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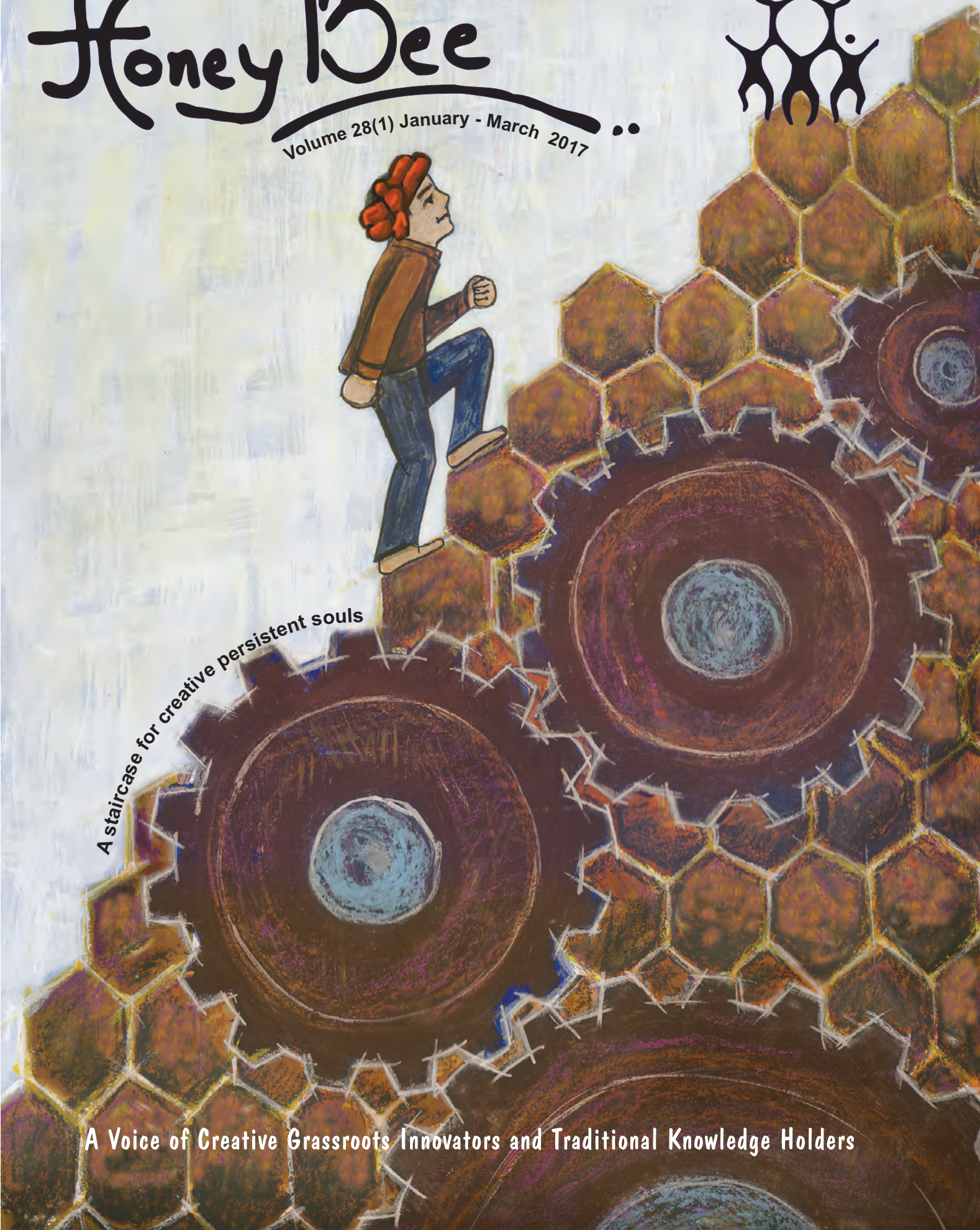

A staircase for creative persistent souls

A Voice of Creative Grassroots Innovators and Traditional Knowledge Holders

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A staircase for creative persistent souls

When wheels of time turn, some people are propelled into orbits they desired, some are left where they were and some fall into the abyss of nothingness. But it is not just a matter of luck. Struggles matter. Strife is not always in vain. The selection of opportunities we respond to, and build upon isn't just a random choice.

A young innovator was very creative, had hundreds of ideas, made a few useful prototypes. In some cases, he fabricated things that worked well in market though original idea was not his. But after a while, his expectations increased, diligence decreased and he was not making progress. He expected investors and companies to make a queue outside his home with bags full of money. But that of course doesn't happen often. A mentor hired engineers to set up a company around his ideas so that he could focus on design and fabrication. He threw away all opportunities. Nothing could be done. Depressed, he returned to his home desolate and angry at the world. The Network failed.

In many other cases the Network likewise failed. In a few cases, it enabled creative grassroots innovators, children and young students showcase their work at the residence of the President of India. Become a part of the Festival of Innovation. But then did these innovators help other less privileged innovators? In some cases yes, in most cases no. Why did their spirit not soar, and rise to embrace a tall tree whose shade would have saved many more from of the scorching heat of the summer sun. This is the paradox when we benefit, we are lucky. We got hit by it because we deserved it. When we lose, the system is oppressive, we blame the whole world. When you win, it is you, when you lose, it is them. No, it is not always so clear. There are many shades of reality in between. We are trying to invent a new inclusive, caring and sharing society. One that make us all obliged to extend a helping hand to those less privileged, less 'lucky' and more reticent.

That's when the Honey Bee Network will grow, not only in numbers but rather in its influence on humanizing our personal and social quests.

-Editor

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From 30 to 3000 years walk: Do we need to recalibrate the compass?

Getting award at the hands of the President of India does make an Important precious statement, that innovation matters, country cares and the Honey Bee Network nurtures. The Network shares a large number of innovations to foster an empathetic innovation ecosystem. But is that enough? Will that sustain the hopes of creative people enough to take their ideas forward? After all, out of say 30-40,000 thousand entries received in every biennial competition, including traditional knowledge practices and contemporary innovations, we recognize hardly 60-70 innovations once in two years. At this rate we are raising a storm of expectations without a cogent pathway for sustaining the generosity of rest of the knowledge providers.

How do we develop new strategies to tackle this challenge? What can be done to not only scout many more new and innovative ideas but also take many more of them forward? On what ground can we support thousand more who have solved a problem in an ingenious way, but that solution is not completely new according to the prior art, review of the prior patent or literature database. At the same time, it is not available in market either. Should such an unmet social need remain unmet? Perhaps, giving award to few but support to many more will have to be one of the realistic way forward.

There are several other challenges that the Network faces which require imaginative and inclusive solutions. As the Network grows, new kinds of skills, perspectives and social capital are needed to serve the innovation ecosystem without losing the energy drawn from the spirit of older colleagues. The scouting of innovations in the field needs new kinds of methods since existing methods may have reached their limits. Easier to access innovations may have been already scouted. As we have observed during shodhyatras, after walking for a week and covering a distance of around 150 km, one hardly ever finds 3-4 worthy innovations. Sometimes lesser. Though unique traditional knowledge practices continue to be discovered. New approaches will also need new kind of partnerships in each state of the country and other countries. For a long time, volunteers have played a very crucial role in searching and spreading grassroots innovators. We need to involve students and teachers from rural and urban institutions in summer vacation to look for innovators from interior regions. Recognition for such efforts must also follow from the fellow Network members so that every new volunteer feels welcome and intensely encouraged.

It is not always true that the strategies, which worked for scouting, will also work for spreading. Also, the expertise in scouting may not always mirror in spreading process. Both need somewhat different social seeding approaches. Spreading requires networking with farmers' associations and small industry organizations so that the creative and innovative ideas get embedded in ongoing programs and practices. Innovators also need to be organised. Vivekanandan in Tamil Nadu experimented with forming association of innovators to trigger self –organising process of peer encouragement and support. Many more such models need to be tried in the years ahead. Brig Ganesham tried chinna shodhyatras. Balaram tried moving school (Pathe Paathshaalaa) for seeking and spreading ideas, SRISTI tried summer scouting by students, Shodh Sankals, shodhyatras, and Saatvik festivals besides numerous other ideas.

When patents had to be filed, the Network needed support of IPR attorneys. None of them charged for their time. Crores of rupees worth of financial resources were thus contributed by IPR community towards the Network growth and development. They are important collaborators whose role has not been adequately recognised by the Network. Similarly, scientists and technologists in mainly public sector but in some private sector institutions too have made a huge contribution towards validation and value addition in grassroots innovations and traditional knowledge practices. But we have not recognised them enough. Their role needs to expand. Some of the senior scientists may like to visit innovators and build local capacity. Without blending formal and informal science and technology, the local knowledge systems will not become robust. Many of the senior leaders of the R&D system have helped in the research advisory committees just as grassroots innovators have helped in the evaluation process of the shortlisted entries. Maybe on the wall of every collaborator's office, workshop, house, there must be a plaque celebrating their role in strengthening HBN so that the Network becomes a subject of everyday conversation. *Some times our individual identities overshadow the Network identity though it is the Network which brought us all together*. But that is not a serious problem. When we become open to welcome new volunteers and help them have a sense of ownership of the Network with in the country and globally, these issues will be easily ignored.

Distributed on-farm and in-workshop research on adapting agricultural and small scale industrial innovations needs new protocols, new ways of validation of systems and rules of engagement among different actors. If tens of thousands of innovations have to be tested around the country in coming decades, current systems will not work. These experiments will have to be tracked through agile, simple interactive apps capable of crossing linguistic, cultural and socio-ecological boundaries.

Similarly, hundreds of thousands of ideas of school children, ITI students and others will need to be processed in short

time with due diligence and high reliability so that we do not miss out on any unique ideas. In situ incubation including extensive mentoring of the shortlisted ideas will also require new kinds of online communities and Apps. Digitisation of HBN in local languages will be one of the key challenges without losing social, and local connect.

