoride removal from groundwater for community drinking purposes

Hemant Goyal
Indian Institute of Technology, Roorkee

Guide:
Prof. Prasenjit Mondal

Groundwater is the primary source of drinking water for over 80% of the global population, particularly in Southeast Asian countries like India and Bangladesh. However, groundwater in many regions worldwide is contaminated with arsenic and fluoride. Among the various treatment technologies available, adsorption and coagulation-filtration methods have demonstrated effective performance for domestic (point-of-use) applications. However, these technologies are not ideally suited for community applications due to their high treatment times and costs. Electrocoagulation (EC) operates on a similar principle but generates the coagulant in situ. In this study, an electrocoagulation technology was developed through the successive scale-up of laboratory studies to an intermediate pilot scale and then to a real-world community application. The technology demonstrated effective performance across a wide range of arsenic (50-600 ppb) and fluoride (3-25 ppm) concentrations. The arsenic-laden sludge produced from the EC process was managed by immobilizing it into plastic paver blocks and bricks. Furthermore, the life cycle assessment of this field-scale technology revealed lower emissions compared to aluminum hydroxide/oxide adsorbent-based technologies. Therefore, EC-based technology has significant potential as a low-cost, environmentally friendly solution for treating arsenic and fluoride-contaminated water at the community level.


As and F containing groundwater
Arsenicosis
Fluorosis
Electrocoagulation-based technology for water treatment
Treated water tank
Sludge management
Paver block
Bricks
Catalyst
Benefits
Safe drinking water
Cost-effective
Environment friendly

Sopan Nangare

Design of affordable surface decorated graphene oxide nanocomposites for label free prognosis of Alzheimer's disease

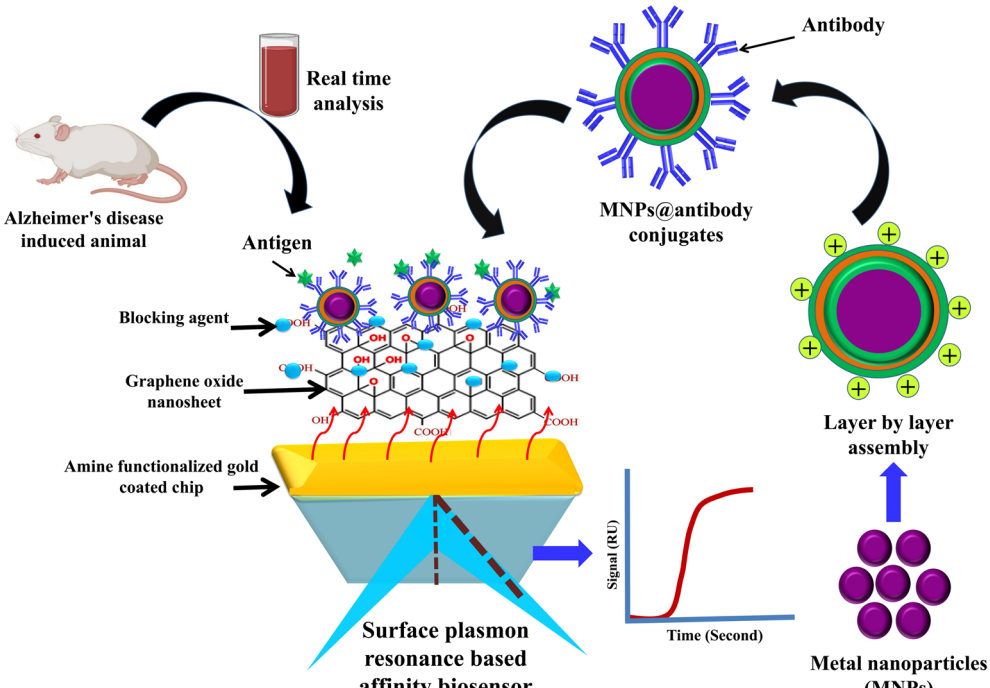
Sopan Nangare
H. R. Patel Institute of Pharmaceutical Education and Research, Shirpur

Guide:
Dr. Pravin Onkar Patil

Alzheimer's disease (AD) is a leading neurodegenerative disorder characterized by memory loss, cognitive decline, and dementia. Current diagnostic methods for detecting AD biomarkers are often hindered by high costs, poor sensitivity, and low selectivity. Therefore, this study addresses these challenges by developing highly sensitive, selective, and cost-effective surface plasmon resonance (SPR) biosensors for the early detection of key AD biomarkers.

The designed biosensor features a surface-decorated graphene oxide (GO) platform intended to detect beta-amyloid 1-42 (A β 1-42). As a result, it demonstrated excellent selectivity and sensitivity, with a wide linear detection range and an impressive limit of detection (LOD) in the femtogram per milliliter (fg/mL) range. The biosensor's real-time applicability was validated through tests on AD-induced rat models. Additionally, a 2D GO-patterned SPR biosensor was used to detect Tau-441, another critical AD biomarker. The integration of plasmonic gold nanoparticles with GO enhanced the biosensor's performance, achieving a broad detection range and an LOD in the fg/mL range. Furthermore, an SPR biosensor was utilized for detecting beta-site amyloid precursor protein-cleaving enzyme 1 (BACE1) using a layer-by-layer assembly on platinum nanoparticles. This system achieved an LOD in the fg/mL range and demonstrated high sensitivity and specificity in complex biological samples.

In conclusion, these advancements underscore the potential of SPR biosensors as non-invasive, rapid, and highly effective tools for the early diagnosis of AD.


Antibody
Real time analysis
Alzheimer's disease induced animal
MNPs@antibody conjugates
Antigen
Blocking agent
Graphene oxide nanosheet
Amine functionalized gold coated chip
Layer by layer assembly
Signal (RU)
Time (Second)
Surface plasmon resonance based affinity biosensor
Metal nanoparticles (MNPs)

Amrita Preetam

Complete recycling of E-waste using greener approach

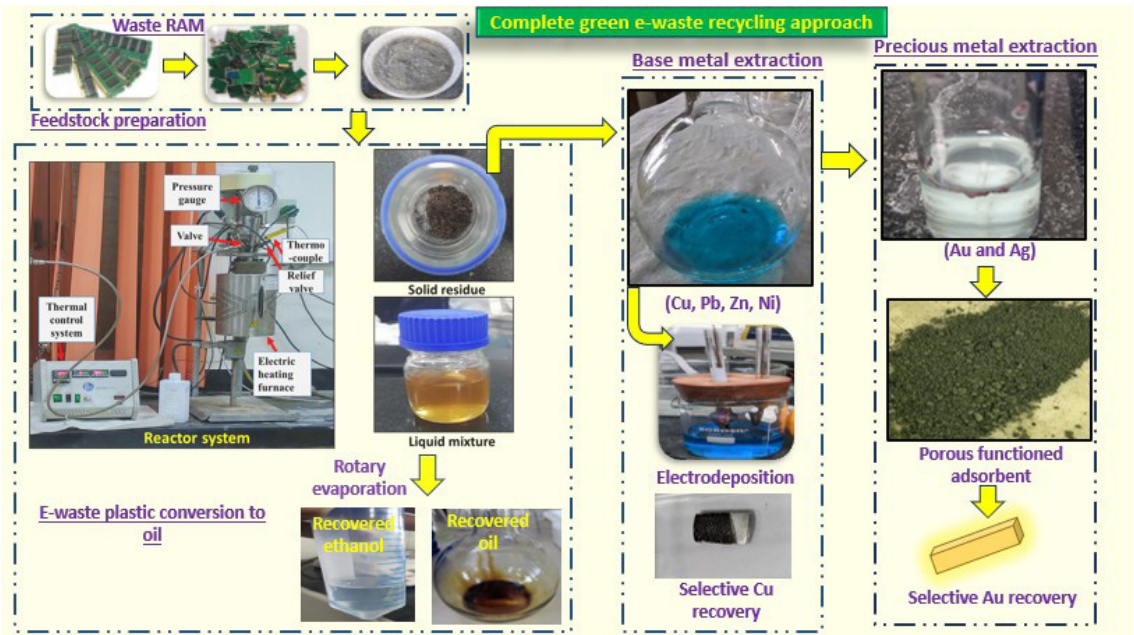
Amrita Preetam
Indian Institute of Technology, Delhi

Guides:
Prof. S.N. Naik
Prof. K.K. Pant
Prof. Vivek Kumar

Electrical and electronic equipment (EEE) has become an essential part of daily life. The extensive production and consumption of EEE generate significant amounts of Waste Electrical and Electronic Equipment (WEEE), commonly referred to as "e-waste." The increasing improper disposal of e-waste has a detrimental impact on the environment and poses serious health risks to both animals and humans. This study aims to develop a sustainable approach to address the growing e-waste challenge by aligning with the "Swachh Bharat Abhiyan" and "Waste to Wealth" missions.

The proposed methodology consists of four key steps: 1) Preparation of feed, 2) Pre-treatment using supercritical fluid (SCF) technology, 3) Base metal recovery, and 4) Precious metal recovery. Initially, the e-waste, specifically waste Random Access Memory (WRAM) from old computers, is dismantled, crushed, and ground to improve metal exposure for further processing. The prepared feed material undergoes SCF pre-treatment using ethanol solvent, converting the plastic fraction of e-waste into liquid products (oil) that can be used as fuel or raw materials after purification. This pre-treatment also enhances metal exposure and enrichment.

Subsequently, base metals (Cu, Pb, Ni, and Zn) are efficiently extracted using acetic acid as a chelating agent. Copper, the most abundant metal in WRAM, is selectively recovered via an electrodeposition technique, achieving approximately 92.7 wt.% purity. The solid residue, enriched with precious metals, is then used as feedstock for precious metal extraction (Au, Ag) using a thiourea solution. A novel, porous, nanofibrous polymer is designed to capture gold from complex e-waste. This approach enables the complete utilization of e-waste in an environmentally friendly manner while minimizing waste discharge.


Complete green e-waste recycling approach
Waste RAM
Feedstock preparation
Pressure gauge
Valve
Thermo -couple
Relief valve
Thermal control system
Electric heating furnace
Reactor system
Solid residue
Liquid mixture
Rotary evaporation
E-waste plastic conversion to oil
Recovered ethanol
Recovered oil
Base metal extraction
(Cu, Pb, Zn, Ni)
Electrodeposition
Selective Cu recovery
Precious metal extraction
(Au and Ag)
Porous functioned adsorbent
Selective Au recovery

Akhil Kongara

Gunjan Kapadia

Low cost, safe and high energy dense mechanically rechargeable zinc-air batteries for long-duration grid energy storage

Akhil Kongara, Gunjan Kapadia
Indian Institute of Technology, Madras

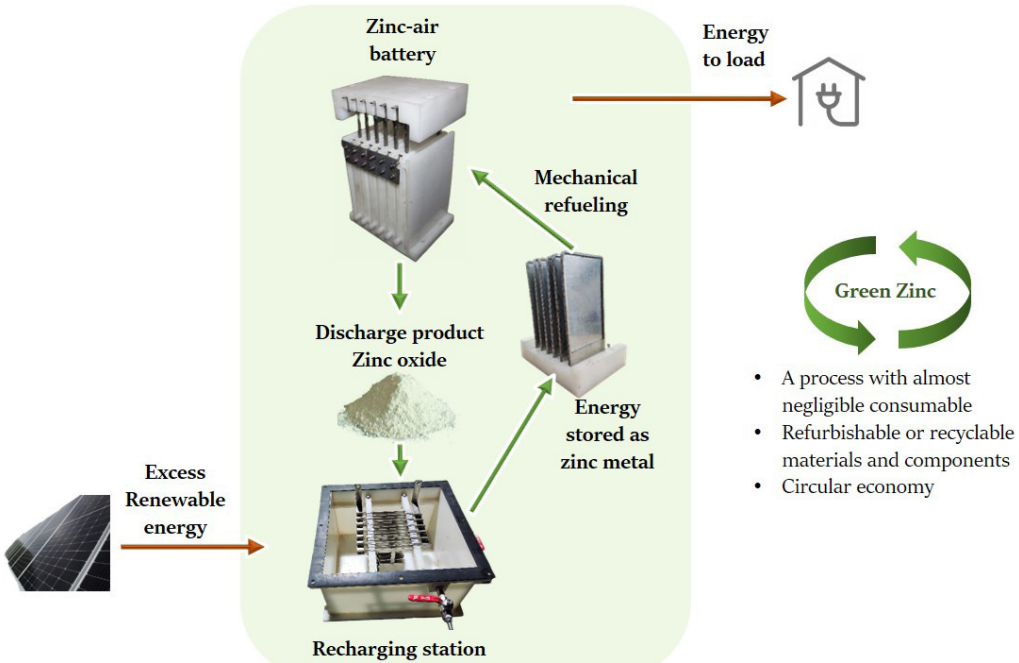
Guide:
Dr. Aravind Kumar Chandiran

Rising concerns over global warming have motivated scientists to explore various clean energy generation options. Renewable energy sources, such as solar and wind, have gained significant traction, resulting in a tremendous increase in energy generation from these sources over the last decade. However, the intermittent nature of these renewable sources creates a time gap between energy generation and consumption. To address this gap, energy storage solutions must be developed that are low-cost, safe, sustainable, and capable of storing excess renewable energy for extended periods with negligible self-discharge.

This innovation highlights the potential of zinc-air batteries as an alternative technology for large-scale and long-duration energy storage. The team has decoupled the charging and discharging processes, allowing them to operate simultaneously. A zinc charging station was established to recycle discharged zinc oxide from the battery using renewable energy, storing it safely as compact zinc plates for over a year with negligible self-discharge. This approach enables the storage of excess renewable energy as it is generated.

A 200 Ah mechanically refuelable zinc-air single cell was designed and fabricated using proprietary in-house developed gas diffusion electrodes. The recycled compact zinc plates can be easily inserted into the battery pack for discharge when energy is demanded. Discharge tests confirmed gravimetric and volumetric energy densities of 300 Wh/kg and 600 Wh/L, respectively, at the module level. Additionally, a refueling time of approximately two minutes was demonstrated in a 1.2 kWh module containing six cells. The 30 kWh battery pack and its corresponding recharging station were fabricated at around $70 per kWh. Operation with an aqueous electrolyte further demonstrated the pack's inherently safe nature.

Other Contributors:
Keerthana Sundara Ganesan,
Shashank Swaminathan


Zinc-air battery
Energy to load
Mechanical refueling
Discharge product Zinc oxide
Energy stored as zinc metal
Excess Renewable energy
Recharging station
Green Zinc
• A process with almost negligible consumable
• Refurbishable or recyclable materials and components
• Circular economy

Payal Meghshyam Yelne

Technology for valorization of keratin waste to value added products

Payal Meghshyam Yelne
Institute of Chemical Technology, Mumbai

Guide:
Prof. Aniruddha B. Pandit

Keratin waste is considered an environmental pollutant and is primarily generated from poultry farms, slaughterhouses, and the leather industry. Worldwide, approximately 2 million metric tons of wool, 0.3 million tons of human hair, and 8.5 billion tons of poultry feathers are generated annually, with India contributing 350,000 tons. Keratin waste is usually dumped, sometimes landfilled, or incinerated. Such actions lead to pollution of soil, water, and air. These wastes increase environmental hazards and pollution and pose a threat to public health while also increasing greenhouse gas emissions.

To address this issue, a new sustainable technology has been developed using advanced oxidation and hydrodynamic cavitation. This process converts keratin waste into valuable products such as liquid fertilizers, amino acid-rich growth stimulants, and keratin protein for cosmetic applications. The technology is patented, scalable, energy-efficient, and environmentally friendly. It addresses issues related to waste management and environmental pollution and generates additional income for poultry processing plants.

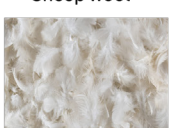
This technology will make the liquid biofertilizers more efficient than marketed products. The developed liquid fertilizer is extremely economical, with prices ranging from $0.20 to $0.30 per liter. Nitrogenous fertilizers are easily digestible by plants and promote growth. This innovation in natural fertilizers is essential, as the world is trying to move away from synthetic products due to their numerous hazards. The cost of isolating protein in pure form, which can be used as a protein supplement for animal feed, is approximately $2 per kg, compared to the price of protein supplements currently available in the Indian market, which range from $9 to $10 per kg.

Technology for valorisation of keratin waste to value added products

Keratin waste

Sheep wool

Human hair

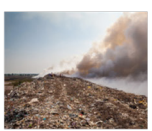


Chicken feather

Animal hair

Conventional method for disposal

Dumping in land



Burning or Incineration

High Cost
No value addition
Not environment friendly

Developed Technology

Low Cost
High-value addition
Environment friendly
Sustainable solution

Products

Protein isolates

Liquid Hydrolysate

Vijaya Kumar Kanchetla

Dhruva-A global navigation receiver chip for NavIC, GPS, Galileo and BeiDou

Vijaya Kumar Kanchetla
Indian Institute of Technology, Bombay

Guide:
Prof. Rajesh Zele

The Kargil War highlighted India's need for self-reliance in navigation technology. In response, the NavIC satellites have been providing location services in the Indian subcontinent for the past few years. However, a commercial receiver chip compatible with all NavIC bands has yet to be developed. To address this gap, IIT Bombay has developed Dhruva, an indigenous navigation receiver RF front-end integrated circuit (RFIC) designed primarily for civilian applications utilizing NavIC and GPS.

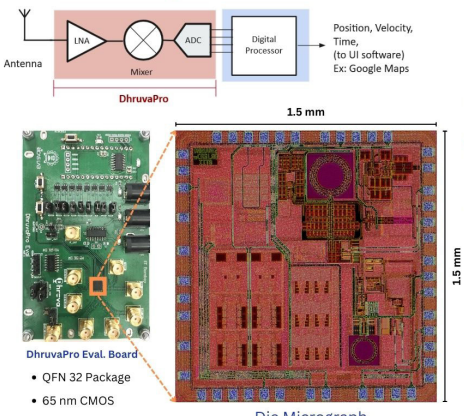
Dhruva effectively filters out interference, isolating weak navigation signals that are amplified approximately 400,000 times before being converted into digital bits using on-chip Analog-to-Digital Converters (ADCs). The resulting digital data can then be processed by any standard digital signal processor to accurately determine location. Dhruva is capable of tuning into signals from NavIC, GPS, Galileo, and BeiDou across multiple frequency bands (L1, L2, L5, S) within the range of 1 to 2.5 GHz, making it a versatile solution. With a die size of 1.85 mm x 1.85 mm, Dhruva is developed as a production-level IC with ESD protection, on-chip testing, and reference circuits that operate within a temperature range of -40 to 100 °C. It consumes less than 50 mW of power from a 1.2 V supply.

In 2023, based on feedback from the chip design industry, an advanced version called DhruvaPro was developed, incorporating features like passive antenna support and flexible digital bit encoding. DhruvaPro meets all necessary specifications and is being prepared for commercial adoption in navigation receiver modules for vehicle tracking and IoT devices using NavIC and other satellite navigation systems.

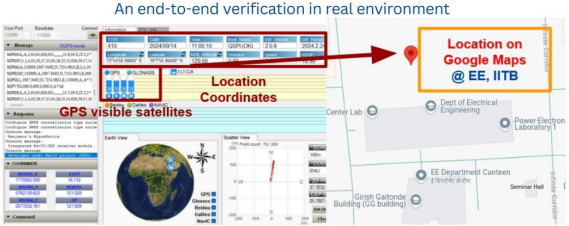
Other Contributors:
Shubham Jain, Ajinkya Kharalkar

Dhruva - A global navigation receiver chip for NavIC, GPS, Galileo, and BeiDou

Navigation receiver



An end-to-end verification in real environment



- First, Indigenous RFIC for NavIC, GPS, Galileo, and BeiDou
- Dhruva and DhruvaPro - Silicon-proven RF front-ends
- Low-power and production-worthy
- Fully reconfigurable and built-in test mechanism
- Capable of civilian and precise positioning with NavIC

Dhruva receivers are developed under the project of "NavIC receiver Development" funded by MeiTY, India.

