



*Editor's Desk*

## Happy New Year 2020!!

It was yet another eventful year for us as we could have a physical footprint in the land of United States of America (USA). Our Ph. D. student, Mr. Suraj Bhat, presented a paper in The IEEE sponsored Conference in Seattle, USA on the Finite Element Analysis of a Palki (palanquin) used for carrying devotees to the temple of Kedarnath (Uttarakhand). The research carried out by Suraj clearly demonstrated how at RuTAG IIT Delhi we “Researchize” rural problems. I am confident that such examples demonstrated by us at different RuTAG Centres will set a tone for the country, and possibility for the Globe as well, to pick up research topics from the issue related to base of pyramid of our society. I personally find such research topics extremely exciting and stimulating as they were not often touched by anyone else earlier. Making them research friendly, i.e., to map the real life issues with the research terminologies taught in our academic courses gives us the “Joy of Creation” Hence, my appeal to the readers is to experience the “Researchizing Rural Problems” (one of my favourite slogans).

**Prof. Subir Kumar Saha**

*Chairman's Column*

## For Moving Towards Sustainability, the Focus must shift to Rural

Presently, we are passing through a strange paradox, on the one hand, there is increasing anxiety and concern about sustainability, while simultaneously, there is increasing thrust towards urbanization towards bigger and bigger cities. The mainstream technology R&D also tends to cater to large scale urbanization towards “smart cities.” But is it very difficult to understand that “mega-cities” can never, never be sustainable?

Presently, these cities are being pumped heavily with non-renewable energy and material resources, and yet we are witnessing increasing difficulty in sustaining these. The quality of life, the environmental conditions and the social fabric are degenerating. Such a thrust towards urbanization has endangered heavy migration and has also rendered the rural sector rather “unliveable.”

This trend has to change if we are really serious about sustainability. The research focus should also shift towards developing technologies and systems, enabling small communities living in harmony with nature, using largely renewable, local, natural resources. Mahatma Gandhi had strongly hinted towards this, as he advocated “Gram Swaraj” more than a century ago, foreseeing the disastrous consequences of heavy centralized industrial and urban development.

For production by masses, the industrial activity also should shift to small-scale, family-centric rural industries providing widespread employment opportunities.

We, as researchers and technology developers need to develop a holistic vision towards development and shift our focus in this direction before it becomes too late. Only the “rural” has the potential to become sustainable, let us work towards realizing this potential with full utilization of Science, and Technology with wisdom. There is no other way!

**Prof. R. R. Gaur**



Figure 1: Prof. Sangeeta Kohli giving certificate to winner of RuTAG IIT Delhi Technohunt



Figure 2: RuTAG IIT Delhi Team at CSWRI, Avikanagar, Rajasthan for demonstration of its Sheep Shearing Machine



Figure 3: Prof. V. Ramgopal Rao, Director, IIT Delhi visiting RuTAG IITD stall during Industry Day 2019



Figure 4(a): Bhilawa Fruit



Figure 4(b): Traditional method of decortication



Figure 4(c): Decortication machine developed by TATA Centre of Technology and Design, IIT Bombay



Figures 5 (a) and (b): Traditional method of making Batasha; and Improved structure for making Batasha



Figure 6(a): Stone carvers using hand tools for the carving



Figure 6(b): A Glove Box setup for the carvers to prevent direct exposure to dust

### 1. Improvement in Bhilawa Seed Decortication Process

**P.I. – Dr. Vinay Gupta, IEC, Greater Noida, Co. P.I. - Dr. Mukesh Kumar, IEC Greater Noida**

**Collaborating NGO – *KARuNaH Society for Development, Betul (MP).***

*Semecarpus anacardium* (also known as Bhilawa in Hindi) is a plant whose seeds are mainly used as medicines. It is used to cure many diseases. Sanjivani Vati and Sanivani Gutika are few market products made using Bhilawa [Figure 4(a)]. Without purification it is poisonous along with its medicinal properties, and the oil from seeds can give blisters and painful wounds. Traditionally, in decortication process the shell is broken with the help of a small metal rod or stone while holding the seed with other hand [Figure 4(b)]. During this process the hands and some of the body parts come in contact with the oil which splashes while hitting the seed. Since the oil of the seed is toxic in nature it burns the skin wherever it splashes on the body. Few years back TATA Centre of Technology and Design, IIT Bombay designed and developed a machine [Figure 4(c)] for de-shelling the seeds of Bhilawa. This machine also requires one hand for holding the seed during the decortication process which can damage fingers shoddily. Therefore, primary objective of the project will be to develop a machine tool to have absolute hand free experience while breaking the shells of the fruit keeping other required safety measures.

### 2. Improvement in the Batasha Making Process (Phase-II)

**P.I. – Dr. Vinay Gupta, IEC, Greater Noida, Co. P.I. - Mr. Nurul Hassan Laskar, IEC, Greater Noida**

**Collaborating NGO – *Lupin Human Welfare & Research Foundation, Bharatpur, Rajasthan.***

Batasha is prepared by making a mixture of water, sugar, milk, citric acid, retha and hydro-sulphite in appropriate amount. This mixture is heated in a pan called Dhaura upto the temperature of 100°-110° centigrade. The Batasha making process is tiring and unhygienic. To eradicate the same, a setup was designed and built as shown in Figures 5(a) and (b) during the first phase of this project. The setup is a three-rack arrangement which is slidable over the channels, and one can adjust the height of the setup as per the user’s requirement. Also, it is modular in nature. A person can sit comfortably on the chair and make Batasha. The setup takes care of both the issue of drudgery and hygiene. However, to make the setup more user friendly and as per the feedback of the artisans the furnace used to heat Batasha solution is also to be lifted to the level of sitting person along with some changes to improve stability and life of the setup. In Phase-II of the project more suitable material will be selected for rack plate, and some design modification related to assembly and stability will be done.