In the coming decade, nurturing talent of children in government schools will occupy much of my personal time. These children come from economically poorest backgrounds. Yet, they hardly get much attention to identify, reinforce and leverage their unique talents. The Network will build upon a lot of work that has been done already by senior colleagues like Vijay Sherry Chand (www.inshodh.org)in this direction with particular reference to innovation by teachers in government schools. We will need to identify more teachers, empathetic educational administrators, help them become social entrepreneur, and let hundred flowers bloom all around. It is well known that children from the poorest families go to government schools. Rest, who can afford even a little more, move over to private schools. We seem to be producing two kinds of citizens: one to rule and other to be ruled. Unless we unleash creative potential of children in government schools, will India become truly inclusive? The Network will have to engage with such disadvantaged children much more in coming decades. May be the new leadership of the Network will emerge from students and teachers in this domain. The youth in conflict prone regions need reassurance that this country cares about them. They have to be provided creative means of livelihood based on their existing strength in skills and endowments. The concept of Innovation Insurgent may provide an optimistic pathway for motivating angry youth to explore constructive and creative means of pursuing developmental goals shunning violence completely in the way.

How will the Network reinvent itself to serve creative communities during the coming decades and centuries will be the subject of retreat during May 1-2, 2017 at Grambharati, Amrapur?

If the inner calling compels you to come, then just engage and involve with this social innovation movement. Please join the humble exploration for more compassionate, and collaborative methods of bridging formal and informal sector together. Educational, institutional, technological and cultural creativity, the four pillars of the Network will be pursued with an open mind and even more open heart. Long term visions provide unbounded energy, make short term failures and setbacks more easily tolerable and sustain the spirit of service before self. If inclusive development is facilitated by self-triggered and self organised grassroots innovations, then this must be possible in every country of the world. This itself is a formidable challenge for coming centuries. Every innovation threatens somebody's inertia. Every inclusive inertial also overcomes social prejudices or biases. Let us hope and resolve that future volunteers of the Network will create even higher standards of inclusivity.

anil k gupta

Children researchers trying to understand making of broom: UNICEF - SRISTI children workshop 2016

SRISTI Samman

SRISTI Samman Awards were conferred to seven grassroots innovators and knowledge-holders. This year the awardees have been selected for their contribution in various fields such as herbal practices, conservation of crop varieties, environmental care etc., whereas some have been awarded for their innovations to improve lives of other people. It is very gratifying to mention that three of the rpeviosu awardees of SRISTI Samman got one of the highest civilian awards that is Padam Shree at the hands of the President of India. We welcome suggestions about outstanding change makers in various fields of grassroots knowledge, innovations, education, institutions, cultural and biodiversity conservation systems.

Smt Annakutty Joseph
Idukki, Kerela
Compiled by P.Vivekanandan and DrVaradarajan ,SEVA

Mrs Annakutty Joseph (71) is a herbal healer who has developed several medicines to treat human and animal diseases. These include skin diseases, worms, intestinal disorders, lean calves, mastitis, foot and mouth disease, inflammation, jaundice, haemorrhoids and some others. She has also made efforts to conserve certain rare varieties of ash gourd, giant granadilla, wild chilli, wild onion, and *Dioscorea spp*.

Shri Kongara Ramesh

Visakhapatnam, Andhra Pradesh
Compiled by PalleSrujana, Brig P Ganesham (retd)

K Ramesh is an innovative farmer who has developed new varieties of chilli and mangoes. He has also developed an organic pest control formulation. Apart from farming, Ramesh is knowledgeable in homeopathy medicine and gives free medicines to the needy. He has developed several sustainable agricultural innovations. He was a pioneer to use biogas energy to run a milking dairy unit.

Smt Padmaja Venigandla
Vizianagaram, Andhra Pradesh
Compiled by PalleSrujana, Brig P Ganesham (retd)

Padmaja trains rural children in classical dances. With the help of few dance experts/volunteers, she has trained scores of village children who have performed at various programs in Delhi, Hyderabad, Vijaywada and on foreign shores too. At the ashram even boys are trained in traditional martial arts and many other traditional local art forms. She has also combined an old age home for women with children's home. Children and the aged women get care and affection from each other.

Shri Upendra Rathod & Shri Rajiv Rathod
Amreli, Gujarat
Compiled by SRISTI Team

After years of experimenting with the Bullet Santi- the first version of a motorcycle driven farming device developed by Mansukhbhai Jagani - Mr Upendra Rathod has played an important role towards its standardisation into a three wheeled tractor called Sanedo at Rathod Agro Industries. He has helped in the diffusion as well as further development of the Bullet Santi in India and Africa. The Sanedo uses features such as hydraulic lifting, reverse gears as well as several attachments like seed drills, sprayers for pesticides. It is now being produced by about 500 manufacturers in Saurashtra region of Gujarat. The efforts of Rathod brothers towards standardisation and diffusion have helped open markets for the Sanedo outside Saurashtra.

Shri Mahadeo Mahato
Hazaribag, Jharkhand
Compiled by Social Upliftment Trust, Ranchi,Jharkhand

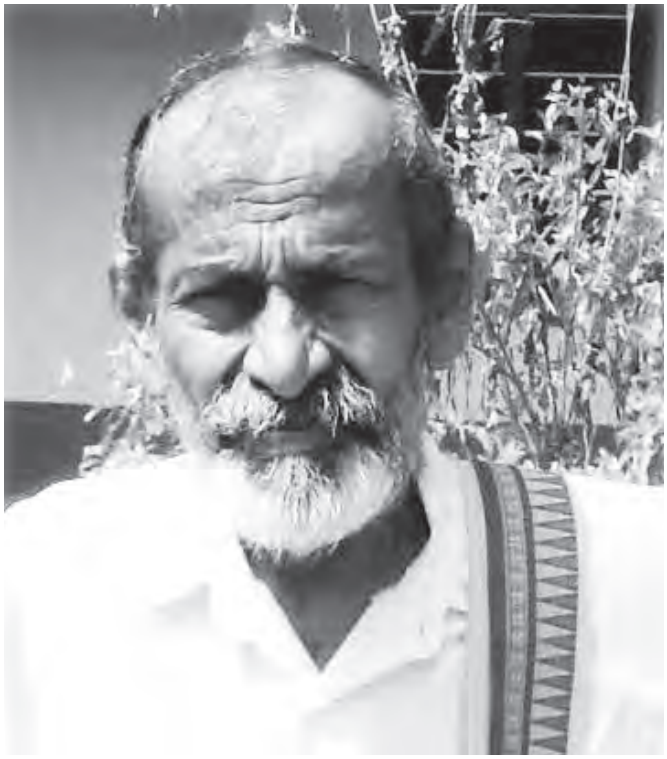
Mahadeo Mahto, 63, has developed a unique way of organising a 'Vriksha Raksha Bandhan' Fair (tying sacred threads to trees for their protection) to conserve forests. The group formed by him, Vanya Prani Suraksh Samiti is now running this campaign at 10 different places. He has succeeded in conserving about 500 acres of land area so far.

Late Shri N Vellan
Wayanad, Kerela
Compiled by P.Vivekanandan ,SEVA

N Vellan (66) coming from a tribal community, Wayanad district, Kerala has helped enormously in conserving the lifestyle, food habits, herbal medicine, bio-diversity conservation, traditional art, dance, archery skill etc. He worked for conservation of common land in Karapula dam site. He also worked for conserving animal species like Wayanad chicken and dwarf cattle. He revived traditional tribal dance forms as well as traditional recipes such as *kalluputtu, karakundappam, mulaiyeri payasam, thenkai soru* (coconunt rice), *irulaila, ilaiyotti, pottala, kaiyotti, mansatti kuthan* etc.

Shri B K Deva Rao
Dakshin Kannada, Karnataka

This septuagenarian farmer from Southern Karnataka has grown and conserved around 154 varieties of traditional and hybrid paddy varieties. He has cultivated paddy in 42



small plots of his field without use of chemical manure or pesticides. His son Parmeshwar Rao, an electrical engineer has now quit his job at a renowned firm to join him in this endeavour.

The Third Festival of Innovation, Rashtrapati Bhavan, New Delhi March 4-10, 2017

The Festival of Innovation (FOIN) is a unique initiative of the Office of the President of India to recognise, respect and reward grassroots innovations and foster a supportive ecosystem. While addressing the Global Roundtable on Inclusive Innovation attended by top innovation leaders of the world and several noble laureates during last two years, he has stressed the need for sharing Indian innovative experiences and learning from the global experience in designing, developing and delivering empathetic and inclusive innovations for the common good. He believes that while India has to learn a lot of lessons from the countries that rank on the top in the global innovation index, India has also a lot to share in terms of frugal and grassroots innovations. That is the only way Indian innovation quotient will go up.

The third Festival of Innovation (FOIN), Rashstrapati Bhavan organized by the Office of the President in collaboration with National Innovation Foundation, and the Honey Bee Network has brought together innovation for and from grassroots to leverage the uniquely frugal and empathetic model of grassroots innovations developed in India.

FOIN had several distinctions this year. The Ninth National Biennial Award for Grassroots Innovations and Outstanding Traditional Knowledge by National Innovation Foundation-India were given by the Honourable President Shri Pranab Mukherjee on March 4, 2017 (see details later). Mr Francis Gury, Director General, World Intellectual Property Organization, Geneva was a special guest of honour. The WIPO brings out the Global innovation Index on which India ranks quite low. Idea also was to show how by not taking into account grassroots innovations, not only the index misses out a very important source of creativity in informal sector but also does not do justice to creative societies like India. On June 5, Mr Francis Gury, DG WIPO, was the chief guest at GYTI (Gandhian Young Technological Innovation Awards given by SRISTI to engineering students under techpedia.sristi.org. Fifteen of the student awardees are given Rs 15 lac each for taking their ideas forward to hopefully set up an enterprise under BIRAC-SRISTI fellowships. Dr Vijay Raghavan, Secretary, DBT, Dr R A Mashelkar, Chair, NIF and SRISTI Adv committee, Dr Renu Swarup, MD BIRAC, Dr Anil Sahasrabuddhey, Chairman, AICTE also joined Mr Gury on the dais and gave away some of the awards.