Komal Shah

Ikshana: An integrated system for adaptive stimulation treatment of urinary incontinence

Komal Shah
Indian Institute of Sciences, Bengaluru

Guide:
Dr. Manish Arora

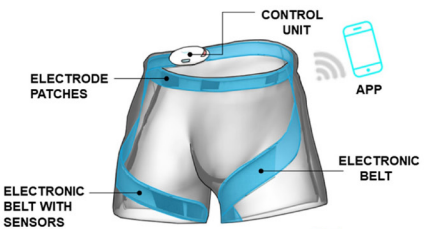
Urinary incontinence (UI) affects over 20% of women in India, presenting significant social, emotional, and economic challenges. While pelvic floor muscle exercises are the standard first-line treatment, around 50% of women cannot perform them correctly, leading to persistent symptoms. Surface electrical stimulation (SES) offers an alternative; however, current portable devices are limited by fixed stimulation parameters that fail to adapt to changes in body dynamics, thereby reducing treatment efficacy and resulting in low patient compliance.

This project addresses these limitations by developing an adaptable SES system that responds to real-time body dynamics, ensuring effective muscle engagement in accordance with physiotherapy protocols. This adaptability enhances treatment efficiency, offering a personalized approach to muscle strengthening. The SES technology is integrated into wearable shorts, ensuring correct anatomical placement of the electrodes. The electronics are removable for easy charging, and the shorts are washable, which improves usability and reusability. This practical, user-friendly design enhances long-term compliance and makes treatment more convenient and accessible.

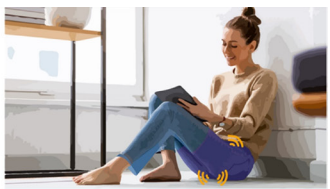
Additionally, the system includes a smartphone app for remote control and monitoring, enabling patients to discreetly manage their treatment while clinicians can track progress and adjust parameters as needed. This optimization of treatment sessions reduces therapy duration and lowers healthcare costs.

Overall, this innovation provides an effective and accessible UI treatment solution, significantly improving the quality of life for women and aligning with the growing digital health landscape in India.

PROTOTYPE IMAGE



WEARABLE SYSTEM: CONCEPT



Kirti Wasnik

Novel biological clue assisting polymeric hydrogel mimic the cellular microenvironment and protect from oxidative stress for neuroregenerative applications

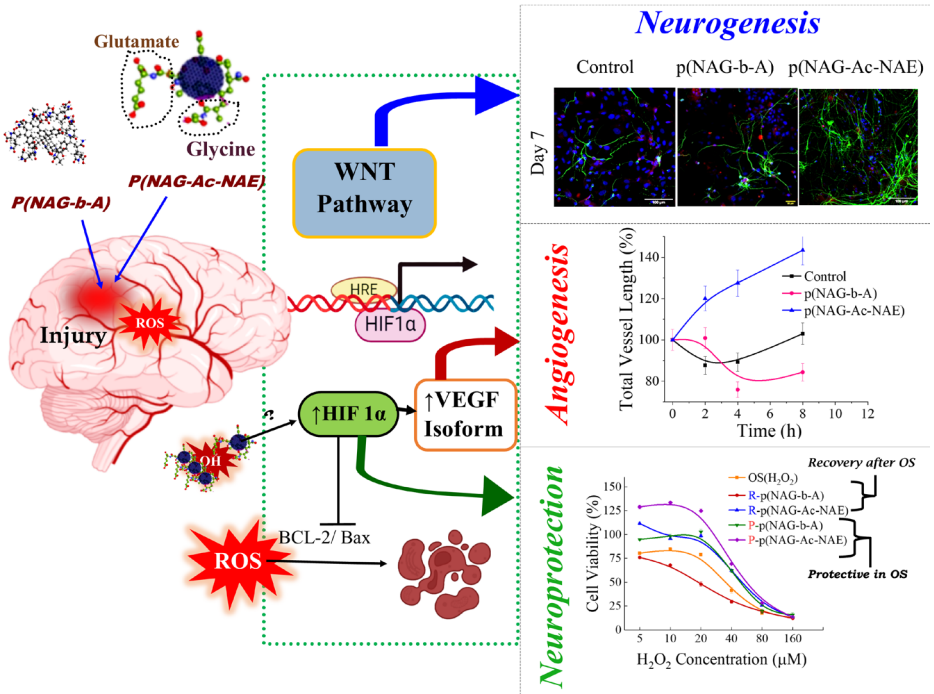
Kirti Wasnik
Indian Institute of Technology (BHU), Varanasi

Guide:
Dr. Pradip Paik

This invention introduces a novel polymeric hydrogel designed for vasculogenesis-assisted neuroregeneration, eliminating the need for conventional medicine. The innovative polymeric biocompatible hydrogel, poly(N-acryloylglycine-acrylamide) [poly(NAG-b-A) nanohydrogel], exhibits an impressive swelling ratio of approximately 1500%, alongside thermal stability (up to 200 °C) and elastic moduli ranging from 2.9 kPa to 3.7 kPa, which favor neuronal outgrowth and protect the cytoskeletal framework of cortical neurons. Serving as a nanomedicine, this nanohydrogel provides essential biological cues and creates a stable three-dimensional extracellular mimetic environment conducive to neuronal regeneration by facilitating cellular adhesion, stabilizing actin filaments, and promoting neuronal differentiation under oxidative stress.

The hydrogel enhances nerve regeneration through GSK3β inhibition, a potential target for neurodegenerative therapies due to its widespread expression in adult neurons and regulation by the PI3K–AKT pathway. Notably, it also fosters the regeneration of Purkinje neurons, which are crucial for proper cerebral function and the transmission of electrical signals to various ventricular muscles. Modulating the poly(NAG-b-A) hydrogel with glutamate monomers yields the poly(N-acryloylglycine)-co-(acrylamide)-co-(N-acryloylglutamate) hydrogel [p(NAG-Ac-NAE)], which displays additional angiogenic properties through VEGF expression stimulation, along with neurogenic and three-dimensional extracellular microenvironment mimetic capabilities. The interplay of vasculogenesis and neurogenesis facilitates the migration of neuronal stem cells, enhancing neurite growth and supporting neuroprotective effects by modulating HIF1-α expression. This clinically appropriate nanomedicine accelerates self-healing capabilities and is ready for industrial translation into clinical applications.

Other Contributors:
Divya Pareek, Sukanya Patra,
Prem Shankar Gupta, Gurmeet Singh


Glutamate
Glycine
P(NAG-b-A)
P(NAG-Ac-NAE)
Injury
ROS
WNT Pathway
HRE
HIF1α
↑HIF 1α
↑VEGF Isoform
OH
BCL-2/ Bax
ROS
Neurogenesis
Control
p(NAG-b-A)
p(NAG-Ac-NAE)
Day 7
Angiogenesis
Total Vessel Length (%)
Time (h)
Control
p(NAG-b-A)
p(NAG-Ac-NAE)
Neuroprotection
Cell Viability (%)
H2O2 Concentration (μM)
OS(H2O2)
R-p(NAG-b-A)
R-p(NAG-Ac-NAE)
P-p(NAG-b-A)
P-p(NAG-Ac-NAE)
Recovery after OS
Protective in OS

Sampad Laha

Electrophysiology-on-a-chip device: A biomimetic test-bench for probing electrical field modulation of cancer metastasis

Sampad Laha
Indian Institute of Technology, Kharagpur

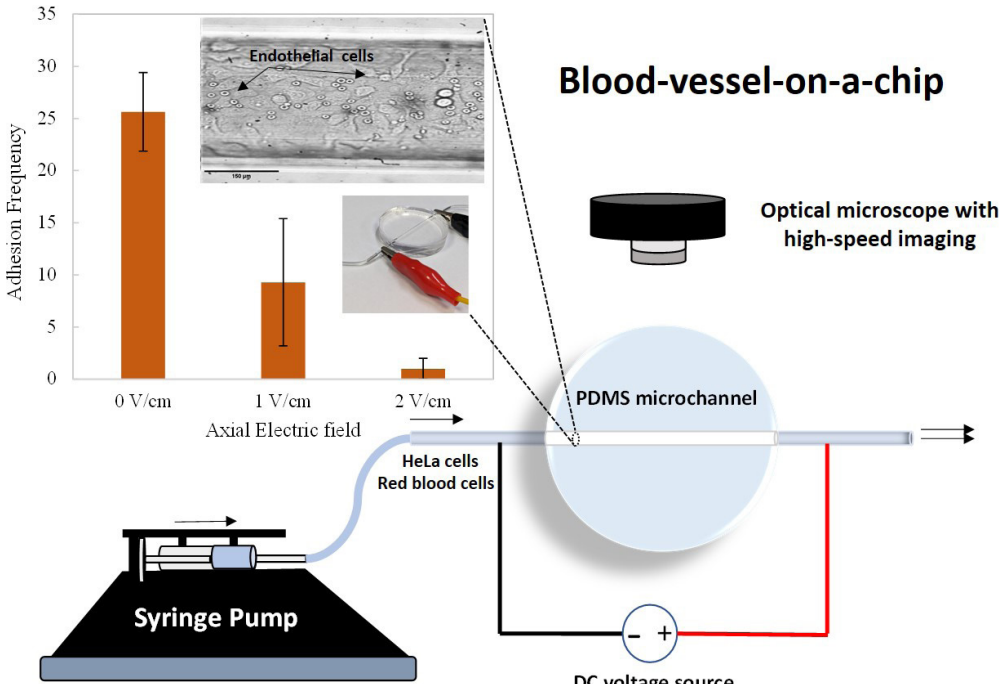
Guide:
Prof. Suman Chakraborty

This innovation involves the development of a novel biomimetic device for studying the in vitro electrophysiology of circulating tumor cells. The resulting device comprises a microchannel of circular cross-section made from a flexible polymer material, with a collagen type I coating on the inner wall. A technology for implanting metallic electrodes in the fluidic pathway has been introduced to apply electric forces to the cells (using any DC voltage source) as they move with the transported fluid, without inhibiting or disrupting the flow.

Using these microfluidic devices in conjunction with an optical microscope, experiments have been conducted with cervical cancer (HeLa) cells, both in the presence and absence of an axial electric field. Cancer cells exhibit adhesive dynamics along the functionalized channel wall, while non-adherent cells, such as red blood cells, do not show signs of adhesion; instead, they undergo lateral migration away from the walls, leading to the formation of a cell-free layer. It has been observed that an axial electric field, even at physiologically relevant magnitudes, significantly reduces the adhesion frequency of cancer cells, which correlates directly with their metastatic potential.

Preliminary results using our device clearly indicate that the migratory patterns of metastasizing tumor cells can be tuned with the application of an electric field, without affecting the natural flow of other cells. We have also successfully created a monolayer of endothelial cells on the inner walls of the channel, thereby developing an artificial blood vessel-like structure with biocompatible electrodes. Thus, this innovative device not only serves as an in vitro platform for testing electric field-based therapies on metastasizing cancer cells, but, through further trials, can also be optimized for use as a vascular implant in cancer patients for the active control of tumor cell migration and cancer metastasis.

Other Contributors:
Dhruba Dhar, Mainak Adak, Aditya Bandopadhyay, Soumen Das, Jyotirmoy Chatterjee


Blood-vessel-on-a-chip
Endothelial cells
Adhesion Frequency
35
30
25
20
15
10
5
0
0 V/cm
1 V/cm
2 V/cm
Axial Electric field
Optical microscope with high-speed imaging
PDMS microchannel
HeLa cells
Red blood cells
Syringe Pump
DC voltage source

Roshan Keshari

Phytonanogel shield: Precision care for psoriasis patients

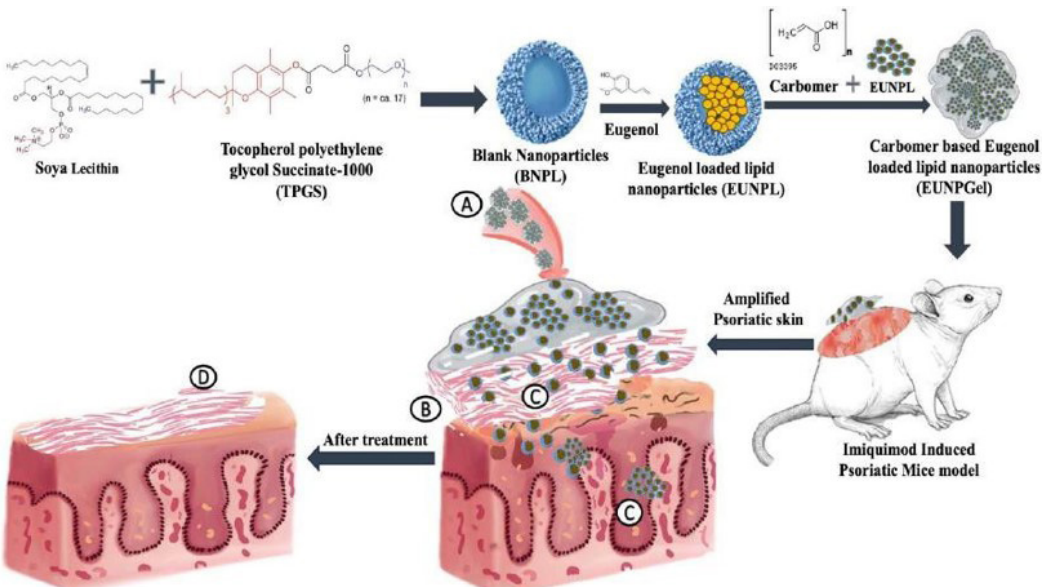
Roshan Keshari
Indian Institute of Technology, Bombay

Guides:
Prof. Rohit Srivastava
Prof. Shamik Sen

Psoriasis is a chronic autoimmune skin disorder mediated by T-cells, resulting in excessive epidermal thickening, abnormal keratinocyte proliferation, disrupted epidermal differentiation, and increased dermal blood vessel growth. Despite the widespread use of corticosteroids, their limited effectiveness and numerous side effects create significant economic and therapeutic challenges globally. To address these challenges, this research proposes an alternative therapeutic approach using nanotechnology, specifically through the encapsulation of eugenol (EU) in soya phosphatidylcholine (SPC) nanoparticles (EUNPL). These nanoparticles exhibit a spherical shape, with a hydrodynamic size of approximately 200 nm, a polydispersity index of 0.23, and an encapsulation efficiency of 85%. Their colloidal stability is indicated by a zeta potential of -27 mV.

Subsequently, these eugenol-loaded nanoparticles were incorporated into a topical hydrogel system using Carbopol 974P (EUNPGel). This hydrogel formulation demonstrated superior drug loading capacity, enhanced release kinetics over 48 hours, long-term stability, and effective scavenging of reactive oxygen species (ROS). In vitro studies showed that EUNPL inhibited keratinocyte proliferation, induced apoptosis, and increased the uptake of IL-6-mediated inflammation in human keratinocyte cells.

When applied to a mouse model of imiquimod-induced psoriasis, the EUNPGel exhibited significant therapeutic benefits. It effectively penetrated the skin, suppressed keratinocyte hyperplasia, and restored normal epidermal growth. Remarkably, the Psoriasis Area and Severity Index (PASI) score was reduced from 3.75 to 0.5 within just five days of treatment. This novel nanoparticle-enhanced hydrogel provides multiple advantages, including improved ROS scavenging, better cellular uptake, and enhanced skin penetration and retention. It also reduces immune cell hyperactivity, making it a promising candidate for treating and managing psoriasis.


Soya Lecithin
Tocopherol polyethylene glycol Succinate-1000 (TPGS)
Blank Nanoparticles (BNPL)
Eugenol
Eugenol loaded lipid nanoparticles (EUNPL)
Carbomer
EUNPL
Carbomer based Eugenol loaded lipid nanoparticles (EUNPGel)
Amplified Psoriatic skin
Imiquimod Induced Psoriatic Mice model
After treatment
A
B
C
C
D

Deepa Dehari

Development of bacteriophage-chitosan microparticles for biofilm-mediated multidrug-resistant bacterial infections on burn wounds

Deepa Dehari
Indian Institute of Technology (BHU), Varanasi

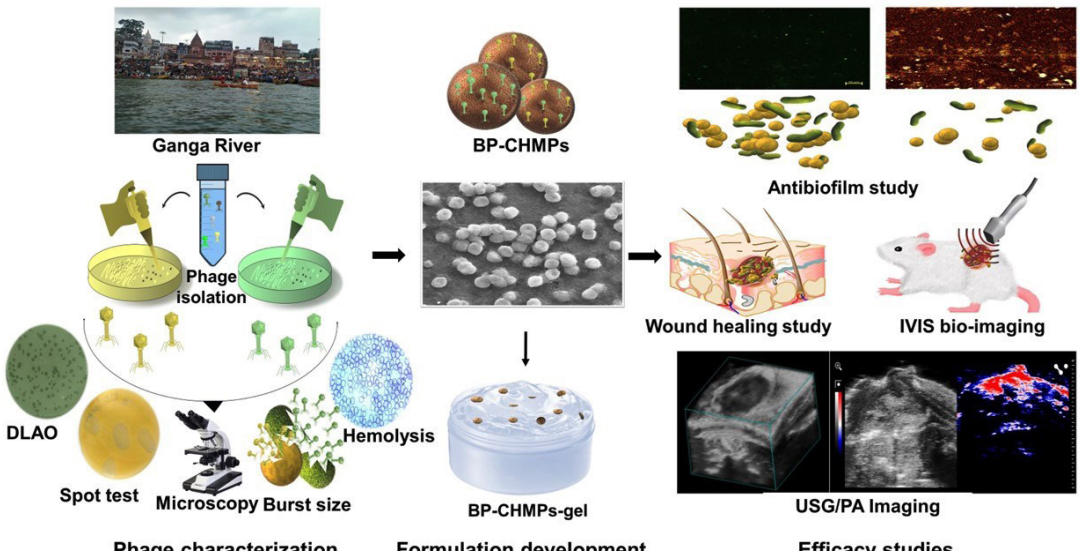
Guide:
Dr. Ashish Kumar Agrawal

Antimicrobial Resistance (AMR) poses a significant global challenge, with the Antibiotic Resistance Threat Report 2019 indicating that approximately 2.8 million infections in the USA each year are antibiotic-resistant, resulting in over 35,000 deaths. Staphylococcus aureus and Pseudomonas aeruginosa, common in burn wound infections, are multidrug-resistant (MDR), and their ability to form biofilms complicates treatment. Bacteriophages (BPs) have emerged as an effective alternative therapy against MDR and biofilm-associated infections.

In this study, two bacteriophages, BPSAΦ1 and BPPAΦ1, were isolated targeting MDR S. aureus and P. aeruginosa, respectively. These BPs were encapsulated in chitosan microparticles (BPSAΦ1-CHMPs, BPPAΦ1-CHMPs, and MBP-CHMPs) and incorporated into the SEPINEO™ P 600 gel formulations. Characterization revealed that BPSAΦ1 and BPPAΦ1 belong to the Caudoviricetes class, exhibiting burst sizes of 74 ± 0.83 PFUs and 110 ± 1.05 PFUs per infected host cell. The average particle sizes were 1.19 ± 0.01 µm, 1.42 ± 0.21 µm, and 2.84 ± 0.28 µm, demonstrating in vitro antibiofilm activity.

In vivo studies assessed the effectiveness of the BPSAΦ1-CHMPs gel, BPPAΦ1-CHMPs gel, and MBP-CHMPs gel using ultrasound and photoacoustic imaging in infected burn wounds in rats. The results indicated significant wound healing improvements (84.61 ± 1.03%, 83.38 ± 1.87%, and 85.54 ± 0.05% healing at 28 days), reduced inflammation, and increased oxygen saturation compared to control and marketed formulations. The findings suggest that incorporating BPs into microparticle gels enhances protection, sustains release, and boosts antibacterial efficacy.

Other Contributors:
Dulla Naveen Kumar, Aiswarya Chaudhuri, Akshay Kumar, Rajesh Kumar, Dinesh Kumar, Gopal Nath


Ganga River
BP-CHMPs
Antibiofilm study
Phage isolation
Wound healing study
IVIS bio-imaging
DLAO
Hemolysis
Spot test
Microscopy
Burst size
BP-CHMPs-gel
USG/PA Imaging
Phage characterization
Formulation development
Efficacy studies

Ankit Ganeshpurkar

Implementation of computational and machine learning techniques for the development of in silico tools and identification of novel leads for the treatment of Alzheimer's Disease

Ankit Ganeshpurkar
Indian Institute of Technology (BHU), Varanasi

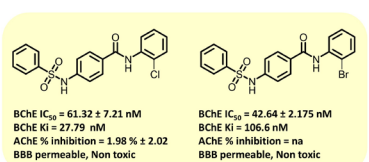
Guide:
Dr. Sushil Kumar Singh

Alzheimer's disease (AD) is a complex neurodegenerative disorder characterized by memory loss, cognitive decline, and neuropsychiatric symptoms. The cholinergic hypothesis emphasizes the loss of cholinergic neurons as a critical factor in AD, supporting the use of treatments such as acetylcholinesterase inhibitors (AChEIs) and NMDA receptor antagonists. However, in advanced stages of AD, the activity of butyrylcholinesterase (BChE) increases, altering the AChE/BChE ratio and prompting interest in selective BChE inhibitors as potential treatments with fewer side effects than AChEIs.

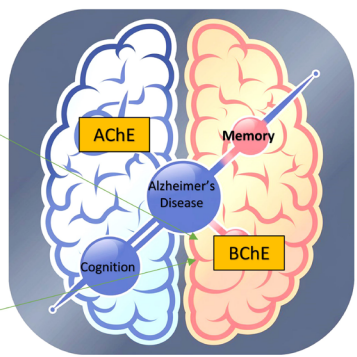
This study aimed to discover selective BChE inhibitors using machine learning (ML) and to assess their efficacy through in vitro, in silico, and in vivo assays. Sulfonamide derivatives were identified as BChE inhibitors using an ML-based gradient boosting model, leading to the selection of N-phenyl-4-(phenylsulfonamido)benzamide derivatives for further investigation. Of the 36 synthesized compounds, two (compounds 34 and 37) exhibited strong BChE inhibition, with IC50 values of 61.32 $\pm$ 7.21 nM and 42.64 $\pm$ 2.175 nM, respectively. These compounds also demonstrated permeability across the blood-brain barrier and maintained cell viability in neuroblastoma SH-SY5Y cells.

In vivo tests in rats with scopolamine-induced amnesia showed significant improvements in memory retention, learning, and performance on maze tests. Additionally, a web application named "Alzleads" was developed to identify potential anti-Alzheimer's compounds using ML models. The application focuses on key AD-related targets, including acetylcholinesterase, BChE, β-secretase 1, GSK-3β, MAO-B, and NMDA receptors. The models were trained using datasets from BindingDB and employed binary classification algorithms such as KNN, SVC, decision tree, and random forest, achieving over 80% accuracy. "Alzleads" offers users a platform to predict inhibitors for Alzheimer's targets, leveraging ML for drug discovery.

Gradient boosting identified sulfonamide derivatives as potential BChE inhibitors.



Compounds 34 and 37 (were identified as potent BChE inhibitors.



Lead compounds improved memory retention and learning in scopolamine-induced amnesia in rats, evidenced by better maze test performance.

A machine learning-based tool for predicting anti-Alzheimer's ligands targeting six key enzymes and receptors, enabling real-time efficacy predictions for user-input compounds.

Vikas Choudhary

Use and throw polymeric tooth cover for acute tooth ache and inflammation to proffer non-permanent relief

Vikas Choudhary
Ideal College of Pharmacy and Research, Mumbai

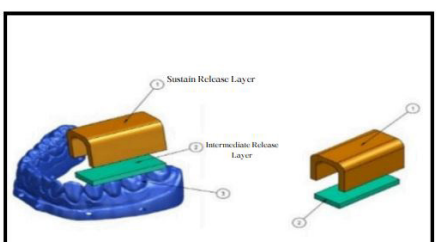
Guides:
Dr. Shubhangi Kshirsagar
Dr. Smita Takarkhede

An approach for addressing acute inflammation and aching teeth was provided by the embodiment of the current invention. Clove oil was incorporated to deliver analgesic effects, while peppermint oil was used for its anti-inflammatory and soothing properties. The aim of this research was to formulate a disposable polymeric tooth cover for acute toothache and inflammation, offering non-permanent relief. The preparation of a sustained-release outer layer was carried out using the solvent casting method. For the immediate-release layer, gelatin was mixed with water to form a solution that was poured into a Petri dish to obtain a thin layer, which was then cut into the required shape and size. The disposable polymeric tooth cover was successfully prepared, and its evaluation was conducted. The evaluation parameters included physical appearance, characterization of surface formulation, surface pH, thickness uniformity, weight uniformity, swelling index, moisture content, viscosity, differential scanning calorimetry, in vitro permeation study, and drug release kinetics.

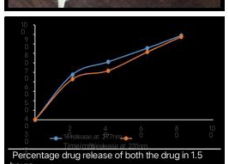
It was found that while numerous buccal and oral drug delivery systems existed for treating dental pain and inflammation, the current market demand necessitated the development of a novel formulation named the "Dental Cap." This innovative product was distinguished by its outer sustained-release layer and inner immediate-release layer, setting it apart from other drug delivery systems. The enhanced drug release of the formulation was evaluated through drug release tests. The primary focus was on treating temporary tooth pain and inflammation, and it was concluded that the product was capable of delivering the desired results based on the evaluation of all parameters.

Other Contributors:
Satyam Mishra, Ajit Maurya, Ashish Rajbhar, Shubham Kamble, Aditya Maurya

Physical Appearance of Dental cap



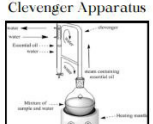
Thickness Measurement



Avg pH value of formulation

Weight Variation

Clevenger Apparatus



Tejal Dube

An impedance-based liquid biopsy method for cancer screening and diagnosis using cfDNA as a biomarker

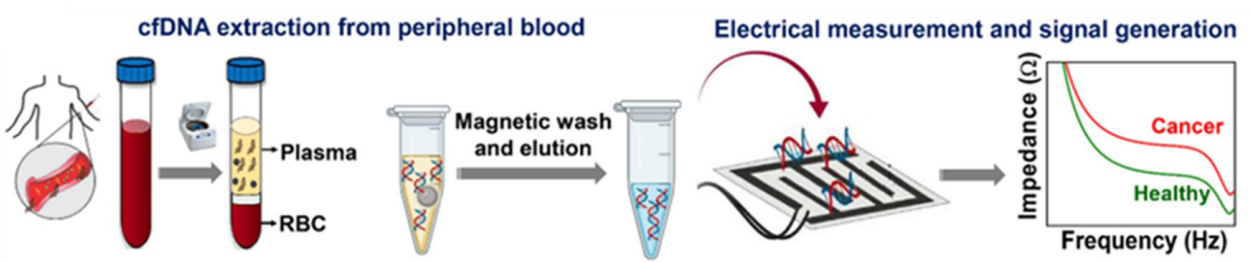
Tejal Dube
Indian Institute of Technology, Delhi

Guide:
Prof. Manojkumar Rameteke

Aberrant DNA methylation is a hallmark of cancer, and plasma cell-free DNA (cfDNA) containing these abnormal methylation patterns has emerged as a promising non-invasive biomarker for pan-cancer detection. However, intrinsic challenges continue to limit its broad clinical application.

A simple and rapid impedance-based assay has been developed to detect cancer cfDNA in under five minutes without the need for any molecular labeling, electrode modification, signal amplification, or target enrichment steps. The study involved 216 clinical samples, including 50 from healthy individuals, across 15 different cancer types (all stages). The assay demonstrated an overall sensitivity of 96.4% and specificity of 94.0%.

Differences in methylation content between cancerous and healthy cfDNA lead to distinct solvation behavior and electro-physicochemical properties that remain consistent across cancer types, regardless of the distribution patterns of methyl cytosine. This test exploits these inherent differences.


cfDNA extraction from peripheral blood
Plasma
RBC
Magnetic wash
and elution
Electrical measurement and signal generation
Impedance (Ω)
Cancer
Healthy
Frequency (Hz)

Neel Kamal Gupta

Multi-station multi-axis hybrid layered manufacturing system

Neel Kamal Gupta
Indian Institute of Technology, Bombay

Guide:
Prof. K.P. Karunakaran

Additive Manufacturing (AM) has revolutionized traditional manufacturing with its layer-by-layer approach, enabling the production of intricate components. However, Hybrid Layered Manufacturing (HLM) takes this further by integrating additive and subtractive techniques to enhance efficiency and reduce costs. For metallic components, HLM involves metal deposition through techniques like arc deposition, laser processing, and Electron Beam Melting (EBM) to achieve near-net-shape parts. Precision machining then removes excess material, delivering a final net shape. This approach offers a versatile solution to complex manufacturing challenges.

HLM's hybridization extends beyond combining processes, incorporating different materials, layering techniques, and operational strategies. A significant innovation in this field is the Multi-Station Multi-Axis Hybrid Layered Manufacturing (MSMA-HLM) system. This advanced system, with multiple stations and a five-axis setup, enhances precision and flexibility, making it suitable for aerospace, automotive, and medical industries. Additional features such as preheating, hammering, and inspection units ensure the production of high-quality, defect-free components.

The indigenous MSMA-HLM system, developed at a cost of INR 50 million, is optimized to produce components with complex geometries, reduced residual stress, and flawless surfaces. Case studies highlight HLM's ability to reduce time and costs compared to conventional methods, with several successful technology transfers demonstrating its practical impact.

In conclusion, HLM, especially with innovations like the MSMA-HLM system, represents a major advancement in manufacturing. Its blend of additive and subtractive processes positions it as a crucial technology for industries seeking efficient, precise, and adaptable manufacturing solutions. Complementary technologies further enhance component effectiveness, making HLM an essential tool for modern manufacturing needs.

Other Contributors:
Ganesan G., Siddhartha, Shahu Rajaram Karade


Station 1
Machining
Station 2
Camera
Station 3
Laser
Station 4
MIG
Station 5
TIG
Station 6
Hammer
Station 7
Preheater

Namrata Baruah

Development of affordable vaccines for multi-drug resistant diarrhea

Namrata Baruah
Indian Institute of Technology, Kanpur

Guide:
Prof. Dhirendra S. Katti

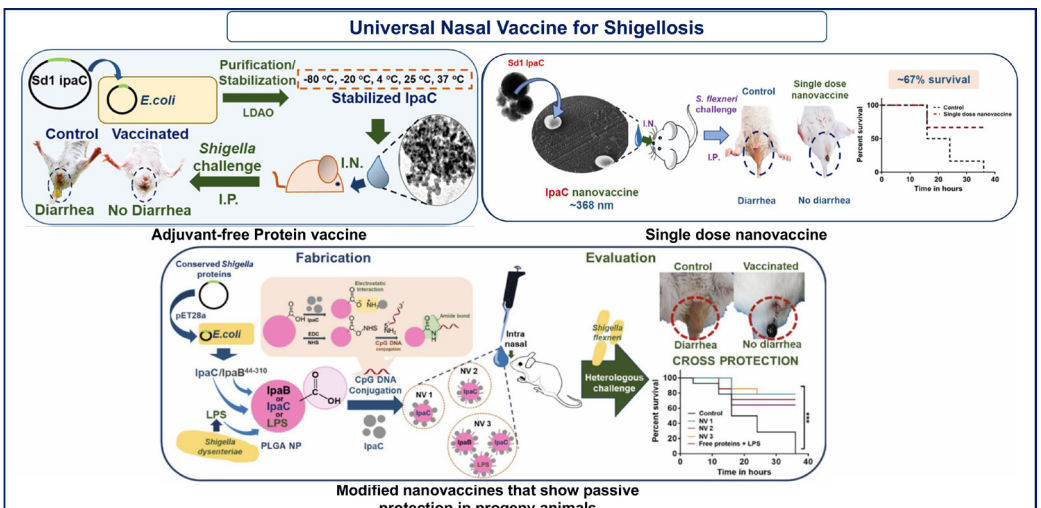
The rise of multi-drug resistant (MDR) Shigella, a leading cause of bacterial diarrhea, poses a significant public health threat, particularly in low- and middle-income countries. Responsible for thousands of deaths annually and multiple epidemics, shigellosis remains a critical health concern. Despite the availability of a Rotavirus vaccine, no licensed vaccines currently exist for shigellosis due to challenges related to low or serotype-specific immunogenicity.

Efforts to develop cross-protective vaccines have focused on conserved antigens, such as recombinant Invasion Plasmid Antigens (Ipa). However, achieving effective cross-protection, especially against Shigella dysenteriae 1 (Sd1), the most virulent strain, remains difficult. Among these antigens, IpaC stands out as a promising target, though its instability and tendency to aggregate have limited its use.

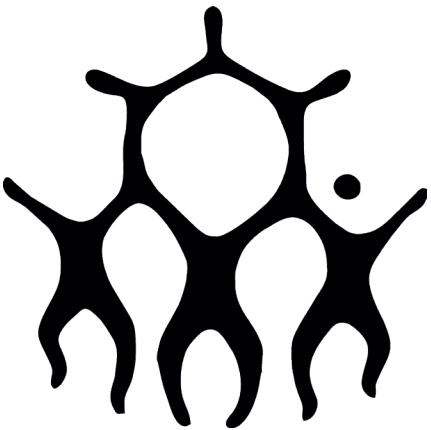
In response, researchers stabilized recombinant IpaC from Sd1, achieving improved temporal stability suitable for transport and storage in tropical climates without the need for a cold chain—critical for countries like India. Mice vaccinated intranasally with stabilized IpaC (granted Indian patent-455359) without an adjuvant showed protection against both homologous and heterologous Shigella strains. To enhance compliance, stabilized IpaC was encapsulated into biodegradable polymeric nanoparticles, creating a single-dose vaccine (Indian patent-202111008181), which generated a superior antibody and cytokine response compared to thrice-administered free IpaC.

Additionally, biomimetic nanovaccine candidates (granted Indian patent-433684) were developed, incorporating Sd1 antigens with biomolecules like stabilized IpaC or CpG DNA to improve cellular uptake and immunogenicity. These vaccines also provided passive protection in neonates.

These non-invasive, room-temperature storable, and cost-effective vaccine candidates represent a significant step toward developing a pan-Shigella vaccine, suitable for mass production and widespread immunization.


Universal Nasal Vaccine for Shigellosis
Sd1 ipaC
E.coli
Purification/ Stabilization
-80 °C, -20 °C, 4 °C, 25 °C, 37 °C
LDAO
Stabilized IpaC
Control
Vaccinated
Shigella challenge
I.P.
I.N.
Diarrhea
No Diarrhea
Adjuvant-free Protein vaccine
Sd1 IpaC
IpaC nanovaccine ~368 nm
I.N.
S. flexneri challenge
I.P.
Control
Single dose nanovaccine
Diarrhea
No diarrhea
~67% survival
Percent survival
Time in hours
Single dose nanovaccine
Conserved Shigella proteins
pET28a
E.coli
IpaC/IpaB44-310
IpaB or IpaC or LPS
LPS
Shigella dysenteriae
PLGA NP
Fabrication
CpG DNA Conjugation
IpaC
NV 1
NV 2
NV 3
Intra nasal
Evaluation
Shigella flexneri
Heterologous challenge
Control
Vaccinated
Diarrhea
No diarrhea
CROSS PROTECTION
Control
NV 1
NV 2
NV 3
Free proteins + LPS
Percent survival
Time in hours
Modified nanovaccines that show passive protection in progeny animals

Honey Bee Network



The Honey Bee Network (HBN) is a social movement supported by a large number of volunteers. The network which had pioneered the open innovation culture much before the term became popular. For the past 36 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 iii) 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 several countries. It has facilitated documentation of over 45000 ideas, innovations and traditional practices besides student projects through volunteers. Honey Bee Network has incubated a series of institutions to support green grassroots innovators and others. It has given birth to Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI), Grassroots Innovation Augmentation Network (GIAN), National Innovation Foundation (NIF) and inspired many national and international innovation policies. It is a global platform where like-minded individuals, innovators, farmers, academicians, policymakers, entrepreneurs and non-governmental organizations (NGOs) come together to respect, recognize 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:

- Scouting, spawning, and supporting innovations and outstanding traditional knowledge at grassroots. It links formal and informal science, tries to validate and add value

in sustainable innovative technologies, promotes creativity among children and also pursues learning from grandparents, particularly centenarians, about viable and green traditional knowledge.

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

- Mentoring individual innovators in various sectors and linking them with each other and informal sector innovators. Lobbying for policy and institutional changes in support of grassroots creativity and innovations at regional, national and international levels.

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

- Linking innovators with formal research and development (R&D) institutions, market and communication institutions & networks, media etc., so that more and more people are inspired to find solutions to problems of our society. SRISTI (www.sristi.org) and GIAN (www.gian.org)provide institutional support to the Network, along with other volunteers.

Linking technology students with small industry, entrepreneurs and informal sector through techpedia.in and facilitating Gandhian Young Technological Innovation (GYTI) 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 Honey Bee quarterly newsletter, a unique voice of creative and innovative people at grassroots in different languages. Motivating commercial organizations and public systems to become more empathetic in providing extremely affordable services and products to common people.

SRISTI (www.sristi.org)

INTRODUCTION:

SRISTI, 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 the last 30 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:

[1] Educational innovations by school and college students, teachers, and other stakeholders;

[2] Institutional innovations at community and other levels in managing natural and other resources,

[3] Cultural creativity so that curiosity, collaboration, and com passion grow through art, literature and crafts;

[4] Technological innovations and traditional knowledge dealing with human, animal, plant and ecosystem health, and

[5] 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:

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

BIODIVERSITY

- Providing intellectual property rights protection and risk capital support.
- Extending necessary support for in-situ and ex-situ conservation of local biodiversity and associated knowledge system.
- Empowering the knowledge-rich, economically poor people by adding value to their innovations, traditional knowledge and associated biological diversity including microbial diversity.

- Linking 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.
- Providing early stage risk capital and mentoring support to grassroots innovators, students and other mavericks to scale up their products and services which are based on grassroots innovations through commercial or non-commercial channels. Embedding the insights learnt from grassroots innovations in the formal educational, policy and institutional systems in order to expand the conceptual, cognitive, institutional and policy space available to these innovations.

INITIATIVES:

BIRAC's BioNEST

Sanctuary of Innovation, Incubation and Entrepreneurship

(SIIE), SRISTI-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. Currently there are 28 incubatees incubated at SIIE-SRISTI BioNEST.

CHILDREN'S CREATIVITY:

The Children's Creativity and Co-creation Workshops aims to empower children to not only identify and articulate their own problems but also identify and try to solve problems of socially disadvantaged segments, individually and/or collectively. This workshop aims to involve children in solving the social challenges faced by community and thus help us mobilize the creative potential of children around the world. The aim is to overcome persistent social inertia in emerging and sometimes even in advanced geographical regions. It is hoped that many of these children will grow into empathetic, creative, and compassionate leaders in future and will try to work towards making an inclusive and sustainable society.