Global Roundtable on Inclusive Innovation continued on March 4-5, 2017 at FOIN addressed by the President of India, Shri Pranab Mukherjee in the concluding session. He said

> To make grassroots innovations more inclusive, we need a strong mechanism for dispersal and quick adoption of ideas. I am told that many public-sector scientists do not charge any cost for the time used in validating and value-adding grassroots innovations. Many intellectual property firms also do the same. Let me compliment them for their service, which has helped in harnessing IPR support for local communities and grassroots innovators. The concept of Technology Commons used by NIF allowing fellow community members to use innovative ideas of others for non-commercial purposes has also helped in wider dissemination of innovations. These positives should continue unabated.

If India becomes a growth engine for the world and provides a new model of inclusive development then she will gift a large number of open technological and other solutions for the developing and developed worlds. The global Roundtable included sessions on Inclusive Innovations; Leveraging Science, Technology and Innovation: Developing an Inclusive Ecosystem; Education for Inclusive Innovation, Development of Incubation and Acceleration Models for Innovative Startups; Incentives for Innovation in Public Policy and Programmes; and Social Innovations for Large-Scale Societal Change.

A National Roundtable on Innovations in Public Service Delivery was organized on March 6, 2017. One of the highlight was the way prof Gurdeep Singh, then VC of Vinoba Bhave University, Jharkhand, handled the extreme shortage of teachers with more than three lac students to teach. He described how he asked the topper student of each class to teach students. Not only that the students enjoyed it but even the result performance went up drastically. While teachers shortage must be overcome, but involving bright students to teach to promote peer to peer learning seems a very effective pedagogy for improving quality of education and bringing freshness of ideas.

Workshop of Innovative and Creative Children for Addressing Unmet Social Needs was organized next day. A mixed group of privileged and disadvantaged children were given an exposure to innovations by children. Then they were asked to visit different sites where local communities pursued manual craftsmanship in wood, stone and other such crafts. They did field research and presented their recommendations and solutions in the workshop.

A national meeting of National Innovation Clubs from around several central institutions of higher education was held on March 8. They discussed best practices about searching, spreading and celebrating innovations and also sensing or finding out the unmet social needs in the hinterland. Same day, a meeting of the Design Innovation Centers (DIC) and design spokes was held for design inputs in grassroots and student's innovations. A roundtable on Innovations in Medical Science and Bio-technology applications for grassroots was held on March 9. It was followed by a roundtable on Sustainable Inputs for Agriculture, followed by interaction of scientists with grassroots innovators.

Roundtable on Financing of Innovation based Startup and Early Stage Ventures was organized by DST, AIM and NIF on March 10. The key recommendations of the roundtables were presented to the Hon'ble President. The FOIN was declared closed with the concluding address the President of India. Renowned businessman Mr Ratan Tata, Shri Pankaj Patel, Chairperson, FICCI, senior executive sof Lockheed Martin and several other thinkers, policy makers, academicians and entrepreneurs from around the world attended the session.

In sync with the policies of the government of India, FOIN provides a window to creative and innovative solutions for social development through grassroots innovations, student ideas and other technologies for agriculture, rural development, sanitation, health, women and child development, biotechnology and medical innovation for grassroots.

The Decade of Innovation (2011-20) is characterised by various initiatives taken by the Government of India and the President's House to promote innovation, particularly

GYTI Award book release, March 5, 2017

grassroots innovation, in India and forge its linkages with the higher education system.

The festival focused the attention of the nation towards the untapped potential of knowledge-rich, economically poor people. India is perhaps the only country where the head of the state hosts such a festival at his house. The President's secretariat was assisted by the National Innovation Foundation (NIF), Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI) and the Honey Bee Network.

The President's Sectariat organised three editions of the Innovation Scholars In-Residence Programme, during 2014 - 2016. The fourth edition of the programme began on March 4, 2017 and included a two week - long stay of 10 innovation Scholars in Residence at the President's House.

The youngest Scholar was a student of 10th standard whereas the most veteran Scholar was in his sixties. The Innovation Scholars selected by a Jury Chaired by the Secretary to the President, Ms Omita Paul, from various regions like Nagaland; Tamil Nadu; Haryana, Gujarat, Karnataka, Rajasthan, etc. Innovations selected ranged from two feet long carrot variety of Smt Santosh Pachar to silent heart attack detection mechanism of Akash; and a flute like amplifier of humming sound, Bamhum of Moa Subong to Condensation - Heat Recovery mechanism for boilers by Shri Subhash Ola. Honey Bee Network is poised to explore new approaches for creating a nurturing pathway for budding innovators and innovation based entrepreneurs.

Issues discussed in different roundtables at FOIN

How do we bring unmet social needs of society on the agenda of technologists working on high tech and mass impact solutions? How do we create a mindset in formal institutions to co-create solution to generate a reciprocal, responsive and respectful relationship between formal and informal sector? How to make public and private labs accessible to communities to come and discuss their ideas and take them forward alone or together?

Should there be an innovation corps in every country to encourage youth to search, spread, celebrate innovations and sense the unmet social needs as being attempted in National Innovation Clubs under the guidance of the President? How to harness children's curiosity and innate ability to think divergent for generating creative and empathetic solutions for society? Can children thus be treated as

Innovation scholars in Residence with the Hon'ble president of India, Shri Pranab Mukherjee, March 4, 2017

source of ideas rather than sink of advice? How to make translational research more buoyant so that technology on the shelf goes to society for transforming livelihoods of masses?

When disadvantaged households invariably diversify their livelihood opportunities, how to persuade scientists to pursue inter-disciplinary and trans-disciplinary research making solutions more accessible and adaptable?

How to link market based instruments, supply chains and online platforms with offline communication and public delivery systems to make affordable, accessible and adaptable technologies also available at the doorstep of the users? How to make MLM [More from Less for Many] as the new mindset of innovators to ensure maximization of knowledge and minimization of materials and other resources?

India is a diverse nation when it comes to needs, values, culture, expectations, socio-economic factors, etc. Even the same needs require different solutions. Hence, we need different innovations. When it comes to inclusive innovation, we need to think about age, gender, geography and special abilities. We need to think how science and technology can be used to bridge such gaps and create innovations that are useful to everyone.

Social immersion is increasingly used as a means of triggering samvedana [empathy and compassion], but the concrete results in the form of srijansheelta [creativity] are not so evident. How can new pedagogies be generated to mold the young minds to make them more responsive to social aspirations of the excluded communities and sectors such as small industries, public system like primary health centers or schools?

Indian Council of Medical Research (ICMR), BIRAC, Department of Biotechnology (DBT) and NIF recognised and rewarded the innovations in medical and biotechnological science having grassroots applications. Ways of scaling up grassroots rural innovations were discussed.

Roundtable on sustainable inputs for agriculture

Enhanced agricultural productivity is paramount for meeting the food security of mankind and to sustain farming activities. Agricultural mechanization, improved seed material and crop protection have played major role in constant production of food and other sustenance. There is little awareness among farmers and users regarding the use of appropriate technology. Researchers and entrepreneurs are also concerned about a clear and supportive environment so more and more innovative technologies could reach the market in a timebound manner. In round table, there was discussion on blending grassroots innovations with modern science. The discussion developed a roadmap to support policies related for popularization and use simple, user and ecofriendly, affordable technologies for farmers.

How do we enrich the ecosystem for financing innovation based start-ups, early stage ventures and new product designers?

Shri Prakash Javadekar, Union minister Human Resource Development, visiting FOIN exhibition

9th-National Biennial Grassroots Innovation Awards 4th March 2017, Rashtrapati Bhavan, New Delhi

Out of 33,000 + entries received, shortlisting was a tedious exercise pursued at National Innovation Foundation. To finalise the awards for 9th National Biennial Competition, NIF organized the National Regional Advisory Committees or RAC meetings at IIM Ahmedabad. During these meetings, 54 engineering innovations, 16 practices related to human health, 11 to veterinary health and 24 plant varieties/ innovations/ practices related to agriculture were presented before the experts. The experts evaluated the innovations on various criteria like novelty, practicality, social applicability, drudgery reduction, environment friendliness, quality of validation reports, user feedback, etc. The final list of 105 ideas, innovations and outstanding traditional knowledge practices were presented before the RACs. "We aim to reach 700 odd districts of the country so that no region will remain untapped for creativity at the grassroots level," said Professor Anil Gupta. He also thanked the President for giving a new stature to grassroots voices.

The President of India, Pranab Mukherjee, presented the ninth National Biennial Awards for Grassroots Innovations and Outstanding Traditional Knowledge at Rashtrapati Bhavan on the opening day of the week-long 'Festival of Innovations.'

The awards were given in four categories viz. Life time Achievement (1) National (15), State (12), Consolation and appreciation (26) awards. Along with the grassroots innovators, awards were also given to scouts identifying innovators from different parts of the country with one scout being given the award posthumously, journalists for their support to the grassroots innovations movement, and a Research and Development institute and a KVK helping in verification/validation of technologies.

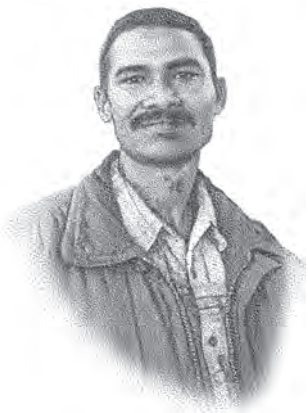
"The fact that everyone is someone. The fact that India does not have just one point three billion mouths but one point three billion minds," Dr Mashelkar said. CSIR, DBT , ICMR and several other national institutions are also coming together to support and partner in this grassroots innovations movement. He focused on the need to spread this wave of innovation among young minds. "A million ideas at the rate of two ideas per school from 4.5 lakh schools is what we are aiming at," he added.

Speaking on the occasion, the President said that in the present scenario, where the global economy continues to remain weak and lack of industrial growth is leading to joblessness, even in emerging economies, the Gandhian model of decentralised, distributed and diversified innovation-based enterprises is perhaps the best way forward to solve the problems. Stressing that Gandhiji had always wanted to blend modern science and technology with community knowledge and institutions, President Mukherjee said that the former's message has become extremely relevant in today's context.

"To further enrich the eco-system around inclusive innovations, we need all public and private systems around grassroots innovations to become empathetic enablers. And we need to do it, not just for India, but for the whole world," said the President Mukherjee.

The President's visit to the Innovation Exhibition of grassroots innovators enthused the innovator immensly. The exhibition hosted over 70 innovators from across the country. He also met with the innovation scholars, artists and writers, who were staying in Rashtrapati Bhavan as part of In-Residence Programme.

Smt. Surekhaben Parshottam receiving lifetime achievement award from The President of India onbehalf of Late Shri Parshottam Patel



LIFETIME ACHIEVEMENT AWARD (POSTHUMOUS)

A valiant effort to know and delve into the unknown

Late Shri Parshottambhai Patel
Godhra, Gujarat

Parshottambhai began his association with SRISTI in 1998 when he worked to finalise the second Shodhyatra route from Amirgadh to Tundia (Gujarat). He continued to work in planning the Shodhyatra route till the 35th Shodhyatra conducted at Tripura in the year 2015.

He would walk from one village to another, trying to estimate the distance between two villages, ascertain the Gram Sabha and infrastructural facilities in each village, think of ways to reach the maximum number of people in the shortest time and collecting as well as disseminating knowledge. He would keep all these principles and objectives in mind while planning the Shodhyatra routes.

Parshottambhai would meet the locals and gather information about examples of local creative practices and its implementation in agriculture, animal husbandry, livestock, traditional medicine. He would meet up with innovative people and document their original ideas so that they could be felicitated during the Shodhyatra and also mobilise the local youth who would help us in planning logistics and post shodhyatra followup. There were many such instances where his presence of mind saved the day for the Shodhyatris. He had an uncanny ability to think on his feet. Despite meticulous planning, it is not very uncommon to have last minute changes and surprises in the Shodhyatra.

Many Shodhyatris would recall the Chattisgarh Shodhyatra. This was a walk in the region marred by years of conflict and Naxalite insurgency. Near Bastar region, Parshottambhai, encountered a Naxalite youth in the dense forest during the Shodhyatra who took him to a valley and made all sorts of enquiries. A brave and composed Parshottambhai unflinchingly answered all his questions and conveyed the yatra's objectives to the rebel. The youth was convinced and was so impressed by Parshottambhai and his work that throughout the Shodhyatra there were no problems from the rebels.

Parshottambhai's social capital

With tears in her eyes, Yashodaben Srirambhai Chaudhary, a herbal practitioner from Vikarya village, Dang district narrated an incident related to her association with Parshottambhai. While reevaluating a practice in Vikarya, he visited Yashodaben at her home. At that time, she confided in him that she did not have enough money to treat her husband who had suddenly fallen ill. Parshottambhai immediately gave her Rs 1000 from the money granted to him for his field work. With time, Yashodaben returned the money and he formed a deep and lasting bond with this tribal family. Whenever he visited Dang, this family would be eager to help in SRISTI's work. "I have experienced first-hand this bonding with this Adivasi family during my visit to Dang," recalls Hemaben.

Many friends he formed during his field research often looked up to him for advice and mediation even in domestic

matters. Kodarji Kaluji Paghi and his family were shocked when they heard the news of Parshottambhai's sudden demise. Kodarji from Lunawada Taluka in Panchmahal would regularly get in touch with him to provide direction to his grandson. He was to meet Kodarji at Kolwan after his field visit to Faizabad. Unfortunately, he could never visit him as he started showing signs of severe ailment right after his visit to Faizabad.

A meticulous researcher

He has played an pivotal role in re-evaluation of practices brought by SRISTI's field workers and compiling the detailed practices. He effortlessly conducted the important task of training the field workers of SRISTI and assisting other members of the National Innovation Foundation in their tasks. His way of approaching a task with self driven efforts and his methodology of work was unique.

Parshottambhai's contribution to the Sattvik -Traditional Food Festival

In Sattvik, Parshottambhai did well to bring forward the traditional food from Panchmahal and Dahod. The first Sattvik Traditional Food Festival was organized in 2004. In this festival, the picture of villagers from Dhabudi and Sarjumi villages with their Bavta laddoo was published in the front page of a newspaper. Today Sattvik is one of the most awaited and well attended festivals in Ahmedabad.

A key aide of the National Innovation Foundation

Parshottambhai has played an important role in NIF's Biennial National Awards for Grassroots Innovations and Outstanding Traditional Knowledge. He would patiently explain the importance of the awards to the family members of the innovators and dutifully bear the responsibility of ensuring they reach their homes safely after the festival. Many of these innovators are reluctant to travel so far. Without his persuasion many of these innovators would never have reached New Delhi. He has also played a significant role in bringing such innovators to the SRISTI Samman awards stage.

The eternal journey

We feel as if SRISTI and Honey Bee Network are awaiting his return from this journey as if he would return from one of his several journeys!

He may not be with us in person but his inspirational work and fond memories will continue to live in our hearts forever. He may not be with us in person but his inspirational work and fond memories will continue to live in our hearts forever.

LIFETIME ACHIEVEMENT AWARD

Bhanjibhai (82 years), has been a tinkerer since his childhood. Among the many things he had developed over the years, the most important ones are a low cost check dam, 10/12 HP three and four wheel tractors and bullock operated sprayer.

His son has inherited his innovative nature and has worked with him on a number of innovations. Bhanjibhai has always had the support of his wife and other family members in all his endeavours however, his family believes if his innovations would have brought more prosperity to them, it would have been really nice. Bhanjibhai, though, remains unfazed even to this date. Bhanjibhai is an innovative farmer and active leader in his village and community. He has also served as "Deputy Sarpanch" for five years in his village and was an active member of Kisan Sangh for many years. Soft spoken, and a man of few words, he had been a regular in many shodhyatras and has inspired thousands of farmers, artisans and young people met during these yatras. Bhanjibhai also tried developing a number of other innovations like a ground nut sprayer, low cost storage for grains at home, an air borne agricultural sprayer, etc.

Shri Bhanjibhai Mathukia receiving lifetime achievement award from The President of India

Low cost Check Dam

Due to insufficient rainfall and poor water harvesting in past, the underground level water has been going down. He was deeply concerned with the problem of widespread water scarcity in Saurashtra. The first idea to solve this problem came to him in April 2002 after his participation in the eighth Shodhyatra in Alwar district, Rajasthan. The efforts made by `Tarun Bharat Sangh' to conserve water made him think about his commitment to the future generations. Another inspiring factor was Government's 60x40 check dam scheme, which made him think that if a dam was built at low cost, more dams could be built and more water could be conserved.

Bhanjibhai has built check dam with series of semi-circular bunds on the river Dhrafad flowing through the innovator's village. For constructing the dam he took stones of the size of 11x15 inches and placed the stones in the flowing water keeping a little distance between two stones. Later on this gap was filled up using river sand, stones and cement. The cost for this came up to Rs.10, 000 including the labour cost (then). He constructed this dam without any help from the government agencies. Due to this innovation, the surrounding region has been green for far longer time compared to other years. The wells in the neighbouring regions have also been charged. After this dam was completed, villages requested him to build another check dam downstream. He then build second check dam in collaboration with them. Similar check dams were constructed in many areas of Saurashtra region thereafter.

The Living Root Bridges of Meghalaya - a community developed, community nurtured grassroots innovation

Khasi and Jaintia tribes
Meghalaya

The Living Root Bridges are incredible feats of engineering built by the indigenous people of Meghalaya. The bridges are constructed by pulling and intertwining roots of ficus (*Ficus elastica*) trees growing on both sides of the waterways. Hollowed out betel nut (*Areca catechu*) trunks are used to carry the aerial roots from one side of the river to the other. When they reach the other side, they take root into the soil. The roots are woven and nurtured until they mature and are able to bear the weight of people walking on them. The entire process can take 15 to 25 years to complete and the bridges formed can last for hundreds of years. Some bridges are as long as 100 feet and can take loads of more than 50 people at a time.

BamHum – a bamboo wind musical instrument

Moa Subong
Dimapur, Nagaland

Moa Subong is a musician who has developed *BamHum,* which is a new wind musical instrument made out of a bamboo. The name BamHum is derived from the two

words, bamboo and humming. For playing the BamHum one has to simply hum a tune into the hum hole, which produces a melodic tune. The user can moderate the tone of his/her to get desired musical notes and pitch from the instrument, which takes some practice.

Modified Combine Harvester

Surendra Prasad
Sant Kabir Nagar, Uttar Pradesh

This is a tractor operated modified combine harvester with the provision of collecting chaff. It can be operated using a tractor of 60 hp and above. The combine harvester, has two separate chambers for storing fodder and wheat grains. It cuts stalk of wheat closer to ground to minimise the loss of grains and fodder during harvesting. This machine harvests one acre of standing crop in an hour. The crop storage chamber of the machine can store wheat up to eight quintals whereas six to eight quintals of straw can also be stored.

Improved varieties of *Crossandra spp.* and *Casuarina spp.*

T. Vengadapathy Reddiar
Puducherry

Vengadapathy Reddiar has developed several new varieties of *Casuarina* spp. and *Crossandra spp.* by cross breeding, optimized gamma radiation treatment and subsequent mass selection method. Improved varieties of *Casuarina spp.* MIQ and Modi - 1 have been accepted by many farmers for cropping as they have fast and uniform growth habits. Many varieties of *Crossandra spp.* such as Modi-1 to 3 and Kalam-1 to 3, have unique patterns and colour.