INSHODH - “TEACHERS AS TRANSFORMERS”

Teachers as Transformers is the initiative of Educational Innovations Bank (EI Bank), which is partnered with SRISTI and Honey Bee Network and based at the Ravi J. Matthai Centre for Educational Innovation, Indian Institute of Management Ahmedabad (RJMCEI-IIMA). EI Bank is a clearing house for effective educational innovations developed and implemented by elementary school teachers working in the public system. Teachers in the public system continue to play an important role in ensuring education for the marginalized sections of our society. In spite of the increase in the share of private sector enrolment, the precariously placed socio-economic strata will continue to depend on this system in the foreseeable future. However, the quality and other educational outcomes of the public system have often been criticized for their less than desirable levels. The EI

Bank assumes that top-down reform is necessary but not sufficient: learning from those who have performed in spite of constraints that are common to many teachers, valorizing and supplementing their work and converting this work into a resource, will expose teachers to a solution-augmenting approach to local educational reform, and motivate them.

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. The discussion also enhances the esteem for local knowledge systems apart from speeding up the process of technological change in regions where formal technology generation system has not been very successful - such as dry regions, mountainous regions and other disadvantaged areas.

SOCIAL INNOVATION FUND

The main objective of Social Innovation Fund (SIF) is to provide mentoring, financial, fabrication, validation, support, and value addition facilities in labs, fields, and R&D Institutions 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 products 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's initiative to foster youth-driven tech innovations. Gandhian Young Technological Innovation Awards 2020 were given virtually by the former Union Health Minister of India Shri Harsh Vardhan on November 05, 2020.

Other Activities:

SATTVIK FOOD FESTIVAL:

SATTVIK is the festival to celebrate traditional nutritious food and associated knowledge systems. It was started fourteen years ago at IIMA to provide market based incentives for conserving agro-biodiversity and creation of demand for rarely or less cultivated nutritionally rich crops and varieties to stimulate their cultivation. In the regions with low rainfall, minerals inside of the soil don't leach much and hence crops which are grown there- like millets, sorghum, and pulses- are rich in nutritional value. The paradox

of development is that the food that rich eat is often poor while food that poor grow (in poorer regions) is rich in nutritional value. This festival aspires to put the lesser known but nutrient-rich food from various states on the plate of urban communities, helping them to adopt healthier food habits and lifestyle. The festival also hopes to encourage farmers to grow more nutrition-rich crops and thus help them in augmenting their incomes. http://sattvik.sristi.org/

SHODHYATRA

Shodhyatra is a journey in some of the remotest areas of the country to search for knowledge, creativity, and innovations at the grassroots. It is an attempt on the part of SRISTI with a firm belief that the hardships and challenges of natural surroundings are prime motivators of creativity and innovations. It aims at unearthing such traditional knowledge and grassroots innovations. It is also a journey of mutual exchange and sharing of knowledge. Whatever knowledge and practices that are pooled in over various Shodhyatras are also shared back with the villagers during subsequent Shodhyatras, along with sharing of the various databases of the Honey Bee Network. During Shodhyatras, women and children are also included to display their ecological knowledge through recipe and children competitions respectively. Over the past 25 years, 51 Shodhyatras have been organised covering all the states of the country. https://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/

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, cocreate 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 204,000 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 technology 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.
- Organize 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 30 years. World over, children are often treated as a sink of sermons rather as a source of ideas.

The children creativity workshops are organized to see the societal inertia through the children's 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. The 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) has organized this Summer School on Inclusive Innovation through open, reciprocal and responsible frame work 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.

Email: summerschool@sristi.org Web: ss.sristi.org

In the memory of Dr. A.P.J. Abdul Kalam, the Honey Bee Network, SRISTI, and GIAN have jointly organized an annual competition of innovative ideas by students. Dr. A.P.J. Abdul Kalam Children Ignited Mind Creativity and Innovation Award competition accepts entries from students up to class 12 and also from school dropouts. This award aims to develop a culture of the "Samvedna" among children to find solutions to the local problems addressing unmet social needs. The idea is to make children aware of the problems and hardships which are faced by common people in their day-to-day life, problems with which many of us have learned to adjust and adopt. It is believed that if children start becoming impatient with social inertia at an early age, it is likely that they will bring about more creative and compassionate changes in the society as they grow up.

SITARE 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 been organizing a three-week SITARE BIIS (Students Innovations for Translation & Advancement of Research Explorations-Biotech Innovation Ignition School) for validating, value-adding and product development around grassroots innovations since 2017. The BIIS tries to develop solutions for grassroots applications for humans, animals, and agricultural applications including herbal technologies, medical devices, and microbial applications.

Due to COVID-19 pandemic, we have conducted BIIS (BIIS-5: June 8- June 27, 2020, BIIS-6: September 22- October 12, 2020, BIIS-7: December 1- December 21, 2020, BIIS-8: January 25 – February 14, 2021 and BIIS-9: May 20-June 9, 2021)course as a webinar, where the prime focus has been to build the capacity of primarily undergraduate students to develop skills in the field of phytochemistry, pharmacognosy, extraction, separation of compounds, microbial diversity screening, pest control, development of extremely affordable solutions for farmers, livestock keepers, pastoralists, human applications, besides patent, biostatistics and ethical guidelines for work on grassroots knowledge and innovations.

The topics for the online course BIIS are designed based on the following fields and as a part of webinar we will assign some projects to the students primarily in five action-research areas drawing upon the Honey Bee Network Database:

- Pharmacognosy/Phytochemistry - SRISTI's Grassroots database contains many traditional knowledge practices as well as 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/ hbnew/honeybee_database.php
- Soil Microbiology-SRISTI has a Microbial diversity bank containing 8000+ organisms (bacteria, fungi, and actinomycetes) isolated from the soil samples collected during ShodhYatras (learning walks for scouting and sharing innovations and local practices) 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 applications would be conducted.

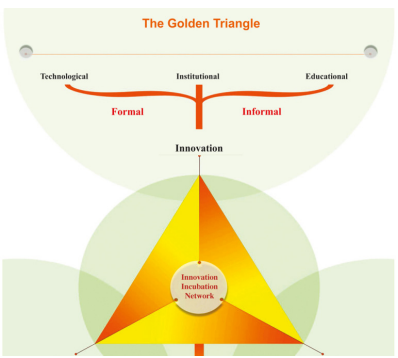
- Veterinary Medicine- Validation of traditional practices for the improvement of livestock health, nutrition, and productivity.
- Agriculture- validation of grassroots practices by conducting trials in the lab, on the station, and in the field for product development/improvement.
- Medical devices- Value addition/product development of any of the open-source projects listed on our summer school website (http://summerschool.sristi.org/) or medical devices for human and animal health care or meeting any other unmet social needs.

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

Having got the best Incubator award in 2002 by 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.

It works in all sectors of human survival and adds value to people's knowledge ín 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 reprsentatives, 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.
- 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

What does it do?

GIAN provides product development, business planning, innovation augmentation through design and development, dissemination and entrepreneurship support. It supports farmers and artisans, primarily in the informal sector in Gujarat, Maharashtra and Goa. However, it can mobilize innovation from any other regions for application in these states. Likewise, it can disseminate innovations from this region to other parts. It has recently started work with the students of ITI and polytechnic, besides school children. It has set up community innovation labs in one of the government primary schools in Ahmedabad. It has also experimented with community food and nutrition lab so that poor people [but also others] can get more nutrition out of available food materials for healthier future. It is well known that despite economic growth, many regions in our country suffer from high anaemia among women and malnutrition among children.

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, shodhyatas, 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 29 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.

Search

Unless young students go out into the field, villages, urban workshops, slums and other MSME clusters to find out innovations by common people as well as others, they would not know the creative potential that already exists in our country. They can mobilize ideas from school children, college students, roadside mechanics, farmers, artisans, homemakers and others for solving various problems or improving the quality of life through incremental innovations. Every time a hidden innovation is brought to surface, many more people feel encouraged and may start trying to solve problems through their own genius. If every college and university starts mapping creativity in its hinterland, the whole society will bristle with positive energy and unleash tremendous dynamism in the economy. The innovations in different fields such as technology, education, institutions, public services, private enterprises, cultural creativity, governance at different levels, etc., will be documented first in a synoptic way and then detailed documentation will be taken up of the more significant ideas. In different courses, these ideas and documentation can be incorporated as a part of curriculum. The social, cultural, ecological, industrial and institutional connection are extremely important for overcoming possible alienation of people in certain areas.

Spread

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

Sense

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

take up projects to address these problems in one or two terms. Accordingly, they can get credit for that too. Practical examples of such a process are given at www.techpedia.in. The innovative solution can be given prizes at university level and also at national level through competition like Gandhian Young Technological Innovation Awards. In social sciences, one can identify gender and other cultural problems and address them likewise through action research approach. Language related students can help improve the linguistics skill of school children and develop innovative pedagogies. If every student develop one lesson for any one topic and for any class, a huge repository of open source local language lesson for school children can be developed to overcome the asymmetry in access to basic education. Different challenges can be sensed and responded.

Celebrate

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

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

HBN will support the value chain development in the case of innovations from informal sector and by school children. The mandate of HBN is restricted to support ideas, innovations and outstanding traditional knowledge practices from the unorganized sector by individuals or communities who have not received any professional training or support. The educational, cultural, institutional and other governance related innovations will be pooled by Society for Research and Initiatives for Technologies and Institutions [sristi.org] and linked to various other programmes. In due course, support may be mobilized to give traction to these ideas. At present, the major contribution will be to give voice and visibility to the innovative ideas in various sectors. Volunteers from among faculty, staff and students will hopefully join hands with the innovators at different levels and in different sectors to ensure widest application for creative and compassionate ideas. Collaborative culture is likely to emerge when learning across formal and informal boundaries get reinforced. During the visit of the Hon'ble President, such clubs can be inaugurated and the team of volunteers can be blessed by the President so as to motivate them to excel in search, spread, sense and celebrate the creativity and innovation in our country.

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Minds on the Margin are not Marginal Minds

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261	Dr. Lokesh Deb	Scientist, Institute Of Bioresources & Sustainable Development, Imphal
262	Dr. Shahila Parween	Scientist, MNR Foundation for Research and Innovation, Hyderabad
263	Dr. Rakesh Maheshwari	Scientist, National Innovation Foundation, Grambharti
264	Mr. Hardev Chaudhary	Scientist, National Innovation Foundation, Grambharti
265	Dr. Nitin Maurya	Scientist, National Innovation Foundation, Grambharti
266	Dr. Ram Rup Sarkar	Senior Principal Scientist, CSIR-National Chemical Laboratory (NCL), Pune
267	Dr. Nishant Verma	Senior Project Scientist, Indian Institute of Technology, Kanpur
268	Dr. Atul Bhargava	Senior Researcher, STMicroelectronics, Delhi
269	Prof. Ravikrishnan Elangovan	Professor, Indian Institute of Technology, Delhi
270	Prof. Amit Kumar Shukla	Professor, Indian Institute of Technology, Delhi
271	Dr. K.K. Deepak	Professor, Indian Institute of Technology, Delhi

LIST OF GYTI AWARDEES (2012 - 2021)

List of GYTI Awardees (2012 - 2020)

GYTI Award 2012

Sr.	Title	Student Name	Institute Name	Supervisor Name
1	Tiles Measurement and Grade Classifying Equipment	Deep M. Bhimani	Government Engineering College, Rajkot	Dr. C. H. Vithalani
2	Multi Desire Wheelchair	Pratik Gandhi, Chintak Dholakia	L.D. College of Engineering, Ahmedabad	Prof. B. H. Parmar
3	Incense Stick Maker	Keshav G	Indian Institute of Technology, Gandhinagar	Dr. Murali Damodaran
4	LPG based Refrigerator	Chintan Patel, Mayank D Patel, Mayank Patel and Biren Patel	Laljibhai Chaturbhai Institute of Technology, Mehsana	Prof. Y. L. Raol, Prof. A. B. Patel
5	Domestic Refrigerator with Water Heater	Dhruv Patel	Gandhinagar Institute of Technology, Gandhinagar	
6	LPG based Refrigerator	Jainil Bhatt, Dhruvin Kagdi, Tirth Jani, Kunjal Jadav	LDRP-ITR College, Gandhinagar	Prof. Tushar Patel
7	Jeevan Dhara Hand Pump with Integrated Filtering System	Kirti Ranjan	Indian Institute of Technology, Kharagpur	
8	Automobile Air Conditioning using Engine Exhaust	Harish Umashankar Tiwari	Pimpri Chinchwad College of Engineering, Nigdi, Pune	Prof. G. V. Parishwad
9	Design, Synthesis & Evaluation of Novel Steroidal Aromatase Inhibitors in Breast Cancer	Dr. Prafulla M. Sabale	Parul Institute of Pharmacy, Vadodara	
10	Image, Speech Recognition and Speech Synthesis for physically disabled	Saurabh Saket	Bhutta College of Engineering, Ludhiana	Dr. Inderdeep Singh Grewal

11	Smart Grid Forecasting Technique	V S K Murthy, Balije palli	Indian Institute of Technology, Bombay	
12	Ultra Sensitive, Low Cost Hand Held Explosive Detector System	Neena Avinash Gilda	Indian institute of Technology, Bombay	Prof. V. Ramgopal Rao, Prof. Dinesh K. Sharma, Prof. Maryam S. Baghini
13	A Tsunami Warning System using Ionospheric Measurements	Jhonny Jha	Indian Institute of Technology, Bombay	Prof. Krishna Sudhakar
14	Vardaan: Stair Climbing Wheelchair	Shanu Sharma	Indian Institute of Technology, Kanpur	Dr. J. Ramkumar, Prof. Shatrupa Thakruta Roy, Dr. Satyaki Roy
GYTI Award 2013				
1	Electronic Support System for Physically disabled(Deaf & Dumb)	Margie Ashok Joshi	C.K. Pithawalla College of Engineering and Technology, Surat	Prof. Dipti Patel
2	Saral Parikshan - An Advancement in Cutting Edge Technology for Rural Area to Detect Vitamin B12 for Pernicious Anemia	L. Sagaya Selvakumar	Council of Scientific & Industrial Research-Central Food Technological Research Institute, Mysore	Prof. M. S. Thakur
3	E-diagnoser: An Advanced Low Cost Patient Monitoring Watch	Libin Varghese, Pillai Sareesh, Shibin Joseph, Adarsh.S, Chithira Jacob, Nithya Merin, Anoop.P	Amal Jyothi College of Engineering, Kottayam	Prof. Reshmi V
4	Hydro-Operated Square-Bottom Paper And Jute Bag Making Machine	Anirudh Thakur	Lala Lajpat Rai Institute of Engineering and Technology, Moga	
5	Nano finishing of Freeform Surfaces of Prosthesis Knee Joint Implants	Sidpara Ajay Muljibhai	Indian Institute of Technology, Kanpur	Prof. V. K. Jain, Prof. V. K. Suri, Prof. R. Balasubramanian
6	Digital Pen	Kalpesh Wani	Visvesvaraya National Institute of Technology, Nagpur	

7	Multifunctional Nano-in-Micro Alginate Microspheres for Biosensing, Drug Delivery and MRI	Rashmi Dilip Chaudhari	Indian Institute of Technology, Bombay	Prof. Rohit Srivastava
8	Highly Gas Impermeable Elastomeric Rubber-Rubber Blend Nano Composites	Ajesh K Zachariah	Mar Thomas College, Tiruvalla	Prof. Sabu Thomas
9	A Portable and Efficient Electronic Filter for Sub-Micron Particles from Fluids	Aswathi R Nair	Indian Institute of Science, Bangalore	Prof. Sanjiv Sambandan
10	Laser Ignited Internal Combustion Engine	Kewal Dharamshi	Indian Institute of Technology, Kanpur	Prof. Avinash K. Agarwal
11	Novel Stand-alone 1-Phase AC Generator for Rural Electrification using Renewable Energy	Sandeep Vuddanti	Indian Institute of Technology, Delhi	Prof. S. S. Murthy, Prof. Bhim Singh
12	Ultra Low Cost Tunable Nano Scale Patterns	NandiniBhandaru	Indian Institute of Technology, Kharagpur	Dr. Rabibrata Mukherjee
13	Vision for the Blind Using Ultrasonic Sensors	Santosh Kumar Bhandari	SRM, Kattankulathur	
14	Spectral Eye	Sai Vijay Gole, Saket Choudhary, Yashesh Gaur	IIT Madras, IIT Bombay, DA-IICT	
15	Automatic Fish Scaling Machine	M. Rajesh Kanna	Velammal College of Engineering and Technology, Madurai	Dr. P. Rajesh Kanna
16	Chetna - Celebrate Your Pregnancy	Keyur Sorathia	Indian Institute of Technology, Guwahati	Keyur Sorathia
17	VAJRA(vessel desk)	Raghunath P lohar	Ganesh Institute of Engineering	
18	SHE- Society Harnessing Equipment	Manisha Mohan	SRM University, Chennai	
19	Clubfoot Orthosis	Kanwaljit Singh	Indian Institute of Technology, Delhi	Dr. P. M. Pandey

20	The Third Eye	Naveen Kumar Rai	Indian Institute of Technology, Guwahati	Dr. Amit Sethi
21	Reactor & Catalyst development for oxygen evolving step in Sulfur-Iodine cycle for Hydrogen production	Kishore Kondamudi	Indian Institute of Technology, Delhi	Dr. Sreedevi Upadhyayula
22	Apparatus for Making Silk Fiber Based Lamellar Biomaterials to Solve Problem of Lower Back Pain	Maumita Bhattacharjee	Indian Institute of Technology, Delhi	Dr. Sourabh Ghosh, Prof. Alok R Ray
GYTI Appreciation 2013				
23	Ambulatory Health Network App	Jayesh Vrujlal Khasatiya	Narnarayan Shastri Institute of Technology, Jetalpur	Prof. Ankita Shah
24	Re-arranging Unused Contacts in Mobile Phones for Quick Access	Bala Vishnu R	Kongu Engineering College, Erode	Prof. P. Natesan
25	Development Bamboo-epoxy nano composites for manufacturing of helmets and other structural applications	Vivek Kumar	Indian Institute of Technology, Delhi	Dr. Sanat mohanty
26	Mosquitocidal Endotoxin from Vellore Poultry Farm Wastes	Bishwambhar Mishra	VIT University, Vellore	Dr. Suneetha Vuppu
27	Sancharak: A Cell-Phone for Blind People	Rohit Bharatkumar Singh	Padmabhushan Vasantdada Patil Pratishthan College of Engineering	Dr. K. T. V. Reddy
28	Target Oriented Niosome Based Delivery of an Antitubercular Drug, Development and Characterization	Gyanendra Singh	Indian Institute of Technology Banaras Hindu University, Varanasi	Prof. Shubhini Saraf
29	Semi-Automatic Rubber Tapping Machine	G. R. Malarmannan	Velammal College of Engineering and Technology, Madurai	Dr. P. Rajeshkanna
30	Cow Dung based Microbial Fuel Cells (CDFCs) to Light up Indian Villages	Vishnu Jayaprakash	University of California, Berkeley	Prof. T. S. Natarajan

31	Development of a Geo-hazard Warning Communication System	Devanjan Bhattacharya	Indian Institute of Technology, Roorkee	Dr. Jayanta Kumar Ghosh, Dr. Narendra Kumar Samadhiya
32	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	SRM University	Dr. M. Anburajan
33	Saree cutting machine for mat making handlooms	Alap Kshirsagar	Indian Institute of Technology, Bombay	Prof. Suhas Joshi
34	Hybrid Classifier for Marine Vessel based on Propulsion	Piyush Aggarwal	Jaypee Institute of Information Technology University, Noida	Prof. Mukta Goyal
35	Design of a Smart Automotive Ventilation System for Parked Vehicles	Gaurav Kumar Jaiswal	Vellore Institute of Technology, Vellore	Dr. Vasudevan R.
36	Snippets-Memory Aid for People With Disability	Devender Goyal	Indian Institute of Technology, Hyderabad	Dr. Kshitij Marwah
37	Graphics Model for Power Systems in CIM Framework and Design of Online Web-based Network Visualizations and Integration of Control Center Applications	Gelli Ravi kumar	Indian Institute of Technology, Bombay	Prof. S. A. Khaparde
38	Cross Linked Antibaterial Hydrogel	Mr. Chakavala Soyeb Rafikbhai	Anand Pharmacy College, Anand	Dr. Nirav V Patel, Dr. Tejal R. Gandhi
39	Robotic Dredger	Amit Dinanath Maurya	Indian Institute of Technology, Bombay	Prof. C. Amarnath
40	Comprehensive Protection from Electrocution	RAMDAS M U	Vidya Academy of Science and Technology, Thrissur	Dr. Sudha Balagopalan, Prof. Mary P Varghese
41	High Performance Cooking Stove	Mayur Rastogi	Indian Institute of Technology, Kharagpur	Prof. S Ray
42	Self-Cleaning Functional Molecular Material	M. B. Avinash	JNCASR, Bangalore	Dr. T. Govindaraju

GYTI Awards 2014				
1	Performance Enhancement of Microthruster using Nano-engineered MEMS Structure for Long Term Space Mission	Pijus Kundu	Indian Institute of Technology, Kharagpur	Prof. T. K. Bhattacharyya, Prof. Soumen Das
2	Parichaya - a Low-cost Medical Device to Increase Adherence among Tuberculosis Patients in Rural Assam	Himanshu Seth	Indian Institute of Technology, Guwahati	Prof. Keyur Sorathia
3	A Simple and Cost Effective Retrofitting to Improve the Thermal and Combustion Performance of Traditional Cook Stoves	Vijay Hanmant Honkalaskar	Indian Institute of Technology, Bombay	Prof. Upendra Bhandarkar
4	Bio mimicked Polymer Surfaces Exhibiting Super hydrophobic and Anti-Reflective Properties	Srinadh Mattaparthi	Indian Institute of Technology, Hyderabad	Prof. Chandra Shekhar Sharma
5	A Low Cost Cardiovascular Diagnostic Instrument For Rural Healthcare	Sushanth Poojary	Indian Institute of Technology, Bombay	Prof. Santosh Noronha
6	Low-cost Diagnosis of Pneumonia	Abhishek Khanolkar	Indian Institute of Technology, Madras	Dr. Vikram Shete
7	Development and Pilot Testing of Nano-Sized Tio2 Based Photocatalytic Oxidation Technology For Controlling Vocs	Indramani Dhada	Indian Institute of Technology, Kanpur	Prof. Mukesh Sharma
8	Microfluidic Immunosensor	Ramchander Chepyala	Indian Institute of Technology, Kanpur	Prof. Siddhartha Panda
9	Laser light Based Fully Computerized automated breast Cancer and Muscle Screening System development	Samir Kumar Biswas	Indian Institute of Science, Bangalore	Prof. K. Rajan
10	Injectable silk Fibroin Hydrogel for Tissue Engineering and Drug Delivery	Surojeet Das	Indian Institute of Technology, Guwahati	Dr. Biman B. Mandal
11	Fabrication of Stable Liquid Crystal Based Biosensor	Arun Prakash Upadhyay	Indian Institute of Technology, Kanpur	Dr. Sri Sivakumar

12	Paper-pencil Based self-pumping and Self-breathing Fuel Cell	Ravi Kumar Arun	CSIR-Central Mechanical Engineering Research Institute, Durgapur	Prof. Suman Chakraborty
13	Development and Evaluation of Women Friendly Vaginal In Situ Hydrogel for Sperm Immobilisation.	Dr. Vaishali Thakkar	Anand Pharmacy College, Anand	Dr. Tejal R. Gandhi
GYTI Appreciation 2014				
14	Voice Activated Safety App	Mithila Harish	Vellore Institute of Technology, Vellore	Prof. Monica Subashini M
15	Integrated Circuit (IC)-based Flexible Electronic Devices and Displays (ICFEDD)	Prakash Kodali	Indian Institute of Science, Bangalore	Sanjiv Sambandan
16	Android application for women safety	Akhil Aggarwal, Shubham Jindal, Siddharth Garg, Rajan Nagpal	Indian Institute of Technology, Delhi	Dr. Rajesh Prasad
17	Microwave Coplanar Sensor System for Detecting Contamination in Food Products	Makkattary Shaji	Indian Institute of Technology, Kanpur	Dr. M. J. Akhtar
18	Amsler Grid Test	Jagjeet Singh	Indian Institute of Technology, Guwahati	Anthony Vipin Das
19	Inhalable Multiparticulate Carrier Systems for Sustained and Targeted Delivery of Isoniazid	Dr. Sanjay Tiwari	Indian Institute of Technology, Varanasi	Dr. B. Mishra
20	Wireless Communication and Security System Embedded Safety Helmet	M. Sivagurunathapandian	Easwari Engineering College, Chennai	Dr. N. S. Bhuvaneswari
21	Cost Effective Vegetable Chiller for Rural Small Farmers	Vishnu Padmanaban	Amrita School of Engineering, Coimbatore	Dr. M. Elangovan
22	Jaivik Prakash: A Simple Tool for Detection of Hazardous Materials and Sanitary Condition at Rural Level	Rajeev Ranjan	CSIR-Central Food Technological Research Institute, Mysore	Prof. M. S. Thakur

23	Concept of Breaker Dipeptides and Its Application in Alzheimer's Amyloid Disruption	Nadimpally Krishna Chaitanya	Indian Institute of Technology, Guwahati	Dr. Bhubaneswar Mandal
24	3D model Generation from 2D X-Ray Images	Vikas Dhruwdas Karade	Indian Institute of Technology, Bombay	Prof. B. Ravi
25	Identification of Safest Path using Crime Records	Puneet Singh	Indian Institute of Technology, Kanpur	Prof. Bhiksha Raj, Prof. Rita Singh
26	Laser Technology Detects Hidden Materials: Applications to Security and Medicine	Sanchita Sil	Indian Institute of Science, Bangalore	Prof. Siva Umapathy
27	Open Source E-Mailing System for the Visually Impaired	Aakash Anuj	Indian Institute of Technology, Kharagpur	Prof. Anupam Basu
28	Development of Microbial Fuel Cells with Improved Performance	Jayesh Manohar Sonawane	Indian Institute of Technology, Bombay	Prof. Prakash Chandra Ghosh
29	Fabrication of Organic Thin Film Transistor using Single Drop of Organic or Hybrid Insulator, Conductor and Semiconductor Materials	Gunda Manideep	Indian Institute of Technology, Kanpur	Dr. Monica Katiyar
30	Adsorptive Removal of Phenolic Compounds Using Mixed Matrix Membrane of Cellulose Acetate Phthalate and Alumina Nanoparticle	Raka Mukherjee	Indian Institute of Technology, Kharagpur	Prof. Sirshendu De
31	Ultra-High Actuation in a Carbon Nanotube Actuator	Prarthana Gowda	Indian Institute of Science, Bangalore	Prof. Abha Mishra
32	A Transceiver for Satellite Based Communication during Emergency Using TV White Spaces	Rajan Kapoor	Indian Institute of Technology, Patna	Dr. Preetam Kumar

33	Macrophage-specific Targeting of Mannose-functionalized Biodegradable Polymeric Nano particles of Some Anti-leishmanial Drugs- Development, Optimization and Efficacy Evaluation	Pramila Chaubey	Indian Institute of Technology (BHU), Varanasi	Prof. Brahmeshwar Mishra
34	Stampede Control Using Image Analysis Technology	S. Vidya Sagar	Kongu Engineering College, Erode	Prof. D.Leela
35	Synthesis and Design of Indigenous Polycentric Knee for Transfemoral Prosthesis	Anand T.S.	Indian Institute of Technology, Madras	Dr. Sujatha Sreenivasan
36	Highly Stable Metallic Nano particle-Semiconductor Hetero structures via Click Chemistry for Photoelectro/ Photocatalytic Applications	Arun Prakash Upadhyay	Indian Institute of Technology, Kanpur	Dr. Sri Sivakumar
37	Novel Algal Bioreactor for Wastewater Treatment And Bio fuel (Lipid) Production	Durga Madhab Mahapatra	Indian Institute of Science, Bangalore	Dr. T V Ramachandra, Dr. H N Chanakya
38	Care Mother-Mobile Pregnancy Care	Shantanu Pathak	INHS Asvini, Mumbai	Prof. Vaibhav Tidke
39	Paper and Pencil Micro Fluidic Device for Point-of-Care diagnostics	Ranabir Dey	Indian Institute of Technology, Kharagpur	Prof. Suman Chakraborty
40	Touchpad for Malignant Tumour (Epithelial) Detection and Imaging	Sritam Parashar Rout	Indian Institute of Technology (BHU), Varanasi	Prof. Anoop Jayaram
BIRAC GYTI Award 2015				
1	RIGHTBIOTIC: The Fastest Antibiotic Finder	Shivani Gupta	Birla Institute of Technology & Science University, Pilani	Dr. Suman Kapur
2	Redefined Spoon for Parkinson's Patient	Dhyey Mayank kumar Shah, Eepsit Tiwari, Rajesh Patidar	Indian Institute of Technology, Gandhinagar	Prof. Bhaskar Bhatt, Prof. Harish P. M.

3	Development of a Powerful New Antibiotic That Kills All Drug-Resistant Bacteria	Venkateswarlu Yarlagadda, Padma Akkapeddi, Goutham B Manjunath	Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR)	Prof. Jayanta Haldar
4	Real Time Wound Management System Wound Segmentation & Analysis using Image Processing on Mobile Platform (Android)	Abhiraj Gupta	Manipal Institute of Technology, Manipal	
SRISTI GYTI Award 2015				
5	Sway: The Rhythm Within	Janhavi Joshi	MIT Institute of Design, Pune	Prof. Sanjay Jain
6	Double Disk Ultrasonic Assisted Magnetic Abrasive Polishing Device	Prateek Kala	Indian Institute of Technology, Delhi	Dr. Pulak Mohan Pandey
7	Development of Shape Controlled Palladium Structures as Electrocatalysts for Fuel Cell Applications	Kranthi Kumar Maniam	Indian Institute of Technology, Madras	Dr. Raghuram Chetty
8	Reduced Converters and Brushless Generators Based Standalone Microgrid for Rural Electrification	Krishan Kant	Indian Institute of Technology, Delhi	Prof. Bhim Singh
9	Novel Nanozyme Technology for Combating Oxidative Stress Related Disorders	Amit Ashok Vernekar	Indian Institute of Science, Bengalore	Prof. G. Mugesh
10	FLEXICAST: A Breathable, Washable and Customized Cast For Immobilization of Fractured Limb	Jamdade Nikhil Kailas, Pankaj kumar K. Chhatrala, Devanshi Saksena	Indian Institute of Science, Kanpur	
11	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, Jaganathan Senthil nathan	Indian Institute of Technology, Madras	Dr. Indumathi M Nambi

12	Evaluation of Blood Pressure and Arterial Compliance by the Radial Arterial Pulse Pressure Waveform obtained using Fiber Bragg Grating Pulse Recorder	Sharath Umesh	Indian Institute of Science, Bangalore	Prof. Sundarrajan Asokan
13	Targeting Lymphatics to Treat HIV Using Lipid Based Formulations	Rashmi Jain, Vivek Makwana, Komal Patel	B. V. Patel PERD Centre, Ahmedabad	Prof. Amita Joshi
14	TAPARCH: A Visually Challenged People Footwear	Krishna Sai	Gitam University, Visakhapatnam	
15	Valproic Acid Prevents Progression of the Diabetic Nephropathy: Elucidation of Molecular Mechanisms and Proof of Concept for Promising Therapeutic Usefulness	Sabbir Khan	National Institute of Pharmaceutical Education and Research (NIPER), S.A.S. Nagar	Dr. Gopabandhu Jena
16	Gift of New Abilities	Shiva Kumar H R	Indian Institute of Science, Bangalore	Prof. A. G. Ramakrishnan
SRISTI GYTI Appreciation 2015				
17	Recyclable Porous Sheets for Low-Cost Water Filter	Abhishek Gandhi	Indian Institute of Technology, Delhi	Prof. Naresh Bhatnagar
18	TEDKIT- An Audio Tactile Storybook for Visually Impaired Children	Ankita Gulati	Indian Institute of Technology, Delhi	Prof. M. Balakrishnan
19	Food Vending Machine for Schools	Subrahmanya Shridhar Shetty	NMAM Institute of Technology, Nitte	Prof. Pradeep Kanchan
20	Nano emulsions as a Vehicle for Delivery of Omega-3 Fatty Acids for Serum and Tissue Lipids	D. Sugasini	CSIR-Central Food Technological Research Institute, Mysore	Dr. B. R. Lokesh
21	Rapid Non-Invasive Diagnostics Kits for Diabetics Patients to Check Glucose Level Thrice a Day	Yadav Vijay Dukhran	Institute of Chemical Technology, Mumbai	Dr. Prajakta Dandekar Jain
22	Injection Mouldable Polymeric Composite Based Passive Polycentric Knee Joint	S. Arun	Indian Institute of Technology, Guwahati	Dr. S. Kanagaraj

23	A Novel Process To Commoditize Carbon Dioxide Gas Into Fuels And High Value Nutraceuticals At Commercially Viable Scale	Dilip Singh, Preeti Mehta, Ravi P. Gupta	DBT-IOC Centre for Advance Bio Energy Research, Faridabad	Dr. D. K. Tuli
24	Development of X-ray Visible Polymers via In Situ Iodination-Crosslinking for Non-Invasive Real Time Imaging	Paulomi Ghosh, Arun Prabhu Rameshbabu	Indian Institute of Technology, Kharagpur	Dr. Santanu Dhara
25	Affordable Power-Assist For Wheelchair	Sri Priya Kalidoss, Karthikeyan S D, Viveksarda	Indian Institute of Technology, Madras	Dr. Sujatha Srinivasan
26	Utilization of Marine Algae As Substrate And Methanogen Inhibitor In Microbial Fuel Cell	Rajesh P P	Indian Institute of Technology, Kharagpur	Prof. M. M. Ghangrekar
27	Prashamana- A Smart Hospital Bed	Toshib Bagde, Jamdade Nikhil Kailas	Indian Institute of Technology, Kanpur	Dr. Ramkumar Janakarajan
28	Linearly Polarised Planar Inverted F-Antenna For Global Positioning System And Worldwide Interoperability for Microwave Access Applications	Mayank Agarwal	Indian Institute of Technology (BHU), Varanasi	Dr. Manoj K. Meshram
29	Use of High Nutrient, Low Cost Natural Materials for Preparation of Well-Engineered Emulsions for Variety of Applications	Lad Virang kumar Nanubhai	Sardar Vallabhbhai National Institute of Technology, Surat	Prof. Z. V. P. Murthy
30	Clubfoot deformity measuring device	Kanwaljit Singh Khas	Indian Institute of Technology, Delhi	Dr. P. M. Pandey, Prof. Alok. R.Ray
31	Virtual Reality Based Minimally Invasive Surgical Simulator with Haptics Feedback	M.S. Raghu Prasad, Abhijit Biswas	Indian Institute of Technology, Madras	PRof. Manivannan M
32	Electrospun Cellulose Acetate Nanofibers for Female Hygiene Applications	Shital Yadav, Illa Mani Pujitha, Tulika Rastogi	Indian Institute of Technology, Hyderabad	Dr. Chandra Shekhar Sharma

33	One Drug to Cure Them All	Chandradhish Ghosh	Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore	Dr.Jayanta Haldar
34	Fabrication of Nano Object Imaging Probe Using Simple & Fast Hydro -Mechanical Etching Technique	Fazle Kibria	University College of Science & Technology	Dr. Rajib Chakraborty
35	Agriculture	Abitha R	Indian Institute of Science, Bangalore	Dr. H. N. Chanakya
36	Rapid diagnosis of brain injury-A novel approach using citrate-capped gold nano particles	Srishti Agarwal	Indian Institute of Technology, Hyderabad	Dr. Anindya Roy
37	Biodegradable LiposAu Nanoparticles for photothermal ablation of Cancer	Aravind Kumar Rengan, Amirali B. Bukhari	Indian Institute of Technology, Bombay	Dr. Rohit Srivastava
38	Biomechanical Investigation of Extracorporeal Irradiation and Reimplantation Therapy in Malignant Bone Tumours	Sakshi Chauhan	Indian Institute of Technology, Delhi	Dr. Anamika Prasad, Dr. Shah Allam khan
39	Suchi-Ahvana	Pratik Raj, Deepak Nagar, Kewal Chand Swami	Pandit Dwarka Prasad Mishra Indian Institute of Information Technology, Design & Manufacturing, Jabalpur	
40	Development of Membrane Technology for Industrial Progress, Societal Benefit and Environmental Safety	Siddhartha Moulik, Dr. Sundergopal Sridhar, Y. V. L. Ravikumar, M. Madhumala, Dasari Manjunath	CSIR - Indian Institute of Chemical Technology, Hyderabad	Dr. S. Sridhar
41	Methane Sensing Module: From Concept to Prototype	Anwesha Mukherjee, Pavan Kumar R, Goutam PrasannaKar, Sanjay Rao A, Vaibhav V Rao	Indian Institute of Science, Bangalore	Dr. Abha Misra
42	Energy Efficient Robust Controller for Autonomous Underwater Vehicle	Meenakshi Sarkar	CSIR - Central Mechanical Engineering Research Institute, Durgapur	Dr. Sambhunath Nandy

43	Inch Worm Mechanism for Solar Panel Cleaning Robot	Bhivraj Suthar	Indian Institute of Technology, Delhi	Prof. Sudipto Mukherjee
BIRAC GYTI Award 2016				
1	Simple Low- cost Bioactive Titanium Foam via Novel Route for Skeletal TissueReunion	Kausik Kapat	Indian Institute of Technology, Kharagpur	Prof. Santanu Dhara
2	Flexible Biodegradable Anti-Microbial New Advanced Form of Intra Uterine Contra-ceptiveDevice (IUCD)	Bhuvaneshwaran Sub-ramanian, Selvakumar M Dibyendu Gouri	Indian Institute of Technology, Kharagpur	Dr. Sujoy K Guha
3	Automated Opto-Fluidic Microscope for Cellular Diagnostic Testing	Veerendra Kalyan Jagannadh, Jayesh V. Adhikari, Albina L. Nirupa, Rashmi S, Bindu Bhat	Indian Institute of Science, Banga-lore, Karnataka	Dr. Sai Siva Gorthi
4	3D Printed Hydroxyapatite Tray for Segmental Mandibular Bone Reconstruc-tion By Stem Cell Delivery for Oral Cancer Patients	Sanskrita Das, Dr. PraveshMehra	Indian Institute of Technology, Delhi	Dr. Sourabh Ghosh
5	NStomoz – Vascular anastomosis assist device	Anand Parikh	Indian Institute of Technology, Madras	Prof. Venkatesh Bala-subr amanian, Dr. V B Narayanamurthy
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	Indian Institute of Technology, Bombay	Prof. Rohit Srivastava
7	Automatic Urine and Fecal Disposal System	Neenu Jose, Athul K.Raj, Athira K.R, Neenu P	Sahrdaya College of Engineering and Technology, Kodakara	Prof. Jinu Sebastian
8	Device for Intrapartum Materno-Fetal ZCare	Vichal P M	BMS College of Engineering, Bangalore	Prof. Appaji M Abhishek