The special features of *Crossandra spp.* developed by him are variation in colour, from dark red to yellow, good shelf life and disease tolerance. In *Casuarina spp.*, high wood yield (200 ton/acre after 5 years) with 90 per cent uniform growth and tolerance to insect pests, are the special features.

Herbal medication for treating anestrous in bovines

Laduben Somabhai Bhambhi
Sabarkantha, Gujarat

Laduben is a traditional knowledge holder who has a lot of herbal medications for treating animal diseases in her repertoire. She has been practicing a herbal medication for treating anestrous, which is a period of sexual inactivity in animals, between two heat periods. During the validation trials, about sixty percent of cows being treated for clinical condition of anoestrus responded in less than seven days whereas forty per cent of buffaloes responded to the medication within six and a half days. The medication, thereby, confirmed its role in the development of follicle. Also, after treatment with the herbal medication, the conception rate among the responded cows was found to be 33 per cent whereas 75 per cent in responded buffaloes.

Improved wheelchair for the physically challenged and silk reeling cum spinning machine

Navajit Bharali
Dhemaji, Assam

Troubled by the tedious process of reeling and spinning, Navajit developed a compact automatic machine, which can efficiently undertake spinning and reeling simultaneously and can process different types of silk including muga silk and eri silk.

Affected by the plight of people with disabilities, Navajit also developed a hands free electronic chair bike, which can be moved by simply shifting the body weight to front, back or sideways while being seated on the chair.

Onion Harvester and Motorcycle Operated Salt Turning Device

Shrawan Kumar Bajya
Sikar, Rajasthan

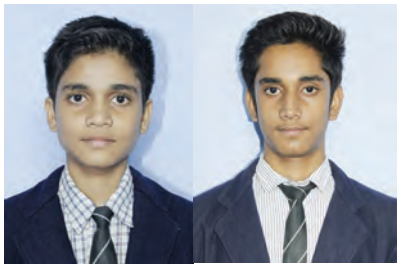
The onion harvester is a tractor front mounted PTO operated machine for cutting leaves/topping and digging the bulbs. The process of leaf cutting is followed by digging the bulbs using the machine. The dug onion bulbs with soil get conveyed along the length of tractor where the soil gets separated due to gap between the slats. The bulbs get collected without damage in the collector box mounted at the rear.

The machine requires a 50 hp tractor with its field capacity varying between 0.15-0.20 ha/h consuming 2-2.5 litre per hour fuel. It is to be noted here that 40 labourers are required to do the same job in one day.

He has also developed a motorcycle operated salt turning device for manual operation in salt for a task, which is done by the workers using their feet (absorbing lot of salt in the process).

Wrapper picker

Pursued so far manually. Diptanshu Malviya and Mukul Malviya
Sirohi, Rajasthan



Mukul and Diptanshu thought about this device when they saw a sweeper picking up waste pouches, pieces of paper, and empty wafer packets littered across a bus station. The machine is very simple, easy to operate and maintain. It is very useful for sanitation workers. It has great potential for diffusion by Municipalities, Town area Committees *etc.* and can help the objectives of the "Swachh Bharat Abhiyaan". NIF has improved this model with the help of designers.

HRMN-99: New apple variety for tropical, sub-tropical and plain areas

Hariman Sharma
Bilaspur, Himachal Pradesh

Hariman Sharma has developed an improved variety of apple that can be successfully grown in plains, tropical and subtropical areas. This variety does not require chilling hours for flowering and fruit setting. The characteristics of this scab disease resistant apple variety include plant height up to 12-15 feet, fruiting after third year of

plantation, flowering in early January and harvesting after six months (June). The ripe fruit color is yellow-red with normal fruit size and sweet in taste. The average yield of a well grown plant (10-12 years old) is about 1.0 quintal/plant.

Herbal medication for curing Ephemeral fever

Sheik Hebazat Hussain

East Champaran, Bihar

Sheik Hebazat Hussain (62), an agriculturist and a herbal healer, has been practicing a novel herbal treatment for curing ephemeral fever in cattle. This is a short term vector borne viral disease characterised by sudden onset of fever, stiffness, lameness and nasal and ocular discharges. During trials it was found that his medication was effective in minimising respiratory distress and lameness on the third day of the clinical infection. The temperature of affected animal was also found to be steady the second day onward after the administration of medication. The medication also restored the average milk yield sixth day onward.

Modified fixture of dozer blade with tractor

Madan Lal Kumawat
Sikar, Rajasthan

Madan Lal has modified the design of fixture/frame of the dozer in tractors, which has resulted in easy repairs, transportation and maneuverability. The modifications include three supports from rear wheel mud guard bolts, tractor chassis and center of front part by attaching a plate. The modification has resulted in no breakage of chassis and easy maneuverability. Further transport from one place to another has become easy due to reduction in width.

Air Sealant/Tyre sealant

K Pandu Ranga Rao
Medak, Telangana

A mechanic by profession, Pandu Ranga Rao has developed a sealant for motorcycle and auto rickshaw tyres to make them puncture resistant. The novelty in his sealant is that it is prepared using rubber powder, mica powder and gum. It helps tyres resist more punctures and works equally good in hot summers and cool winters.

Durga 4- Improved Variety of Carrot

Madan Lal Devada
Jodhpur, Rajasthan

Madan Lal Devada has developed an improved carrot variety through selection method. The carrots are long (up to 60 cm), red in colour with sweet taste, high vitamin

content, long leaves and better shelf life. The long leaves of this carrot variety can be used as green fodder for animals.

A field trial was carried out to test the performance of the variety in farmers' fields where the performance of Durga – 4 (542.5 q/ha) was at par with national check (550.8 q/ha) and far superior than local check varieties. The variety was also found to be free from disease and pest incidence, very sweet in taste with less forked roots. In the biochemical analysis carried out at CALF Lab (National Dairy Development Board, Anand), β-carotene content in Durga 4 was found to be 72.08 mg/kg (dry basis), the iron content at 95.8mg/kg and the vitamin E content was found to be 52.1 IU/kg.

Madhuvan Gajar- Improved Carrot Variety

Vallabhhai Vasrambhai Marvaniya
Junagadh, Gujarat

This is a high yielding, long sized carrot variety, having high carotene content, deep red colour and sweet in taste. The average yield of this Maduvan Gajar is very high (40 – 50 t/ha) and the maximum yield reaches up to 65t/ha under good management practices. Biochemical analysis carried out at CALF Lab (National Dairy Development Board, Anand) showed high β-carotene content at 277.75 mg/kg (dry basis) and high iron content at 276.7 mg/kg. It has also been found to be good for canning and juice purpose.

Herbal medication for the retention of placenta in animals

Shravak Karshanbhai Govindbhai
Banaskantha, Gujarat

Karshanbhai, a farmer, animal care taker and an expert herbal healer, has developed an effective cure for treating retention of placenta, a common health problem affecting cattle.

Retention of Placenta (ROP) is a condition where all or part of the placenta (organ that connects the developing foetus to the uterine wall to allow gaseous, nutrient and faecal matter exchange) is left behind in the uterus after the calf's birth. During the validation trials, the expulsion of placenta in cows was observed to be within 2.43 ± 0.12 hours and within 2.38 ±0.05 hours in case of buffaloes after the administration of the medication.

Groundnut Digger and Disc Harrow Seed Drill

Mansaram Suthar and Malaram Suthar
Churu, Rajasthan

The two brothers, who are engaged in farming and machinery repairs, have developed a light weight groundnut digger with double beaters and a disc harrow based seed drill.

The groundnut digger is a tractor mounted, PTO powered implement, which is lighter with better weight distribution

and has double beaters to reduce load on the engine. The seed drill/seed cum fertilizer drill using a single gang of disc harrow as the furrow opener. They find its performance to be better than cultivator based seed drills.

Robotic Sprayer

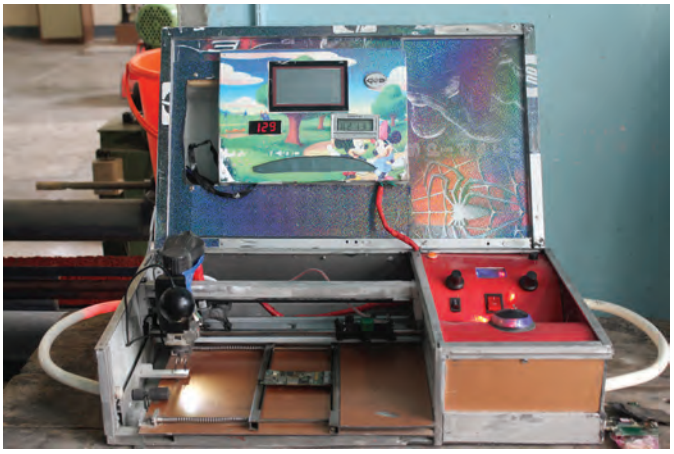
Ganesh Shetty
Chikamangalur, Karnataka

It is an engine operated robotic climber using chain with rubber grippers (like caterpillar legs), which can climb up to height of 50-70 feet and spray pesticide/growth promoter while climbing up an arecanut tree. The device can climb up to 60 feet in approximate seven minutes including setting up time of the device. This device can be controlled through remote within a radius of 200 m and needs two persons for installation.

PCB repairing device for mobiles and others

Mohammad Shafi Ahanger
Anantnag, Jammu and Kashmir

The device is a semi-automatic set-up which has a PCB holding bed movable along Y-axis and a desoldering heat gun attached to a movable X-axis controlled with a joy stick. Camera is attached to the gun to capture the zoomed-in view of the PCB/ICs kept below, which is displayed on the small LCD screen. Tweezers are attached besides the heat gun, which moves down and grips the IC when controlled with a mouse. The X-axis can be locked for proper positioning of the tweezers. It also has a multimeter to show the voltage current and other electrical parameters.