9	Rapid Endotoxin Entrapment and Detection on Surface- engineered Glass Substrates	Sachin Kumar, Prasanta Kalita, Ruchika Sharma, Nitish Goel	Indian Institute of Technology, Delhi	Dr. Shalini Gupta
10	Near Infra-Red light Activable Iron(III) Complex as a Remarkable and Organ-elle- Targeted Anti- Cancer Agent for the Photodynamic Therapy Application	Aditya Garai	Indian Institute of Science, Bangalore	Prof. A. R. Chakravarty
11	Energy efficient Combined Processof Microbi-al Fuel Cell (MFC) and Membrane Bioreactor (MBR) For High Efficiency And Reliable Treatment Of Organic Waste Water	Sreemoyee Ghosh Ray, Gourav Dhar Bhowmick	Indian Institute of Technology, Kharagpur	Prof. M. M. Ghangrekar
12	A Novel Compound Restores Obsolete Antibiotics to NDM-1Superbugs	Divakara SS Murthy, Uppu, Goutham B Manjunath, Padma Akkapeddi	Jawaharlal Nehru Centre For Ad-vanced Scientific Research (JNCASR), Bangalore	Prof. Jayanta Haldar
13	Development of a Novel, Non- Biological Pyrogen/Micro Cellular Components Detection Technique for Purification and Dehydrogenation of Water.	Yadav Vijay Dukhran, Rohan Chhabra, Nikhil Kalane, Anomitra Dey, Tejal Pant, Ratnesh Jain	Institute of Chemical Technology, Mumbai	Dr. Prajakta Dandekar Jain
14	A Compact Microwave Sensor for Char-acterization of Radomes and Dielectric Signature Detection of Materials in 3G and 4G GSM Bands	Abhishek Kumar Jha	Indian Institute of Technology, Kanpur	Dr. M. J. Akhtar
15	Development of Portable Device Based on Polarized Fluorescence for Detection Of Cervical Pre- Cancer	Bharat Lal Meena, Seema Devi, Asima Pradhan, Kiran Pandey, Asha Agrawal	India Institute of Technology, Kanpur	Prof. Asima PrdhanP

SRISTI GYTI Awards 2016				
16	X-Niff: Microcantilever Based Electronic-Nose Platform for Airborne Chemical Vapor Sensing	Gaurav Gupta, Vijay Shrinivas Palaparthy, Shambhulingayya Ningayya Doddapujar, Pallabi Das	Indian Institute of Technology, Bombay	Prof. Valipe Ramgopal Rao
17	Design of an Innovative Retrofitted Tricycle for a Disabled Person	Pushkaraj Sonawane	Maharashtra Institute of Technology, Pune	Prof. Pushkaraj D. Sonawane, Prof. Sandip T. Chavan
18	Soya Nuggets - A novel Drug Delivery Vehicle	Utkarsh Bhutani	Indian Institute of Technology, Hyderabad	Dr. Saptarshi Majumdar
Hari Om Ashram Prerit Dr. Amulya K.N. Reddy GYTI Award 2016				
19	Air-Assisted Electrostatic Sprayer (AAESS)	Manoj Kumar Patel	Academy of Scientific and Innovative Research (AcSIR-CSIO), Chandigarh	Prof. C. Ghanshyam
20	High Altitude Wind Energy Using Kite- A revolution in Renewable Energy	Roystan Vijay Castelino	Srinivas Institute of Technology, Merlapadavu, Mangaluru	Prof. Lokesh B
21	Low Cost Sanitary Napkin Disposal Machine	Aiswarya Paramadathil	Adi Shankara Institute of Engineering and Technology, Kalady	
22	Design And Development of Semi- Automatic Flower Knotting Device	C. Cornelius Durai, S. Lakshmana Raja, S. Sriram	Velammal College of Engineering and Technology, Chennai	Dr. G. Senthil Kumar
23	Automatic Sugarcane Juicer	Nilkantha Dashrath Gadakh	K. K. Wagh Institute Of Engineering Education and Research, Nashik	
GYTI Appreciation 2016				
24	An Indigenous Oxygen Dosing Device To Conserve Oxygen Using Patient MonitoringSystem	Srividhya Sakthi	Sri Ramakrishna Engineering College, Coimbatore	

25	Neuronal Cells Produced From Non-Neuronal Cell Line UsingWalnut Oil	Dr. Varsha Singh	Chitkara University, Chandigarh	
26	Cost effective self-stabilizing smart hand held platform (spoon/pen) for elderly or Parkinson'sdisease patients	Debjyoti Chowdhury	Heritage Institute of Technology, Kolkata	Dr. Madhurima Chatto padhyay
27	Paper Microfluidic Chip	Avisekbarla Sameer Sharma	Indian Institute of Technology Madras	
28	Multimechanist ic Polymer Based Novel DrugElutingStentCoating	Dr. GovindaKapusetti, Ms. Shiva KalyaniAdepu	National Institute of Pharmaceutical Education and Research, Ahmedabad	Prof. Kiran Kalia
29	Harnessing Micro Air Jets for Spraying Viscous Non- Newtonian Fuels	Manisha B. Padwal, Prof. D. P. Mishra	Indian Institute of Technology, Kanpur	Prof. D. P. Mishra
30	Paper Based Resistive Touch-pad For Electronic Applications	Mitradip Bhattacharjee	Indian Institute of Technology, Guwahati	Dr. Dipankar Bandyopa dhyay
31	Nano Material Based Flexible Aqueous Power Cell for Energy Conversion and Storage(Self- Charging and Flexible Aqueous Power-Cell)	Vinay Gangaraju	Visvesvaraya Technological University, Belgaum	Prof. Dinesh Rangappa, Dr. D. S. Prasanna
32	Handicap Support Device	Vishrut Bhatt, Sumanth Mudaliar, Joshi Ashay, Dave Kaushal	L J Polytechnic, Ahmedabad	Prof. Harshul Bhrambhatt
33	Biobased Adhesive Formulation for Construction Applications	Neelima Tripathi	Indian Institute of Technology, Guwahati	Dr. Vimal Katiyar
34	CHECKit –A low cost mobile OMR system	Rahul Patel	Institute of Engineering &Technology, Lucknow	Prof. Mehul Raval, Prof. Dhruv Gupta
35	Green flexible conducting paper from edible bacteria derived 3D nanocellulose matrixand polyaniline	Divya Anand	Indian Institute of Technology, Hyderabad	Dr. Mudrika Khandelwal
36	Latex (Natural Rubber) Carry Backpack	Ajin Omanakuttan	Amal Jyothi College of Engineering, Kanjirappally	Prof. Abi Varghese

37	Bio-Inspired Flapping Near Surface Underwater Vehicle	Mannam Naga Praveen Babu	Indian Institute of Technology, Madras	Prof. Krishnankutty. P
38	E-Droid Meter	Bitu C. Ghoniya, Shruti B. Patel, Jigisha M. Karangiya, Jinal N. Modi	Sarvajanik College of Engineering & Technology, Surat	Dr. Urmi Desai
39	Design and development of multipurpose Electric cycle	Patel Krunal, Brijesh patel, Prashant Solanki, Jigar parmar	Shri Satasangi Saketdham, Vadsama	Dr. Sandip Godse
40	Cost Effective Mechanical Testing Equipment For Characterising Creep Behaviour Of Materials Under Combined Tension-torsion Loading	Vineesh K P	Indian Institute of Technology, Kharagpur	Prof. Vikranth Racherla
41	Application Of Nano Material to Analyze The Strength Of Concrete	Dhrafani Ishita Mayurkumar	College of Engineering, Rajkot	Prof. Hitesh Rameshchandra Ashani
42	mSleep - Measure your Sleep	Shuchita Gupta, Yashovardhan Sharma	Indraprastha Institute of Information Technology, Delhi	Dr. Vinayak Naik
43	Straut AERO : Solar Industrial Hot Air Generator	Sharad Parekh	Universal College of Engineering & Technology	Dr. Nilesh Bhatt
BIRAC GYTI Award 2017				
1	White Light Emission from Vegetable Extracts	Dr. Vikram Singh	Indian Institute of Technology, Madras	Prof. Ashok Kumar Mishra
2	Rotary Ultrasonic Bone Drilling	Dr. Vishal Gupta	Indian Institute of Technology, Delhi	Dr. Pulak M. Pandey
3	A Novel Hybrid System for Textile Dye Waste Water Treatment.	Bhaskar Bethi	National Institute of Technology, Warangal	Dr. Shirish Hari Sonawane
4	Revealed: Dual functional characteristics of Escherichia coli outer membrane protein Wzi and its implications in the design of novel antibiotics	Shivangi Sachdeva, Narendar Kolimi	Indian Institute of Technology, Hyderabad	Dr. Thenmalarchelvi Rathinavelan

5	Targeted Theranostic Nanomedicines for Brain Cancer Therapy	Sonali, Rahul Pratap Singh, Poornima Agrawal	Banaras Hindu University, Varanasi	Dr. M.S. Muthu, Prof. B. L. Pandey
6	Blood Quality Assessment Using Digital Holographic Microscopy	Mandeep Singh, Azhar Muneer	Indian Institute of Technology, Delhi	Dr.Kedar Khare, Dr. Sarita Ahlawat
7	STERI-FREEZ: Flash Freeze Sterilization	Saugandha Das, Archit Devarajan	Institute Of Chemical Technology, Mumbai & Ramnivas Ruia Junior College, Mumbai	Prof. Padma V. Devarajan, Prof. Vasihali Kavishwar
8	Prophylactic Transdermal Patch Against Neurotoxin Poisoning In Biological Warfare Situations.	Subham Banerjee	Defence Research Laboratory, Tezpur & Birla Institute of Technology, Mesra.	Prof. Pronobesh Chattopadhyay, Prof. Animesh Ghosh
9	Low cost and field-portable smartphone platform water testing kit for detection and analysis of contaminants in drinking water	Iftak Hussain, Kamal Uddin Ahamad	Tezpur University, Assam	Dr. Pabitra Nath
10	Near Infrared Fluorescence Probes for Diagnosis of Alzheimer's disease	K Rajasekhar, Kavita Shah	Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore	Prof. T. Govindaraju
11	Low Cost Automated Handheld Melamine Detection Device (for Testing Melamine in Milk)	Dhiraj Indana, S.C.G. Kiruba Daniel, Varun S., Prateek Katare	Indian Institute of Science, Bangalore	Dr. Sai Siva Gorthi
12	NeuroBuds - Brain Wave Mapping Smart Earphones	Nitin Vasanth	Cochin University of Science & Technology, Kochi	Prof. Unni A M
13	Affordable and Rapid Paper-based Test Kits for Antimicrobial Susceptibility Assays	Shantimoy Kar, Tarun Agarwal, Shubhanath Behera, Varun Varma	Indian Institute of Technology, Kharagpur	Prof. Suman Chakraborty, Prof. Tapas K. Maiti
14	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	Indian Institute of Technology, Bombay	Prof. Soumyo Mukherji

15	Affordable Kit for Cervical Cancer detection.	Appidi Tejaswini, Syed Baseeruddin Alvi, Anurag Meena	Indian Institute of Technology, Hyderabad and Indian Institutes of Technology, Bombay	Dr. Aravind Kumar Rengan, Dr.Rohit Srivastava
16	Non-invasive, Point-of-care Diagnostic System for Early Detection of Oral Cancer using Digital Infrared Thermal Imaging	Manashi Chakraborty, Santanu Patsa, Nishat Anjum	Indian Institute of Technology, Kharagpur	Dr. Sudipta Mukhopadhyay, Prof. Swapna Banerjee, Dr. Sourav Mukhopadhyay, Prof. Jay Gopal Ray
GYTI Award 2017				
17	A Virtual Reality (VR)-based Immersive Simulator For Endoscopy Training	Shanthanu Chakravarthy	Indian Institute of Science, Bangalore	Prof. G. K. Anantha-suresh
18	Navyo-The Smart Glove	Madhav Aggarwal, Mohd. Suhail, Bhavesh Pachnanda	Delhi Technological University, Delhi	Prof.Vikas Rastogi
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	Parikshit Moitra, Deepa Bhagat, Rudra Pratap	Indian Institute of Science, Bangalore & Indian Association for the Cultivation of Science, Kolkata	Prof. Santanu Bhattacharya
20	ANUBHAV - AN EFFICIENT WRITING TOOL FOR VISUALLY IMPAIRED	Sachin N P, Vimal C	Indian Institute of Technology, Kanpur	Prof. Shantanu Bhattacharya
21	Swayam - Passively Stabilized Communication Satellite	COEP Satellite Initiative	College of Engineering, Pune	Dr. M.Y. Khaladkar, Dr. B.B. Ahuja
22	Indigenous Technology of Soft Body Armour for Defence Applications Using 3D Woven Aramid Fabrics	Animesh Laha	Indian Institute of Technology, Delhi	Prof. Abhijit Majumdar

GYTI Appreciation 2017				
23	Affordable paper microfluidic device for blood glucose and cholesterol detection	Avisek Barla,Abrar Ali Khan, Sameer Sharma, Vijay Anand, Nitish Kumar Singh	Indian Institute of Technology, Madras	Dr. Vignesh Muthuvijayan
24	Never Ending Learning of Sound	Ankit Parag Shah, Rohan Badlani, Benjamin Elizalde, Anurag Kumar	National Institute of Technology, Surathkal	Prof. Bhiksha Raj Ramakrishnan
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	Indian Institute of Technology, Kharagpur	Dr. Pawan Goyal, Dr. Animesh Mukherjee
26	Paper-based Device For Rapid Detection Of Dengue	Sanjay Kumar, Pulak Bhushan	Indian Institute of Technology, Kanpur	Prof. Shantanu Bhattacharya
27	Trolley Straw Baler by Ram Compressing Mechanism with Traction Force	Ramalingam.Pl, M. Prakash, M. Prabhu, C. Logesh, Jayaprakash.P.S	Panimalar Institute of Technology, Anna University, Chennai	Prof. R.Vigithra
28	Enhancement of Distribution System performance using HVAC Boost Converter and Fuzzy Controller	Anusha Vadde	M S Ramaiah University of Applied Sciences, Bangalore	Prof. V.S.N Sitaram Gupta .V
29	Design of a Mechanical Device (Nanorobot) for Diagnosis and Removal of Plaque from Human Heart Artery System	Mallikarjunachari G	Indian Institute of Technology, Madras	Dr. Pijush Ghosh

30	"Electrolithography"- A Novel Nano Patterning Technique Using Electric Field Induced Material Transport	Santanu Talukder	Indian Institute of Science, Bangalore	Prof. Rudra Pratap, Dr. Praveen kumar
31	Cost Effective Inspection System For Automated Large Scale Cocoon Quality Assessment	Prasobh Kumar P. P.	Indian Institute of Science, Bangalore	Dr. Sai Siva Gorthi, Prof. C. R. Francis
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	Indian Institute of Technology, Guwahati	Dr. Vimal Katiyar
33	Fish inspired propulsion for remotely operated surface ships and underwater vehicles	Mannam Naga Praveen Babu	Indian Institute of Technology, Madras	Prof. P. Krishnankutty
34	Development And Characterization Of Smart Nanocarriers For Oral Insulin Delivery	Ashish Kumar Agrawal	National Institute of Pharmaceutical Education and Research, Mohali	Prof. Sanyog Jain
35	Design & Development Of Automated Five Axis CNC Ball End Magnetorheological Finishing Machine	Dilshad Ahmad Khan, Faiz Iqbal, Zafar Alam	Indian Institute of Technology, Delhi	Dr. Sunil Jha
36	Grid Interactive Solar PV Based Water Pumping Using BLDC Motor Drive	Rajan Kumar	Indian Institute of Technology, Delhi	Prof. Bhim Singh
37	A Mechanism for Toilet Seat Sanitation	Arvind Pujari, D V S S SKushal Kumar Reddy, Shashwat Jain, Subham Kumar Sahana, Tanay Garg	Indian Institute of Technology, Madras	Dr. Anil Prabhakar

38	Design of Highly Efficient and Inexpensive Membrane Equipment as Import Substitutes for Demineralized Water Production and Hemodialysis	Harsha Nagar, Shaik Nazia, M. Madhumala, Y.V.L. Ravi Kumar	CSIR-Indian Institute of Chemical Technology, Hyderabad	Dr. S. Sridhar
39	Portable Geo-specific Water Filtration Bottle	Ramesh Kumar, Anupam Chandra	Indian Institute of Technology, Madras	Prof. Thalappil Pradeep
BIRAC GYTI Award 2018				
1	Point of Care Nano Diagnostic Kit for Brucellosis	Rohit Shivaji Pawar	Institute of Chemical Technology, Mumbai	Prof. Vandana B. Patravale
2	Miniaturized Fluorescence adapter for Fluorescence Sputum Smear Microscopy using bright-field microscope	Vikas Pandey	Indian Institute of Technology, Delhi	Dr. Ravikrishnan Elangovan
3	A multipurpose low cost biological air purifier	Mrs. Neeta Ganesh Wagle	Dr. D.Y. Patil Vidyapeeth, Pune	Prof. Neelu N. Nawani
4	Nano Spermviricide: A Dual Acting Aid for Prevention of Unintended Pregnancy and Unprotected Sexual Intercourse Associated HIV	Amit Mirani	Institute of Chemical Technology, Mumbai	Prof. Vandana B. Patravale
5	A Low-Cost Disposable Microfluidic Biochip for malaria diagnosis	Brince Paul K	Indian Institute of Technology, Hyderabad	Dr. Shiv Govind Singh
6	Smartphone-based impedimetric disposable biosensor for detection of cardiac biomarkers	Debasmita Mondal, Sourabh Agrawal	Indian Institute of Technology, Bombay	Prof. Soumyo Mukherji
7	Decellularized corneal matrix (DCM) based injectable hydrogel for strengthening cornea matrix in severe Corneal Keratoconus	Shibu Chameettachal	Indian Institute of Technology, Hyderabad	Dr. Falguni Pati
8	Super Resolution Ultrasonic Imaging (SUI)	Kiran Kumar Amireddy	Indian Institute of Technology, Madras	Dr. Krishnan Balasubramanian, Dr. Prabhu Rajagopal

9	Understanding the design principles of protein nanosensor to combat multidrug resistant enterobacteriaceae	Abhishek Narayan	Indian Institute of Technology, Madras	Dr. Athi Narayanan N
10	A novel strategy to block malaria transmission	Divya Beri	Indian Institute of Science, Bangalore	Prof. Utpal Tatu
11	Design and Development of Phase Change Material (PCM) based Milking cum Cooling Pail	Ravi Prakash	National Dairy Research Institute, Karnal	Dr. Menon Rekha Ravindra, Dr. M. Manjunatha
12	An Alternative Technology to Produce Biomass-Based Food Grade Flavors, Fuels and Value Added Chemicals	Shelaka Gupta	Indian Institute of Technology, Delhi	Dr. M. Ali Haider
13	Nano based soil conditioner for agricultural application	Pallabi Das, Kasturi Sarmah	Tezpur University, Tezpur	Dr. Sanjay Pratihar, Dr. Satya Sundar Bhattacharya
14	SNAP - A RAW images' based setup that can calculate nutrient concentration in leaves	Ekdeep Singh Lubana	Indian Institute of Technology, Bombay	Dr. Maryam Shojaei Baghini
15	Rolling Water Purifier - Roll Pure	Ramesh Kumar	Indian Institute of Technology, Madras	Prof. T. Pradeep
GYTI Award 2018				
16	Battery-less IoT Sensing Nodes	Anandarup Mukherjee	Indian Institute of Technology, Kharagpur	Dr. Sudip Misra
17	Road Accident Detection using Perceptual Attributes of Video	Sinnu Susan THomas	Indian Institute of Technology, Kanpur	Prof. Sumana Gupta, Prof. Venkatesh K. S.
18	Feasibility Study of Wireless Power Transfer Using Metamaterial	Amit kumar Baghel	Indian Institute of Technology, Guwahati	Sisir Kumar Nayak
19	Design of Low Cost Infrared Vein Detector	Trivikram Annamalai	Institute of Chemical Technology, Mumbai	Prof. Purba Joshi, Prof. B. K. Chakravarthy