Multipurpose tool - Axe cum chisel cum hammer

Mohd Rafiq Ahanger
Anantnag, Jammu and Kashmir

This is a multipurpose tool, which can be used as an axe, hammer, chisel, blade, screw driver for domestic or other carpentry tasks as per the requirements. This multipurpose device is made from high carbon steel. This tool can replace or combine various tools into a single product rather than having them separately.

Cooking cum drying stove

Maibam Deben Singh
Imphal West, Manipur

This is a wood charcoal fuelled cooking stove with a number of drying trays below the gas top, to dry various food items. The stove is a self-standing one, which also serves as a work place having a work platform at a height of 75 cm from ground and measures around 60 cm x 90 cm. Two cooking stoves have been provided at the

top and a third one for drying purpose at the bottom in the centre. The stove was designed in accordance to the traditional food preference of people of Manipur, Nagaland etc., where they dry various items like fish, meat, certain vegetables etc., for consumption.

Step-lock system in bus

R Santhosh, J Rajasekar, A Nivashini, K Rathna
Tiruvarur, Tamil Nadu

After reading about accidents occurring when people stand at the stairs of the bus or run to catch the bus, the four young school students independently thought of a system in the bus, which would not allow the bus to move if people are standing on its stairs (while getting up or getting down), thereby preventing accidents.

Posture correcting chair

Kulsoom Rizavi, Tarun Anand, Sunvi Agarwal
Lucknow, Ghaziabad, Uttar Pradesh; Chandigarh

The three school students have independently conceived the idea to have a chair with sensors at appropriate places, which will alert the user if s/he is sitting in a wrong posture. They thought that while it may not be possible to be reminded again and again by some third party for not sitting properly, this task can be done by the chair itself. Or there can be a sensor in the computer or TV screen which will go blank when posture is not right, and a message will flash, "pl sit properly, I will not let you see the screen".

***Chingjin Thabi* Selection – Improved cucumber variety**

Sapam Lukhoi Singh
Thoubal, Manipur

Sapam Lukhoi Singh has developed an improved cucumber variety through selection from a local variety *Chingjin Thabi*. The specific characteristics of the variety are high yield, dark green colour, tolerance to leaf curl and long storage life (10-15 days). This variety is suitable for sandy loam soil and sown in March-July. In trials, the farmer's variety *Chengjin Thabi* Selection (25.87 t/ha) was found to be good and high yielding next to *Alimgir CT 380* (30.63 t/ha), a very high yielding variety

from Thailand, which is grown commonly in Manipur. The longest fruit (24.42 cm) was also recorded from *Chengjin Thabi* Selection. The average number of fruits/plant (17), fruit weight/plant (1.08 kg) and yield (25.87 t/ha) of the farmer's variety were also found to be higher than the other three check varieties taken up for the trials

Pandrinath-1: Improved variety of Soybean

Kashinath N. Lokhande Betul, Madhya Pradesh

Soybean Pandrinath-1 is a bi-seasonal variety of 90-95 days with the plants having comprehensive growth habit, more number of pods and uniform bold sized seeds. The variety is tolerant to Yellow Mosaic disease, has high yield of 12-15 q/acre and is suitable for areas having heavy and low rainfall.

The field trials on soybean variety Pandrinath-1 were conducted in Madhya Pradesh, Gujarat and Karnataka where it was found to be early maturing, having high yield and a disease free performance.

Niranjan Bhata: Improved traditional variety of Brinjal

Leela Ram Sahu Dhamtari, Chhattisgarh

Leela Ram Sahu has improved and conserved a good quality traditional brinjal variety and has been maintaining its purity by mass selection. The Niranjan Bhata variety has long sweet purple fruit with spine on stem and calyx. The number of fruits per plant is more than other commonly available varieties. The variety is resistant to major diseases and pests. The report received from Department of Vegetable Science, Indira Gandhi Krishi Vishwavidyalaya (IGKV) Raipur, Chhattisgarh during 2016-2017 confirmed that the variety Niranjan Bhata possesses longer (45-60 cm) and good quality fruits with lower instance of insect pest & disease. They also mentioned that it is a valuable traditional cultivar for research purpose.

Improved varieties of Anthurium and its planting method

D. Vasini Bai Thiruvananthapuram, Kerala

Vasini Bai has developed ten varieties of *Anthurium* by cross pollination. Large and medium flowers with rare color combination (light and dark orange, magenta, green and rose color combination, dark red and white colors) are uniqueness of these varieties. The salient features of all the varieties are large beautiful flowers, different colors of spathe and spandex, long stalks and longer s helf life.

Herbal medication for treating bloat in animals

Sitanath Munda Ranchi, Jharkhand

Sitanath Munda (48) is an agriculturist who is also quite known for providing herbal treatments for various human and animal related ailments. His herbal practice for bloat, a condition where excessive gas gets accumulated in stomach, has been found to be novel and promising. During the trials, the medication was found effective by improvising digestive function of rumen in livestock.

Gandhian Young Technological Innovation (GYTI) Awards, 2017

Dr. R. A. Mashelkar, Chairperson, NIF and the Chair of the Advisory Committee of AASTIIK and SRISTI, chaired the award function and inspired students along with Dr. K. Vijay Raghavan, Secretary, DBT, Dr. Anil Sahasrabuddhe, Chairman, AICTE, Dr. Renu Swarup, MD, BIRAC. Guest of Honour Dr. Francis Gurry, Director General, WIPO, Geneva gave away the awards and also shared his vision about what makes some nations great in innovation race while others get left behind. SRISTI and HBN appreciate the efforts of hundreds of faculty members in India and abroad, executives from leading tech companies for reviewing 2,715 nominations from 308 Institutions & Universities, from 27 states & two Union Territories, India in 54 different subject disciplines. This time 22 innovations were selected for award and another 17 for appreciation.

White Light Emission from Vegetable Extracts

Dr. Vikram Singh
Guide: Prof. Ashok Kumar Mishra
Indian Institute of Technology, Madras

White light emission (WLE) is generated from natural dyes extracted in the laboratory using a green and simple procedure. The colour temperature of the WLE is conveniently tunable by simply adjusting the concentrations of the component emitters. The primary emitting pigments responsible for contributing to WLE are polyphenols and anthocyanins from pomegranate, and curcumin from turmeric. WLE from such cheap and nature friendly resources could be important in the context of lighting and sensing application. It would be interesting to see if such a system can be used as dyes for tunable dye laser applications. WLE biomaterials with ease of adjusting colour temperature, which will obviate more expensive alternatives currently being pursued.

http://gyti.techpedia.in/project-detail/white-light-emission-from-vegetable-extracts/7414

A Virtual Reality (VR)-based Immersive Simulator for Endoscopy Training

Shanthanu Chakravarthy
Guide: Prof. G. K. Ananthasures
Indian Institute of Science, Bengaluru

Virtual Reality (VR) together with haptics offers an immersive and flexible platform for training doctors in medical procedures. In this project, a VR-based endoscopy simulator together with the force-feedback system is developed.

Endoscopy is minimally invasive and is used as an important diagnostic tool to detect abnormal tissues, ulcers, tumours, polyps, cancers, etc., Gastrointestinal (GI) endoscopy, including colonoscopy, is a complex procedure involving a high degree of hand-eye coordination. These procedures are generally carried out by highly skilled clinicians. In order to practice endoscopy safely, a training system that does not involve patients is deemed important. VR-based training system developed in this work has many advantages. The endoscopy simulator developed in this project has the potential for extension to other interventional procedures such as colonoscopy, bronchoscopy, and endovascular training.

http://gyti.techpedia.in/project-detail/a-novel-virtual-reality-vr-based-immersive-simulator-for-endoscopy/7710

Rotary Ultrasonic Bone Drilling

Dr. Vishal Gupta
Guide: Prof. Pulak Mohan Pandey
Indian Institute of Technology, Delhi

There is always a necessity to minimise the magnitude of drilling force and torque during the bone drilling process. To minimise the rise in temperature, force and torque during surgical bone drilling process for more efficient and successful orthopaedic and trauma surgery, a novel bone drilling technique i.e., rotary ultrasonic bone drilling named as RUBD has been successfully developed. It also minimizes micro-cracks during bone drilling. It was also found that RUBD generated a much lower temperature, force and torque as compared to the CSBD.

http://gyti.techpedia.in/project-detail/rotary-ultrasonic-bone-drilling/7768

A Novel Hybrid System For Textile Dye Waste Water Treatment

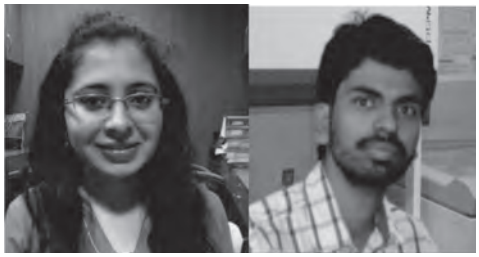
Bhaskar Bethi
Guide: Dr. Shirish Hari Sonawane
National Institute of Technology, Warangal

Ultrasonic irradiation is used to initiate the emulsion polymerisation to form hydro-gel through the generation of free radicals as well as the uniform distribution of clay across the hydro gel polymer matrix. These are a new class of composite materials, which combine elasticity and permeability of the gels with high ability of the clays to adsorb different substances. The developed hybrid system for the treatment of dye waste water can be easily scaled up to industrial scale for the treatment of bulk volume of textile wastewater. This innovative technology mainly involves unique feature of both the degradation and subsequent absorption of dye organic pollutants from the waste water in a single set of unit.

http://gyti.techpedia.in/project-detail/novel-hybrid-system-for-textile-dye-wastewater-treatment/7871

Dual Functional Characteristics of *Escherichia Coli* Outer Membrane Protein Wzi And Its Implications In The Design Of Novel Antibiotics

Shivangi Sachdeva, Narendar Kolimi
Guide: Dr Thenmalarchelvi Rathinavelan
Indian Institute of Technology, Hyderabad