20	Window Solar Cooker	Avinash Prabhune	Indian Institute of Technology, Hydrabad	Prof. B. K. Chakravarthy
21	Magnetic tool for nano finishing the holes, vertical and horizontal surfaces	Girish Verma	Indian Institute of Technology, Delhi	Prof. Pulak Mohan Pandey
22	Origgon - A Social Search Engine	Abhik Saha, Harshit Jain	Indian Institute of Technology, Hydrabad	
23	A novel low cost polyvinyl alcohol-Nafion-borosilicate membrane separator for microbial fuel cell treating distillery wastewater	Bikash Ranjan Tiwari		Prof. M. M. Ghangrekar
GYTI Appreciation 2018				
24	3D bioprinted skin scar model for drug and cosmetic testing	Shikha Chawla	Indian Institute of Technology, Delhi	Dr. Sourabh Ghosh
25	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
26	Performance Evaluation and Process Optimization for Production of Ready-to-Eat Therapeutic Food Paste in Pilot Scale Unit	Rakesh Kumar Raigar	Indian Institute of Technology, Kharagpur	Prof. H N Mishra
27	3D-NuS: A Web Server for Automated Modeling and Visualization of non-canonical 3-Dimensional Nucleic Acid Structures	L Ponoop Prasad Patro	Indian Institute of Technology, Hyderabad	Dr. Thenmalarchelvi Rathinavelan
28	Eco-Friendly Water Retention Natural Polymer	Narayan Lal Gurjar	Maharana Pratap University of Agriculture & Technology, Udaipur	Prof. S. M. Mathur
29	New generation periscope fruit picking device	Tania Dutta	Birla Institute of Technology & Science-Pilani	
30	Nano-biosensor and methods for detecting potassium ion concentration	Jaymin Kanubhai Jadav	Junagarh Agricultural University, Junagarh	Dr. B. A. Golakiya

31	Development of Graphene Coated Conductive Fabrics based Smart Wearable Body Warmers for Defense and Medical Applications	Nagarjuna Neella	Indian Institute of Science, Bangalore	Prof. K. Rajanna
32	Buzzing Band	Saka Naveena	Jawaharlal Nehru Technological University, Hyderabad	Dr. Ravuri Viswanadhan
33	Brain wave nerve excitation for physically disabled	Sarath S, Shilpa M Biju, Nanda Kiran, Hridhya Jolly K, Shilpa P Prasad, Midhun Raj, Sachin Suresh	A.P.J. Abdul Kalam Technological University, Thiruvananthapuram	Dr. Sunil Jacob
34	A computational alternative to analyze and understand Ebola virus pathogenesis in human	Abantika Pal	Indian Institute of Technology, Kharagpur	Dr. Pralay Mitra
35	Open Source Augmented Reality Wearable Smart Assist Device for Blind	Sarang Nerkar		Prof. Steve Mann
36	White Cane - A Virtual Assistant for the Visually Impaired	Barnopriyo Barua	Indian Institute of Technology, Kharagpur	
37	Ionic movement bases desalinator	Ravindranath Ragunathan		Dr. S.Anbumalar
38	Rapid Cervical Cancer Detection Using Neuromorphic Hardware	Narayani Bhatia	Indian Institute of Technology, Delhi	Dr. Manan Suri
39	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	Indian Institute of Technology, Delhi	Prof. Bhim Singh
40	Cerium impregnated activated carbon composite as a filtering material for fluoride removal from groundwater	Mahipal	Indian Institute of Technology, Patna	Dr. Trishikhi Ray Choudhury

41	Loco-Pilot Vision Enhancement System: TRINETRA (Third eye) for Indian Railways	Anand Kumar K.S.	Indian Institute of Technology (BHU), Varanasi	Dr. R. K. Saket, Dr. R. Rajendran
42	Katha	Ritika Singh		Dr. Koumudi Patil
43	Aadharv - A Multi Utility Assistive Device For Elders And People With Mobility Impairment	Vimal C	Indian Institute of Technology, Kanpur	Dr. J. Ramkumar
44	Augmentative Rehabilitation of SCI and Stroke Patients	Kashif Sherwani	Other	Dr. Neelesh Kumar
45	Detection of hydrocarbons by laser assisted paper spray ionization mass spectrometry (LAPSIMS)	Pallab Basuri	Indian Institute of Technology, Madras	Prof. T. Pradeep
46	An indigenous technology for development of cost-effective and energy-efficient engine intake air filters	Ajay Kumar Maddineni	Indian Institute of Technology, Delhi	Prof. Dipayan das
47	Smartphone based portable low-cost continuous wave Doppler Ultrasound system	Biswabandhu Jana	Indian Institute of Technology, Kharagpur	Prof. Swapna Banerjee, Prof. Goutam Saha
48	SIT: Smell Your Health	P. Sri Lekha	Jawaharlal Nehru Technological University, Hyderabad	Dr. Pushpa Kotipalli
49	On Board Diagnostic Data Analysis System (OBDAS)	Archit Agarwal	University of Petroleum and Energy Studies, Misraspatti	Dr. Rajesh Singh
50	NOWAH (No Waste at Household) Technology - A novel, sustainable, smart and complete treatment technology for both Feacal sludge and Organic waste management	Anu Rachel Thomas	Indian Institute of Technology, Madras	Prof. Ligy Philip
51	Bioelectric toilet: A novel approach for treatment of human waste and generating onsite electricity for lighting toilets	Indrasis Das	Indian Institute of Technology, Kharagpur	Prof. M. M. Ghangrekar

SITARE GYTI Award 2019				
1	Novel Hybrid Technology for Bioseparation	Jayeshkumar Sevantilal Mevada	Institute of Chemical Technology, Mumbai	Prof. Aniruddha B. Pandit
2	Development of engineered E.coli for high-throughput drug screening against Malaria and Kala-azar	Preeti Yadav	Jawaharlal Nehru University, Delhi	Dr.Shailja Singh, Dr. Swati Garg, Dr.SoumyaPati
3	Anti-pesticide dermal gel	Ketan Thorat, Subhashini Pandey	Institute For Stem Cell Biology and Regenerative Medicine, Bangalore	Dr. Praveen Kumar Vemula, Dr. Sandeep Chandrashekharappa
4	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	Dr. Manish Arora
5	Magnetic-field actuated hybrid nanofiber scaffold and apparatus for 4D tissue engineering	Uday Kumar Sukumar, Vinay Kumar	Indian Institute of Technology, Roorkee	Dr. P. Gopinath
6	Modernization of traditional anti-malarial drug artesunate via nanomedicine approach.	Deepika Kannan, Nisha Yadav	Shiv Nadar University, Noida	Dr. Shailja Singh, Dr. Bimlesh Lochab, Dr. Soumya Pati
7	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	Yogeeshwar Ajjugal, Narendar Kolimi	Indian Institute of Technology, Hyderabad	Dr. Thenmalarchelvi Rathinavelan
8	Low-cost, easy-to-use, in-house developed electric cell impedance sensing (ECIS) system for studying the dynamic behaviour of the biological cell	Uvanesh K asiviswanathan	Indian Institute of Technology (Banaras Hindu University), Varanasi	Prof. Neeraj Sharma, Dr. Sanjeev Kumar Mahto
9	Growth factor free strategy for therapeutic neo-vascularization	Shivam Chandel, Abel Arul Nathan S	Indian Institute of Technology, Madras	Dr. Madhulika Dixit
10	Real Time Surrogate Visual Tracking of Lung Tumours for Effective Radiotherapy	Priya Singh, Darshan Ramesh Shet	Indian Institute of Technology, Kanpur	Prof. Venkatesh K Subramanian

11	Patient-specific spheroid-on-chip for cancer treatment: combinatory drug screening	Sharanya Sankar, Viraj Mehta	Indian Institute of Technology, Hyderabad	Dr. Subha Narayan Rath
12	Pneumatic Damping Prosthetic Leg For Above-knee Amputees	Muhammed Janish U, Abhijitnath A	MES College of Engineering, Kuttippuram	Prof. Padmakumar K
13	Actin Mimetic ATP Driven Controlled Supramolecular Polymerization	Ananya Mishra	Jawaharlal Nehru Centre For Advanced Scientific Research, Banglore	Prof. Subi J. George
14	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	Prof. Sunando Das Gupta, Prof. Maitreyee Bhattacharya
15	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	Dr. H N Mishra, Prof. Shubhangi Srivastava
GYTI Award 2019				
16	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	Prof. K. K. Pant, Prof. S. K. Naik
17	Non- Catalytic Deep Desulfurization Process Using Hydrodynamic Cavitation	Nalinee B. Suryawanshi	CSIR-National Chemical Laboratory, Pune (CSIR-NCL), Pune	Dr. Vinay M. Bhandari
18	Dual action of SPIONS in effective removal of heavy metals and mosquito larvae from water.	Roshini S. M, Karthika M, Lavanya Agnes Angalene J.	Sathyabama Institute of Science and Technology, Chennai	Dr. Antony V Samrot
19	Formic Acid-powered Ferrobots For Clean Energy Technology	Amit Kumar Singh, Saptak Rarotra, Viswanath Pasumarthi	Indian Institute of Technology, Guwahati	Prof. Dipankar Bandyopadhyay, Prof. Tapas Kumar Mandal
20	Early Diagnosis Of Osteoporosis Using Metacarpal Radiogrammetry And Texture Analysis	Anu Shaju Areeckal	National Institute of Technology, Surathkal	Prof. Suman David S

21	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	Prof. Aniruddha B. Pandit, Prof. J.B. Joshi
GYTI Appreciation 2019				
22	Artificial Biomarkers of Knee Osteoarthritis	Nikhil Gupta	Indian Institute of Technology, Delhi	Prof. Tapan Kumar Ghandhi, Dr. Alok Prasad
23	Developing Labscale Magneto-Mechanical Experimental Setup to Predict the Plaque Growth of Human Heart Coronary Arterial Layer System	Mallikarjunareddy Reddy Boreddy	Madanapalle Institute of Technology and Science, Angalla	Dr. Mallikarjunachari G
24	Development of low grain arsenic rice by the fungal arsenic methyltransferase via bio-volatilization	Shikha Verma, Pankaj Kumar Verma	CSIR - National Botanical Research Institute, Lucknow	Dr. Debasis Chakrabarty
25	Towards Application of Helical Nanorobots for Biomedical Applications.	Malay Pal, Debayan Dasgupta, Arijit Ghosh, Neha Somalwar	Indian Institute of Science, Bangalore	Prof. Ambarish Ghosh, Dr. Deepak K Saini, Prof.Ramray Bhatt
26	Development of improved biocatalysts for D-allulose production utilizing the low-cost agro-industrial residues	Satya Narayan Patel	Center of Innovative and Applied Bioprocessing, Ajitgharh	Dr. Sudhir P. Singh
27	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 (AIIPMR), Mumbai	Dr. Sisir Kumar Nayak, Prof. Deepak P. Prabhu
28	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 (IMS and Sum Hospital), Bhubaneswar	Prof.Rabindra Nath Padhy, Prof. P. Sudhir Kumar

29	Proteasome Activation: A potential drug target for treatment of Parkinson's Disease.	Mohd Ahsan, P Chinmai	Indian Institute of Technology, Madras	Prof. Sanjib Senapati
30	A more accurate detection and intrinsic subtype classification of breast cancer using machine learning.	Bikash Ranjan Samal	Indian Institute of Technology, Kharagpur	Dr. Ranjit Prasad Bahadur
31	Fighting resistance in cancer cells due to bacterial infections with modular drug platforms: An idea towards personalized medicine	Rohini Singh	Indian Institute of Technology, Delhi	Prof. Shalini Gupta
32	Economical Paper-Strip For Early Stage Mastitis Disease Detection In Cow	Harika Chappa, Avisek Barla, Navin V Narayanan, Sudip Chakraborthy, Ahila Yegappan	Sri Venkateswara Veterinary University, Tirupati	Prof. Y. Hari Babu
33	Anemia meter	Jeethu Raveendran	Amrita Vishwa Vidyapeetham University, Coimbatore	Dr. T. G. Satheesh Babu
34	Understanding Sequence-Disorder-Function Relationship of an Intrinsically Disordered Protein to Design Soil Salinity Sensor	Sneha Munshi	Indian Institute of Technology, Madras	Dr. Athi Narayanan N
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	Nikhiya Shamsher	Greenwood High International School, Bangalore	Prof. Aloysius D'Mello
36	Multifunctional Granulator (MFG) -A Multi functional device to prepare dried spherical granules	Rajendra Prasad Moturu	Andhra University College of Pharmaceutica Sciences, Visakhapatnam	Prof. K.V. Ramana Murthy
37	Audience response device for Deaf and mute classroom	Manasi Mishra	Indira Gandhi Delhi Technical University for Women, Delhi	Prof. S. RN Reddy

38	Development of Process Technology for Manufacture of RTD Carbonated Grain Beverage	Anjali Thakur, Pooja Pandey	Indian Institute of Technology, Kharagpur	Dr. H N Mishra
39	Manufacture of Micronutrient Fortified Rice Kernels through Extrusion Technology	Dalbhagat Chandrakant Genu, Jayshree Majumdar	Indian Institute of Technology, Kharagpur	Dr. H N Mishra
40	An Automated Panipuri Vending Machine	Abhijit Nath, Saurav Jyoti Sarma, Chandeep S. Gogoi	Tezpur University, Tezpur	Prof. Polash Pratim Dutta
41	Fibonacci Series based Rectangular Microstrip Patch Antenna	Deven G. Patanvariya, Kalyan Sundar Kola	National Institute of Technology, Goa	Dr. Anirban Chatterjee
42	Smart Signalling And Interlocking System	S. Karthikeyan, S. Umasankar, Karthikeyan S.	M. Kumarasamy College of Engineering, Tamil Nadu	Dr. C. Ramesh
43	Bhu-goal : Predicting Moods Of India	Kartik Vij, Rahul Kinra, Rouble Gupta, Debarshi Ghosh	Chitkara University, Chandigarh	Dr. Nitin K. Saluja
44	Pyrophosphate and Metaphosphate as Next-generation Cathode Material for Energy Storage Devices	Ritambhara Gond, Krishnakanth Sada, Anshuman Chaupatnaik	Indian Institute of Science, Bangalore	Prof. Prabeer Barpanda
SITARE-GYTI Award 2020				
1	A Portable Diagnostic Platform for Rapid Label-free Phenotyping of Breast Cancer	Anil Vishnu G K, Saeed Rila B.C., Arun Baby, Midhun C.Kachappilly	Indian Institute of Science, Bengaluru	Prof. Hardik J. Pandya, Prof. Annapoorni Rangarajan
2	Multipurpose Proctoscope	Siddhant Shrivastava, Dr. Arshad Ahmad, Dr. K S Venkatesh	Indian Institute of Technology Kanpur	Dr. J RamKumar
3	An Affordable and Easy-to-Use Optical Biosensor for Mannosylated Lipoarabinomannan (manLAM) in Urine for TB Diagnosis	Divagar M, Kuzhandai Shamlee J, Lakshmana Swamy V V	Indian Institute of Technology Madras	Dr. V. V. Raghavendra Sai, Dr. Vani Janakiraman

4	An Automated Cardiovascular Replicator for Online Assessment of Cardiac Assist Devices, Prosthetics and Beyond	Sumanta Laha, Pulak Ray, Aritra Rakshit	Indian Institute of Technology Kharagpur	Prof. Prasanta Kumar Das
5	Development of Poly-unsaturated Fatty Acid PUFA and Antioxidant Rich Vegetable Oil Powder for Healthy Hearta	Monalisha Pattnaik, Dr. Mousumi Ghosh	Indian Institute of Technology Kharagpur	Prof. Hari Niwas Mishra
6	A User Friendly, Affortable Device for Self Blood Microsampling for Diagnostics and Pharmaceutical Applications	Vaibhav Shitole	National Institute of Pharmaceutical education and Research Ahmedabad	Prof. Prasoon Kumar
7	Artificial Deep Learning Brain Actuated Lower Limb Exoskeleton For Paralysed	Vinoj P.G, Varun G Menon, Saira Joseph	SCMS School Of Engineering & Technology, Kerala	Dr. Sunil Jacob
8	Nanofiber Yarn Suture: A Medical Device	Arthi Sunil Richard	Indian Institute of Technology Madras	Dr.Rama Shankar Verma
9	Development of Electrochemical Impedence based Aptasensor for Semen sorting in Cattle	Sumit Kumar Singh	National Dairy Research Institute, Karnal	Dr. Sudarshan Kumar
10	A Novel, Low-cost, Non-invasive Eye Tracker Using Fiber Optic Sensora	Shweta Pant, Sharath U, Srivani Padma, Sumitash Jana, Varsha V	Indian Institute of Science, Bengaluru	Prof. Sundarrajan Asokan
11	Frustum CAM in Medical Ventilators	Prem Dakshin	Birla Institute of Technology & Science University, Pilani	Dr. Shashank Khurana
12	Continuous Monitoring of Gasotransmitters for Early Stage Management of Systemic Inflammatory Response Syndrome (SIRS) Using Microfluidics Platform	Ravindra Gaikwad	Indian Institute of Technology, Madras	Dr Ashis Kumar Sen
13	A Non-Electric and Affordable Surface Engineered Particle Based Point-of-Use Water Disinfection	Deepa Dixit	Indian Institute of Technology, Gandhinagar	Prof. Chinmay Ghoroi

14	Nanotechnology Based Intranasal Spray Formulation for the Effective Treatment of the Alzheimers Disease	Shivraj Vasantrao Naik	Institute of Chemical Technology, Mumbai	Prof. Vandana Bharat Patravale
SITARE-GYTI Appreciation 2020				
1	Real-time Ultrasound-Based Acoustic Parameter Imaging to Track Spatio-temporal Evolution of Hotspot in High Intensity Focused Ultrasound and Microwave Hyperthermia	Aliarshad Kothawala	Indian Institute of Technology Madras	Prof. Arun K. Thittai
2	Tannin-based Mouth Fresheners	Sonali Naik	National Chemical Laboratory, Pune	Dr. Kiran S
3	Development of Protocol of Commercial Cultivation of Nobel Wild Edible Mushrooms of Tripura, Northeast India and Evaluation of their Biological Properties	Sanjit Debnath	Tripura University, Agartala	Prof. Ajay Krishna Saha
4	A Low Cost Passive Microdevice for Platelet Rich Plasma PRP Separation from Human Blood	Vijai Laxmi,	Indian Institute of Technology, Bombay	Prof. Amit Agrawal, Prof. Suhas S. Joshi
5	Breath Volatile Organic Compound Detection Using Conducting Polymer Coated Chemiresistive Filter Paper Sensors	Aswathy M. Nair, Debasmita Mondal, Sourabh Agrawal	Indian Institute of Technology, Bombay	Prof. Soumyo Mukherji
6	Production of Bioactive Chicken IL-17A by Genetically Engineered Food Grade Lactic Acid Bacteria Lab : From Gene to Biomedical Application in Poultrya	Aritraa Lahiri,	Indian Institute of Science Education and Research, Kolkata	Dr. Amirul Islam Mallick
7	Development of Sustainable Antimicrobial Wrapping Material from Biopolymers	Puja Kumari,	Indian Institute of Technology, Madras	Prof. Mukesh Doble
8	Crop Productivity and Related Value Addition Black Rice by Co-inoculation with Nanoembedded Mycorrhizal Fungus Piriformospora Indica Serendipita	Shubhangi Mahajan	Amity University, Noida	Prof. Ajit Varma