The emergence of multidrug resistance in bacteria is a major cause of infection and mortality worldwide. In Gram-negative bacteria, polysaccharide layers are one of the major virulent determinants that are involved in the evasion of host immune response as well as offers impermeability to antibiotics. Thus, inhibiting the capsular polysaccharide (CPS) biogenesis or surface exportation or its attachment to the bacterial surface may be an attractive strategy to generate a virulent Gram-negative bacterial strain. Here, the focus is on multidrug resistant Gram-negative *Escherichia coli*, which is a common cause for urinary tract infections (including infections in the kidney), bloodstream infection, intra-abdominal infections such as peritonitis, skin and soft tissue infections, neonatal meningitis, diarrhoea and food borne infections. The dual functional role of Wzi was not realised earlier due to the occluded pore, a property that can be used to treat *E. coli* infections.

http://gyti.techpedia.in/project-detail/revealed-dual-functional-characteristics-of-escherichia-coli-outer-membrane-protein/7923

Targeted Theranostic Nanomedicines For Brain Cancer Therapy

Sonali Singh Doharey, Rahul Pratap Singh, Poornima Agrawal
Guide: Dr. M. S. Muthu, Prof. B. L. Pandey
Banaras Hindu University, Varanasi

Chemotherapy is the most common method for the treatment of different types of brain cancers. Unfortunately, the diagnosis

and therapy of brain cancer are very unsatisfactory because of the existence of the blood-brain barrier (BBB), which excludes more than 98% of small molecules and almost 100% of large molecules. Another obstacle in cancer therapy is to maintain the desired concentration of therapeutic agents and/or diagnostic agents at tumor site.

The innovators demonstrated that RGD or transferring TPGS decorated theranostic liposomes were highly effective in delivering desired concentration of therapeutic agents and diagnostic agents across BBB without any signs of brain damage or oedema in brain histopathology. These advanced platforms can diagnose brain cancer at early stages, initiate first-line therapy, monitor it, and if needed, rapidly start subsequent treatments. In future, brain theranostics will be able to provide personalized treatment which can make brain cancer even curable or at least treatable at the earliest stage.

http://gyti.techpedia.in/project-detail/targeted-theranostic-nanomedicines-for-brain-cancer-therapy/8327

Blood Quality Assessment using Digital Holographic Microscopy

Mandeep Singh, Azhar Muneer
Guide: Dr. Kedar Khare and Dr. Sarita Ahlawat
Indian Institute of Technology, Delhi

The stored blood in blood banks is used regularly in surgical procedures or transfusions. Current blood quality assessment protocols involve a number of chemical assays or impedance measurements making the process cumbersome and difficult to standardise. A superior DHM technology for accurate high resolution 3D imaging of biological cells for blood cell classification and quality assessments been developed. DHM operates on the principle of interference of light and can provide accurate information regarding minute refractive index changes in the cells that are ultimately related to cellular changes in response to ageing, physical cell damage or infections. Using the novel 3D imaging capability of this prototype system has indicated that fresh and old red blood cells have clearly distinguishable morphological features.

http://gyti.techpedia.in/project-detail/blood-quality-assessment-using-digital-holographic-microscopy/8332

STERI-FREEZ: Flash Freeze Sterilisation

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Guide: Prof. Padma V. Devarajan

Surgical site infections are one of the most common complications associated with surgery, with reported incidence rates of 2-20%. About one-third of surgical patients get infected in developing countries, of the various causes, the use of contaminated medical instruments that have not been properly cleaned and sterilised. STERI-FREEZ provides a simple on-site technology, which provides a ready to use, economic yet effective solution to the existing lacunae. This portable, cold sterilisation device comprises an insulator box housing a metallic vessel covered with a lid containing a green cryogenic biocidal mixture or Flash Freeze Elixir (FFE). Sterilisation is achieved using a combination of biocides acting at subzero temperatures (-70 degree Celsius). Surgical instruments to be sterilized are kept immersed in FFE and removed just prior to use without leaving any toxic residue on the surfaces. Conventional methods of medical sterilisation (autoclave, hot air, chemical and gaseous sterilisation) require energy intensive instruments and long processing time while alternative sterilisation techniques (Boiling in water) are not considered effective enough.

http://gyti.techpedia.in/project-detail/steri-freez-flash-freeze-sterilization/8374

Prophylactic Transdermal Patch Against Neurotoxin Poisoning In Biological Warfare Situations

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Guide: Dr. Pronobesh Chattopadhyay, Dr. Animesh Ghosh
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Drug-in-adhesive matrix type combinational prophylactic transdermal patch has been developed. It includes eserine and pralidoxime chloride (PAM) against acetyl choline agonist (±)-anatoxin a neurotoxin poisoning. Initially, a simple RP-HPLC method was developed and validated for

the simultaneous determination and quantification of eserine and 2-PAM using UV detection. The method was validated as per ICH guidelines for validation of analytical procedures, and was applied for the routine analysis of these two drugs in fabricated transdermal patches. From safety point of view, the optimised transdermal patch was safe for application to the skin with no dermal and mutagenic toxicity as well. Pharmacodynamic study proved that it was effective against acetyl choline agonist(±)-anatoxin a neurotoxin poisoning. While pharmacokinetic study revealed that the systemic absorption of the drugs from the fabricated best optimised patch through the skin was sufficient enough to achieve pharmacodynamic efficacy

http://gyti.techpedia.in/project-detail/prophylactic-transdermal-patch-against-neurotoxin-poisoning-in-biological-warfare-situations/8446

Low Cost and Field-Portable Smartphone Platform Water Testing Kit for Detection and Analysis of Contaminants in Drinking Water

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Guide: Dr. PabitraNath

Tezpur University, Tezpur

More than three core household are using drinking water contaminated with excess iron, followed by fluoride, salinity and nitrate. Most of the detection methods for water contamination are confined to laboratory due to time-consuming measurement procedure and the use of bulky instruments such as spectrophotometer in colorimetric tests.

In the present invention, the smartphone is converted into a laboratory grade low-cost, robust and field portable water quality monitoring kit to detect and quantify water contaminants such as fluoride, turbidity and salinity. Using the same kit, all the colour based water quality monitoring can be possible. The illumination sensor or ambient light sensor (ALS) of the smartphone is used as a detector and its optical led flash is used as a light source to convert the smartphone in to a photometric sensor for its utilisation in water quality monitoring.

http://gyti.techpedia.in/project-detail/low-cost-and-field-portable-smartphone-platform-water-testing-kit/8576

Near Infrared Fluorescence Probes for Diagnosis of Alzheimer's disease

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Guide: Prof. T. Govindaraju
Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru

Selective detection and staining of toxic amyloid beta (Aβ) plaques found in the Alzheimer's disease (AD) brain is crucial for clinical diagnosis and monitoring of the disease progress. Herein, a coumarin-quinoline (CQ) conjugate-based molecular rotor type, turn-on near-infrared (NIR) fluorescence probe for selective and specific detection of Aβ fibrillar aggregates is designed. Remarkably, CQ unambiguously stains Aβ plaques in human brain tissue over its co-existing Tau aggregates, neurofibrillary tangles (NFTs), which are strongly associated in AD and in various tauopathies. This is a highly desirable attribute to distinguish AD from disease conditions caused by Tau pathology.

http://gyti.techpedia.in/project-detail/near-infrared-fluorescence-probes-for-diagnosis-of-alzheimer-s-disease/8577

Low-Cost Automated Handheld Melamine Detection Device (for Testing Melamine in Milk)

Dhiraj Indana, S.C.G. Kiruba Daniel, Varun S, Prateek Katare
Guide: Dr. Sai Siva Gorthi
Indian Institute of Science, Bangalore

Even though a number of kits and devices are available for detecting common milk adulterants like urea, boric acid, water, sugar and detergents, there is hardly any portable device available for the detection of melamine. Currently, bulky instruments like Gas Chromatography (GC), HPLC, GC-MS and LC-MS are used

for detecting melamine. These costs approximately 25 to 50 lakh rupees, besides skilled personnel for operation. A fully automated handheld device to detect melamine from milk with integrated milk pre-processing step using chemical dried cotton is developed. Melamine is finally detected through interference in silver nano particle formation. Both the pre-processing and detection steps are innovative and patented. The cost of the device may be few thousand rupees. This device fulfils the goal of taking melamine sensing to every household so as to save people from melamine adulteration.

http://gyti.techpedia.in/project-detail/low-cost-automated-handheld-melamine-detection-device-for-testing-melamine/9171

NeuroBuds: Brain Wave Mapping Smart Earphones for Rural India

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Cochin University of Science & Technology, Cochin

An average human brain consists of over 80 billion neurons. These communicate with each other by sending short ionic impulses, which in turn creates small voltage fluctuations around the proximity of brain. By placing highly sensitive sensors, these fluctuations can be used to understand the brain activity. NeuroBuds is a pair of smart earphones that have these specially fabricated sensors embedded into it to understand the brain activity of user. The brain data is analysed to look for anomalies in pattern that indicate brain disorders like epileptic seizures. This kind of early detection helps in doing pre-emptive action and sending out alerts. The brain wave data is also used to analyse the mental state of the user, their concentration levels and stress levels. At a time when lot of people suffer from stress related issues and sleeping disorders due to a fast-paced lifestyle, NeuroBuds can be used as a mental health monitor. Once the application has enough data coming in from different users, it can recognize patterns and optimise algorithms on its own using the underlying neural network. NeuroBuds serves as the perfect link between the user and the smartphone to monitor other body vitals including heartbeat.

http://gyti.techpedia.in/project-detail/neurobuds-brain-wave-mapping-smart-earphones/9228

Affordable and Rapid Paper-based Test Kits for Antimicrobial Susceptibility Assays

Shantimoy Kar, arun Agarwal, Shubhanath, Behera, Varun Varma
Guide: Dr. Suman Chakraborty, Prof. Tapas K. Maiti
Indian Institute of Technology, Kharagpur