9	Colorimetric Yes/No Type Swab Based Detection of Pesticides on Agricultural Produce	Tathagata Pal,	Indian Institute of Technology, Bombay	Prof. Soumyo Mukherji
10	Development of Polymer Based Nano Medicine for the Treatment of Cerebral Malaria	Sukanya Patra, Himadri Medhi, Somedutta Maity	Indian Institute of Technology(BHU), Varanasi	Dr. Padip Paik
11	Smart Gloves for Assisted Physiotherapy	Krishna Sivanand, Deepika Gunasekaran	Kumaraguru College of Technology, Coimbatore	Dr. B.L.Lakshmi Meera
SRISTI-GYTI Award 2020				
1	An Inexpensive Deep Tissue Blood Flow Measurement System Using Low Frame Rate Camera	Murali K	Indian Institute of Technology, Bombay	Prof. Hari M Varma
2	A Novel CD4 cell Count Method for HIV Infected Patients Using a Hematology Analyzer	Rajesh Srinivasan, Vikram S, Niraj N Jadhav	Indian Institute of Science, Bengaluru	Prof. Sai Siva Gorthi
3	AbleFit: Wearable Device for Orthopedic and Neurological Disorderes Patients	Gunjan Patel	Indian Institute of Technology, Madras	Dr. Sujatha Srinivasan Dr. Rajdeep Ojha
4	MOKSH-Convert Crop Waste into Wealth	Amrinder Singh, Gurditt Singh, Varinder Singh Nitika Dhingra	Chitkara University, Punjab	Dr. Nitin Saluja
5	A Method and a System for Remotely Controlled Manipulation of Nanomaterials in Fluids	Souvik Ghosh	Indian Institute of Science, Bengaluru	Prof. Ambarish Ghosh
6	Development of Patient Specific Customized Shape Vascular Stent by 3D Printing Technology	Jasvinder Singh, Gurminder Singh	Indian Institute of Technology, Delhi	Prof. Pulak Mohan Pandey
7	Sediment Microbial Fuel Cell as a Renewable Power Source in Remote Area	Jeetendra Prasad	Motilal Nehru National Institute of Technology, Allahabad	Prof. Ramesh Kumar Tripathi

SRISTI-GYTI Appreciation 2020				
1	Disposable Onsite kit for Discriminating Raw/Synthetic/Pasteurized Milk Based on Alkaline Phosphatase Indicator	Kuldeep Mahato, Buddhadev Purohit, Ashutosh Kumar	Indian Institute of Technology, Guwahati	Dr. Pranjal Chandra
2	A Ready-to-use Haemostatic Bandage for Military and Civilian Trauma Care	Syed Muntazir Andrabi	Indian Institute of Technology, Kanpur	Prof. Ashok Kumar
3	Design of an Indigenous Atmospheric Water Generator for Economical Production of Drinking Water in the Water Scarce HILLY, rid and Coastal Regions	Bukke Vani, Sajja. S. Chandrasekhar, Dileep Kumar Fothedar, Mr. B. Govardhan Shiva Prasad Nandala, M. Madhumala, Karishma Mishra	Indian Institute of Chemical Technology (CSIR-IICT), Hyderabad	Dr. Sundergopal Sridhar, Dr. Nivedita Sahu, Dr. Sugali Chandra ekhar, Mr. Mukkavilli Rama Krishna
4	Self-sustainable E-waste Recycling: Generating Wealth from Waste via Zero Discharge Technology	Prashant Ram Jadhao, Ramdayal Panda, Snigdha Mishra	Indian Institute of Technology, Delhi	Prof. K. K. Pant, Prof. K. D. P. Nigam Prof. Ejaz Ahmad
5	Smart, Flexible, and Multi-Functional Thermal and Energy Management Systems for Next-Generation Electronic Devices	Sri Ganesh Subramanian	Indian Institute of Technology, Kharagpur	Prof. Sunando Das Gupta, Prof. Justin A Weibel
6	Harvesting Delayed Fluorescence in Mn-doped Perovskite Quantum Dots Using Vibrationally Assisted Delayed Fluorescene (VADF)	Pradeep K R	Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru	Prof. Ranjani Viswanatha
7	Design of Acetone Breath Gas Analyzer in the Evaluation of Diabetes Mellitus	Ramji K.	SRM University Chengalpattu	Dr. U. Snekhalatha
8	Design and Development of Advanced CNC Micro-machining System	Ashish Kumar Sahu, Harish Kumar, Hardik Arvindbhai Patel, Jitin Malhotra	Indian Institute of Technology, Delhi	Prof. Sunil Jha

9	Not-IS : A Currency Identification Aid for the Visually Impaired in India	Sri Navya Kondaveeti	Indian Institute of Technology, Bombay	Prof. Swati Pal
10	Recovery of Lithium Cobalt and Manganese Values from Discarded Lithium-Ion Batteries	Singh Rahulkumar Sunil	Indian Institute of Technology, Roorkee	Dr. Nikhil Dhawan
11	Electrical Power Generation from Wet Textile	Sankha Shuvra Das, Vinay Manaswi Pedireddi	Indian Institute of Technology, Kharagpur	Prof. Suman Chakraborty, Prof. Aditya ndopadhyay, Prof. Partha Saha
12	Development of New Electro-mechanical Muscle Fatigue Measurement Device	Parth Joshi, Poojan Gajjar	Indian Institute of Technology, Jodhpur	Dr. Kaushal A. Desai, Dr. Prathamesh H Kamble
13	Highly Sensitive, Scalable Reduced Graphene Oxide with Palladium Nano-composite as Strain Sensor	Suresh Nuthalapati, Vijay Shirhatti, Vaishakh Kedambaiboole	Indian Institute of Science, Bengaluru	Prof. K Rajanna, Prof. M. M. Nayak
14	Development of Sustainable Mosquito Repellent Cum Multifunctional Textile using Microencapsulation of Essential oils	Nagender Singh	Indian Institute of Technology, Delhi	Dr. Javed N. Sheikh
15	Deposition Reactor Designed for Low cost Low-temperature Deposition of High-quality Oxides Films for Next Generation Electronics	Vivek Singh	Indian Institute of Science, Bengaluru	Prof. Sushobhan Avasthi
16	A Machine Learning Package to Design Novel Functional Glasses	Ravinder, Hargun Singh Grover, Suresh, Sourabh	Indian Institute of Technology, Delhi	Prof. N. M. Anoop Krishnan

SITARE-GYTI Award 2021				
1	An Intraoperative Probe for Brain Tumour Margin Delineation	Arjun B S	Indian Institute of Science, Bengaluru	Prof. Hardik J. Pandya
2	Microsensor Integrated Intubation Catheter for Chronic Airway management	Alekya B	Indian Institute of Science, Bengaluru	Prof. Hardik J. Pandya
3	Design and Development of Hollow Polymeric Microneedles for controlled drug/ vaccine delivery	Pankaj Shivhare	Indian Institute of Technology Bombay	Prof. Rohit Srivastava
4	Environment Safe Antimicrobial Phytoabsorbent Pads For Sanitary & Hygiene Products	Deepika NP	JSS College of Pharmacy	Dr. B. Duraiswamy
5	Pro-Care: Prognostic point of care monitor for cardiovascular disease management	Ruchira Nandeshwar	Indian Institute of Technology, Bombay	Prof. Siddharth Tallur
6	Rapid detection of bilirubin using Cationic Multifluorescent Carbon Quantum dots as a fluorometric probe	Barkha Singh	Indian Institute of Technology, Bombay	Prof. Rohit Srivastava
7	Genetic characterization and development of endophytic Microbacterium based bioinoculant for rice blast disease management	Asharani Patel	Indian Agricultural Research Institute, Delhi	Dr. Aundy Kumar
8	Digitization of Manufacturing Process of Indian Sweetmeats with Tailored Functionality for Harnessing Food Safety and Quality	Sukirti	Indian Institute of Technology, Delhi	Dr. Jatindra K Sahu and Prof. Satyanarayan Naik
9	Development of process technology for instant soluble skim milk tablets	Siddharth Vishwakarma	Indian Institute of Technology, Kharagpur	Prof. Hari Niwas Mishra

10	Enriching Methane Content in Biogas through CO2 Conversion into Acetic Acid via Microbial Electrosynthesis	Moumita Roy	Indian Institute of Science Education and Research, Mohali	Dr. Sunil A Patil
SRISTI-GYTI Award 2021				
1	Lithography-less, Frugal and Scalable Microfluidic Device for Drug Discovery and Drug Screening Applications	Ketaki Bachal, Shital Yadav, Dr. Tanveer ul Islam and Makrand Rakshe	Indian Institute of Technology, Bombay	Prof. Abhijit Majumder, Prof. Prasanna Gandhi
2	Boron Analogs of Graphene as Alternative Nanoadditives for Fuels used in Space and Defence Applications	Harini Gunda	Indian Institute of Technology, Gandhinagar	Dr. Chinmay Ghoroi, Dr. Kabeer Jasuja
3	Battery Less Electrochemical Sensor for Quantification, Removal of Naringin and Determination of Maturity of Citrus Fruits	Arun Kumar Gupta	Tezpur University, Tezpur	Dr. Poonam Mishra Prof. PP Sahu
4	Development of Drop Impact Printing Technique: A Way Towards Clog Free Printing Technology	Chandantaru Dey Modak, Arvind Kumar and Dr. Abinash Tripathy	Indian Institute of Science, Bangalore	Dr. Prosenjit Sen
5	Development of Completely 3D printed Microfluidic Device with Reusable Bioelectrodes for Enzymatic Glucose Biofuel Cell Applications	Jayapiriya U S	Birla Institute of Technology and Science, Pilani (Hyderabad Campus)	Prof. Sanket Goel
6	Design and Development of a Low-cost Milk Tester	Moupali Chakraborty	Indian Institute of Technology, Kharagpur	Prof. Karabi Biswas
7	A Low-Cost Pocket-Sized Digital Microscope	Sanjeev Kumar	Indian Institute of Technology, Kharagpur	Prof. Pranab Kumar Dutta, Prof. Manjunatha Mahadevappa

8	Point-of-care Spinning Disc for Complete Blood Count (CBC)	Rahul Agarwal, Arnab Sarkar, Arka Bhowmik, Devdeep Mukherjee	Indian Institute of Technology, Kharagpur	Prof. Suman Chakraborty
9	Development of Light Weight Cost Effective Soft Body Armour using Indigenous Technology	Mukesh Bajya, Unsanhame Mawkhlieng	Indian Institute of Technology, Delhi	Prof. Abhijit Majumdar, Prof. B. S. Butola
SITARE-GYTI APPRECIATION-2021				
1	A low-cost Automated Bone Mill for Delivering Graft Particles of Definite Sizes	Jannu Rajeev Naren	S V S Group of Institutions, Mahabubnagar	Dr. R. Viswa Chandra
2	An Intelligent Hand Rehabilitation and Assessment System for Stroke Patients	Chandan Kumar Jha	Indian Institute of Technology, Gandhinagar	Dr. Arup Lal Chakraborty
3	Design and Development of Phased Array Applicator for Hyperthermia Treatment of Locally Advanced Breast Cancer	Divya Baskaran	Indian Institute of Technology, Madras	Dr. Kavitha Arunachalam
4	Nucleic Acid Testing Based Low-Cost Portable Rapid Diagnostic Device for Detecting Viral Pandemic Infection at the Community Level: from Saliva to Solution	Sujay Kumar Biswas	Indian Institute of Technology, Kharagpur	Prof. Suman Chakraborty
5	A Diagnostic Kit to Minimize Risks from the Micro-TESE Procedure While Differentiating Nonobstructive vs. Obstructive Azoospermia	Govindkumar Balagannavar	Institute of Bioinformatics and Applied Biotechnology, Bengaluru	Prof. Kshitish K Acharya
6	Design and Development of Post-Surgical Rehabilitation Device for Temporomandibular Joint Disorder Patients	Priyanshu Raj Shrivastava	Indian Institute of Technology, Jodhpur	Dr. Kaushalkumar Ashokbhai Desai

7	Ultra-Low Cost Instrumented Foot Pressure Insole for Gait Rehabilitation in Locomotor Dysfunction Among Differently-abled and Other Clinical Populations	Ashutosh Tiwari	Indian Institute of Technology, Delhi	Dr. Deepak Joshi
8	Microfluidic Immunosensor for Point-of-care-testing of Beta-2-microglobulin in Tear	Surjendu Maity	Indian Institute of Technology, Guwahati	Prof. Dipankar Bandyopadhyay, Dr. Dipankar Das
9	Processing of Citrus Limetta Seeds as Industrial Waste into Acaricidal Agents for Controlling Cattle Tick	Parag Jain	Columbia Institute of Pharmacy, Raipur	Dr. Ravindra Kumar Pandey, Dr. Trilochan Satpathy
10	Technological Transformation of the Integrated Biomass Conversion Process in the Rural Context for the Production of Handmade Paper from the Locally Available Common Reed Phragmites karka in Chilika Lake of Odisha	Falguni Pattnaik	Indian Institute of Technology, Delhi	Dr. Satyanarayan Naik, Dr. Vivek Kumar
11	A Point-of-Care Device for Heavy Metal Ion Detection in Body Fluids	Swetha Menon	Indian Institute of Technology, Madras	Dr. V. V. Raghavendra Sai
12	Neonatal Hearing Screening Headband for Brainstem and Cortical Response Extraction	Rathin Joshi	Indian Institute of Science, Bangalore	Dr. Hardik J Pandya
13	Wearable Interactive Parkinson's Disease Assistive Device (WIPAD)	Yogesh Singh	Indian Institute of Technology, Gandhinagar	Dr. Vineet Vashista
14	Targeting Plasminogen Activator Inhibitor-1 to Treat Skin Fibrosis	Isha Rana	Institute for Stem Cell Science and Regenerative Medicine, Bangalore	Prof. Colin Jamora
15	A Novel Approach to Cure the Chronic Diabetic Wounds	Akshay Hegde	Institute for Stem Cell Science and Regenerative Medicine, Bangalore	Prof. Colin Jamora

SRISTI-GYTI APPRECIATION-2021				
1	Osteoinductive Personalized Bone Grafts by 3D Printing of Novel Natural Fiberreinforced Composite for Maxillofacial Reconstruction	B. Sri Sai Ramya	Indian Institute of Technology, Hyderabad	Dr. Falguni Pati
2	Design and Development of a Trans Illumination Imaging to Detect Breast Malignancies and Correlation of Results with Mammograms	Chiranjib Bhowmick	Indian Institute of Technology, Kharagpur	Prof. Manjunatha Mahadevappa, Prof. Pranab Kumar Dutta
3	Development of a Novel Low Cost Non-thermal Process Technology for Preparation of Shelf Stable Sugarcane Juice	Dr. Hari Niwas Mishra	Indian Institute of Technology, Kharagpur	Chirasmita Panigrahi
4	An Electrolithography Tool for High Throughput Pattern Generation	Sumit Kumar, Ebinesh Abraham	Indian Institute of Science, Bengaluru	Dr. Praveen Kumar Prof. Rudra Pratap
5	Modified Trickling Filter- A Solution to Water Crisis in India	Rishabh Shukla	Indian Institute of Technology, Delhi	Prof. Shaikh Ziauddin Ahammad
6	Efficient Deep Learning Technique for Automated Ischemic Stroke Detection Assisting Radio-diagnosis for Reperfusion Therapy	Anusha Vupputuri, Akshat Gupta	Indian Institute of Technology, Kharagpur	Dr. Nirmalya Ghosh
7	Greywater Sink for Potable and Non-potable Uses	Ankit Nagar, Md Rabiul Islam	Indian Institute of Technology, Madras	Prof. Thalappil Pradeep
8	An Indigenous Low-cost Smartphone Interfaced Handheld Potentiostat	Abhranila Das	Indian Institute of Engineering Science & Technology, Shibpur	Dr. Chirasree Roy Chaudhuri

9	An Affordable, Sensitive and Portable Electric Field Mediated Device Towards Label-free, Point of Care Disease Diagnostics	Bhaswati Chakraborty	Indian Institute of Engineering Science & Technology, Shibpur	Dr. Chirasree Roy Chaudhuri
10	Origami Microfluidic Microbial Fuel Cell (MFC) for Powering IoT Node with Cloud IoT Platform	Prakash Rewatkar	Birla Institute of Technology and Science Pilani, (Hyderabad Campus)	Prof. Sanket Goel
11	A Unipolar Coil Arrangement Method for Improving the Coupling Coefficient without Ferrite Material in Wireless Power Transfer Systems	Gautam Rituraj	Indian Institute of Technology, Guwahati	Prof. Praveen Kumar
12	Psychophysiological Monitoring of a Subject using Optical Respiration Rate Measurement System	Abhinav Gautam	Indian Institute of Technology (ISM), Dhanbad	Dr. Amitesh Kumar
13	Position Sensorless Permanent Magnet Brushless DC Motor Drive for Grid Interactive and Solar Powered Irrigation Pump	Aryadip Sen	Indian Institute of Technology, Delhi	Dr. Bhim Singh
14	A New Control Surface Auxiron for Aircraft and a Solar UAV Equipped with it	Vijay Shankar Dwivedi	Indian Institute of Technology, Kanpur	Prof. A. K. Ghosh, Prof. G. M. Kamath
15	Multifunctional Disperse Dyes	Ankit Kumar Singh	Indian Institute of Technology, Delhi	Dr. Javed Nabibaksha Sheikh
16	Metal-Organic Frameworks Functionalized Smart Textiles for Environmental Air Purification, Anti-odour, and Antimicrobial Applications	Hardeep Singh	Indian Institute of Technology, Delhi	Prof. Ashwini K. Agrawal Prof. Manjeet Jassal

17	Self-Disinfection Property for Repurposing of Personal Protective Masks	Shounak Roy, Praveen Kumar	Indian Institute of Technology, Mandi	Dr. Amit Jaiswal
18	Smart Polymer with Human Body Temperature Activation	Hema Garg	Indian Institute of Technology, Delhi	Dr. Bipin Kumar, Dr. Bijay P. Tripathi, Dr. Apurba Das

HBN Database Link and QR Code

	(1) http://honeybee.org/honeybee_database.php Methods of low-cost farming, animal husbandry and rural modification, published in the Honey Bee English Newsletter.
	(2) http://honeybee.org/honeybee_innovation.php More than four thousand farming, animal husbandry and rural modification practices are present in this database. This database is available in four languages namely Gujarati, Hindi, English and Tamil.
	(3) http://honeybee.org/plant_db.php There is an illustrated database of medicinal plants in which 250 plants and their uses have been mentioned. This database is available in four languages namely Gujarati, Hindi, English and Tamil.
	(4) https://techpedia.in/search_project.php This is a compilation of specific projects done by engineering students from across the country. More than two lakh projects are present in it.
	(5) https://techpedia.in/search-projects This database contains over four lakh abandoned and expired USPTO patents.

	(6) http://www.sristi.org/cpri/ This is a database Common Property Resource Institutions (CPRI).
	(7) http://www.inshodh.org Teachers from Gujarat and Maharashtra have invented new methods in teaching children. These experiments have been included in this database.
	(8) https://grid.undp.org.in/#3.01/22.82/82 This is a database on rural artisans, farmers and holders of traditional knowledge as well. This database has been created by the Honey Bee Network in association with UNDP.
	(9) https://gyti.techpedia.in/view-project/all/ This is a database of the projects of the GYTI Awards winners.

Honey Bee Network

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GYTI AWARDS 2024

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