Increasing drug resistance of the pathogenic microbes is a global threat to the human mortality. To meet this challenge, there is a need to develop a rapid antimicrobial susceptibility testing platform. The current techniques are time consuming, labour intensive, require sophisticated infrastructure and skilled personnel. This collectively increases the overall cost of the diagnosis. A simple paper based microfluidics platform for easy and rapid execution of antimicrobial susceptibility assays is developed. The device consists of a paper-based platform which includes four different layers: a base layer, a bacterial suspension layer, a drug layer and a top layer containing a chromogenic substrate which changes color in accordance to the bacterial metabolic activities. The developed technology provides faster detection (~ 5-6 h) and multiplexing (upto 8 different samples could be analyzed) in comparison to the gold-standard stereotype laboratory

practices. Moreover, portable nature and ease of fabrication method collectively make it more convenient for functioning at resource limited settings.

http://gyti.techpedia.in/project-detail/affordable-and-rapid-paper-based-test-kits-for-antimicrobial-susceptibility/9277

Portable Biosensing Platform Based on Conducting Polymer Decorated Optical Fiber for Bacteria as well as Heavy Metal Sensing in Tap Water

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Guide: Prof. Soumyo Mukherji
Indian Institutes of Technology, Bombay

The presence of water borne bacteria and heavy metals in tap water could be a potential human health risk. A common

platform is developed for detection of water contaminants (bacteria and heavy metals) in tap water. The primary sensing mechanism is based on change of optical properties of polyaniline (conducting polymer) due to the binding of water contaminants on the polyaniline coated fibre-optic sensor probe. As a proof of concept, it is demonstrated that as low as 20-60 cfu/ml concentrations of E. coli and 1 picomolar concentration of lead ions are detectable using this system. The deliverable will be a marketable prototype of an optical fibre sensor integrated with micro-controller unit. The novelty lies in the alteration of optical properties of polyaniline and its utilisation for water contaminants sensing.

http://gyti.techpedia.in/project-detail/portable-biosensing-platform-based-on-conducting-polymer-decorated-optical-fiber/9640

Affordable detection kit for Cervical Cancer

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Guide: Dr. Aravind Kumar Rengan
Indian Institute of Technology, Hyderabad

Cervical cancer is treatable, if diagnosed early. The screening/ diagnostic procedures available are time-consuming and explorative. A technique has been developed to quantify the acetic acid used for protein coagulation. This is responsible for the aceto-white patches in VIA (Visual Inspection with Acetic acid, a conventional screening procedure for detection of cervical cancer/Cervical intraepithelial neoplasia (CIN)). The percentage of acetic acid is quantified; such that various percentages would result in various colors. This will help to identify the presence of cervical cancer/CIN without naked eye observation as required in VIA. This technique will be embedded into a paper/strip based device which can be initially used as an assistive technique but has the capability to emerge as self-screening tool.

http://gyti.techpedia.in/project-detail/affordable-kit-for-cervical-cancer-detection/9682

Non-invasive, Point-of-care Diagnostic System for Early Detection of Oral Cancer using Digital Infrared Thermal Imaging

Manashi Chakraborty, Dr. Santanu Patsa, Dr. Nishat Anjum
Guide: Dr. Sudipa Mukhopadhyay, Prof. Swapna Banerjee, Dr. Sourav Mukhopadhyay, Prof. Jay Gopal Ray, Indian Institute of Technology, Kharagpur

This project is the pioneering attempt to develop a non-invasive, non-ionizing, radiation hazard free, point-of-care computer aided diagnostic framework for oral cancer detection using machine intelligence and Digital Infrared Thermal Imaging (DITI). Oral cancer is the most common cancer in India where approximately 14 people die/hour.

Due to abnormal metabolic activities in carcinogenic facial regions, heat signatures of patients are different from that of normal subjects. Asymmetry of temperature distribution was compared between facial regions (opposite sides of frontal image and between left and right profile images) for patients and normal subjects. The analysis suggested that patients manifest greater asymmetry compared to normal subjects. This project requires only a one-time investment of a long infrared thermal camera, image processing and machine learning software and a laptop/workstation. Also, DITI has no recurring or maintenance cost. It provides on-the-spot oral-cancer screening facility and is portable.

http://gyti.techpedia.in/project-detail/non-invasive-point-of-care-diagnostic-system-for-early-detection/9929

Navyo - The Smart Glove

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Guide: Dr. Vikas Rastogi
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To enable a blind person to navigate his way, a smart glove is designed to help her to reach the destination via vibrations.

Navyo is accompanied by a mobile app, interface of which is simple and easy to use. User simply needs to speak out the destination in app. Navyo then connects to the app via Bluetooth and the person is ready to go. As per the map, when the left turn approaches, the frequency of vibration also starts increasing in left portion of hand indicating left turn and stops when turn is taken. This way by following different vibration patterns at different manoeuvre points

(i.e. right turn, overhead bridges, underpass etc.,) destination can be reached out easily. In case, user has missed out any vibration instruction on glove, then it can be repeated by simply pressing a button on Navyo.

The solution is based on haptic feedback technology which is safe and non-distractive from blind person's point of view. Also, this solution provides the hassle-free way for navigation by allowing user to speak the destination and walk with mobile phone inside pocket/purse etc

http://gyti.techpedia.in/project-detail/navyo-the-smart-glove/7617

A Novel Bio-engineering Approach to Generate an Eminent Surface Functionalized Template for the Selective Detection of Female Sex Pheromone of Certain Agriculturally Hazardous pests

Dr. Parikshit Moitra, Dr. Deepa Bhagat
Guide: Prof. Santanu Bhattacharya
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For bio-control of pests, silicon dioxide or zinc oxide based MEMS devices are covalently functionalized for robust and efficient optical sensing of the female sex pheromones of the pests like *Helicoverpa armigera*, *Scirpophaga incertulas* and *Bactocera oleae* for the first time in literature. The functionalised devices are also capable of selectively measuring the concentration of this pheromone at the femtogram level which is much below the concentration of pheromone found at the time of pest infestation in an agricultural field.

Selective and reversible sensing of female sex pheromones of certain hazardous pests is a novel contribution. It may be efficiently and economically used in agricultural field to determine the stage of prior pest infestation.

http://gyti.techpedia.in/project-detail/a-novel-bio-engineering-approach-to-generate-an-eminent-surface/8579

ANUBHAV – An Efficient Writing Tool for Visually Impaired

Sachin. N. P, Vimal. C
Guide: Prof. Shantanu Bhattacharya
Indian Institute of Technology, Kanpur

Currently several tools are available in the market which help people with visual disability to perform everyday functions like read, write, navigate, have food, use ATM etc. The writing tools that are available today do not allow the users to write from left to right which seems natural. It has to written backwards and the paper has to be reversed to read the written text. As a consequence of this, they are unable to read what they have just written effectively. This makes mathematical operations a difficult task as they will have to remember too many numbers and positions. A Taylor slate attempts to solve this problem but requires the user to learn a whole new device and is still slow in its operation.

This project solves the problems of writing and performing mathematical operations in a single device, which uses the same technique which visually impaired people have learnt for writing in an affordable and user friendly package.

http://gyti.techpedia.in/project-detail/anubhav-an-efficient-writing-tool-for-visually-impaired/9158

Indigenous Technology of Soft Body Armour for Defence Applications Using 3D Woven Aramid Fabrics

Animesh Laha
Guide: Dr. Abhijit Majumdar
Indian Institute of Technology, Delhi

Soft body armours are developed by using multiple layers of high performance fabrics. Generally, 30-40 layers of 2D fabrics woven aramid fabrics (Kevlar, Technora etc.) or ultrahigh molecular weight polyethylene (UHMWPE) sheets are assembled together to make soft armour panel which becomes heavy and inflexible. In this innovation, two approaches have been amalgamated to reduce the weight of body armour. 3D fabrics, in which yarns are arranged in three perpendicular directions, namely X, Y and Z were produced in the laboratory. 3D fabrics were then treated with shear thickening fluid (STF). STF treated 3D fabric prototypes developed in this research have been tested against 9 × 19 mm bullets (430 m/s). Soft armour panel having STF treated 3D fabrics stopped bullets fired at 430 m/s. The areal density of the panels was 4500 g/m square.

http://gyti.techpedia.in/project-detail/indigenous-technology-of-soft-body-armour-for-defence-applications-using/10137

Swayam- Passively Stabilised Communication Satellite

COEP Satellite Initiative
College of Engineering, Pune

Swayam is a pico-satellite developed by undergraduate students of College of Engineering, Pune. It is a passively stabilized communication satellite of dimensions 10 X 10 X 11.35 cm and mass 990 g. ISRO launched it on 22nd June, 2016 by PSLV-C34. Swayam is currently in-orbit and data is being downlinked at COEP ground station and analysed on a regular basis.

Student satellites offer a distinct challenge in terms of reliability and interdisciplinary nature of design. To achieve the highest standards of design and fabrication, the project was organised into five constituent subsystems. Altitude control is achieved by a passive magnetic attitude control system to satisfy the space and energy constraints.

Swayam has a half-duplex communication subsystem. Beam of the antenna is optimised to offer maximum communication link time in conjunction with the available pointing accuracy. To satisfy the power budget of the satellite, the autonomously sent beacon is sent at lesser power than the digital payload data. Swayam is also an experiment which shows the cohesive application of passive stabilisation for a communication satellite in low power environment.

http://gyti.techpedia.in/project-detail/swayam-passively-stabilized-communication-satellite/9178

Swayam team

Glimpses of permanent exhibition of Grassroots Innovation, Nawachar-2 at Rashtrapati Bhavan, New Delhi

The Honey Bee Network team thanks all its readers, subscribers, collaborators and well-wishers for their support over the past 28 years. If you wish to contribute in any of our missions, please write to us at *info@sristi.org*

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