### 3. Prevention of Stone Dust Inhalation for Stone Carvers at Bharatpur, Rajasthan

**P.I. – Dr. Debabrata Dasgupta, Dept. of Mech. Engg., IIT Delhi, Co-P.I. – Dr. Bahni ray, Dept. of Mech. Engg., IIT Delhi**

**Collaborating NGO – *Lupin Human Welfare & Research Foundation, Bharatpur, Rajasthan, and Daang Vikas Sansthan, Karauli.***

Inhalation of stone dust is a common and severe problem faced by labourers working in stone quarry and stone crushing units [Figure 6(a)]. The silica traces present in the stones, if inhaled, can cause a respiratory ailment known as ‘Silicosis’. The disease in its severe form can be fatal and there is no known cure for silicosis till date. Artisans use both manual and mechanized way to carve the stones based on the applications. Particulate measurement devices reported abnormally high amount of particulate matter concentration in the working environment. Use of water to suppress the dust is not feasible due to severe water shortage. P1 Masks are provided by the contractor. Proper maintenance and utilization of the mask is not done. Labourers prefer thinner mask since the current mask is bulky and restrictive. Based on the socio-economic study, technical solutions are being developed [Figure 6(b)] that can prevent the inhalation of stone dust by the artisans. This may include dust suppression at source, low cost masks, controlled environments, etc. based on the technical and economic feasibility.



(a)



Figures 7 (a) and (b):  
Pomegranate Seed Extraction  
Machine developed by RuTAG  
IIT Roorkee

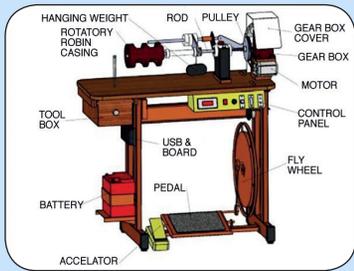


Figure 8(a): CAD Model of  
Modified Bageshwari Wool  
Charkha



Figure 8(b): Modified Bageshwari  
Wool Charkha by RuTAG IIT  
Roorkee



Figure 9: De-husking Machine

#### 4. Pomegranate Seeds Extraction Machine

**P.I. – Prof. R. P. Saini, Dept. of Hydro and Renewable Energy, IIT Roorkee**

**Collaborating NGO – *Pravatiya Jan Shiksha Evam Vikas Sansthan, Sirmour, Himachal Pradesh***

Pomegranate grows in lower and middle altitudes in the state of Himachal Pradesh and Uttarakhand. The pomegranate crop (wild as well as cultivated) ripens in the month of September. Seeds from wild variety of Pomegranate are used for making ‘Anardana’ which is used in culinary. There is ready market for ‘Anardana’, and it is a good source of income for local community. Dried peels are sold for making vegetable dyes. Fresh pomegranate seeds can also be used for making vinegar. Presently, local people collect fruits, extract seeds and dry seeds as well as peels in shade using conventional method which involves cutting the fruit by knife into pieces and then separate the seeds by domestic motorized machine at small scale. A major problem in domestic machine is that some grains are trapped in the machine. Also, the quality of extract seeds and efficiency of machine is very poor. The machine also takes longer time to extract seed, and process of separation is very tedious and time consuming. In order to improve the efficiency of the processing unit for local communities, an attempt has been made by RuTAG, IIT Roorkee to introduce a new technology [Figures 7(a) and (b)] to pomegranate processing to enhance local income for rural occupational groups (farmers, landless poor traders) and for providing new avenues of livelihoods to the rural communities.

#### 5. Modified Bageshwari Wool Charkha

**P.I. – Prof. R. P. Saini, Dept. of Hydro and Renewable Energy, IIT Roorkee**

**Collaborating NGO – *Himalaya Trust, Bageshwar, Uttarakhand***

Spinning Wool by drop spindle or spinning wheel has been a traditional occupation in the Himalayan region. A spinner normally spins nearly 70 grams of 8 count woolen yarn in 8 hours by using the traditional charkha. Manual spinning is not attractive option these days as the production is low. Moreover, hand spinning of wool is laborious and time consuming. To promote higher earnings, RuTAG at IIT Roorkee initiated improvement in spinning wheel [Figures 8(a) and (b)] to reduce the drudgery in spinning and improve the productivity. The charkha has facilities to be operated by Solar PV system with speed control mechanism while its foot paddle mechanism has been retained. The manually operated charkha has been fully automated by introducing foot operated speed controller, electric motor connected to solar panel, battery power, generator, foot paddle operated, USB Socket for charging, modified flyer, and a crank for lateral motion of the bobbin. A spinner can spin about 250 grams of 8 count wool by this modification. The production rate is improved, and high-quality thread is produced using the automated charkha. Moreover, knob control for spinning coarse and fine quality yarn, USB socket for light, battery backup, light weight structure and its components can be easily assembled and disassembled for transportation to remote areas.

#### 6. Modifying Design of De-husking Machine for Minor Millets in Maharashtra

**P.I. – Prof. Anand B. Rao, CTARA, IIT Bombay**

**Collaborating NGO – *Shashwat, Junnar, Pune***

The project focuses on generating livelihood opportunities for tribals in Dimbhe dam area. The project is aimed at helping the tribals in generating livelihood opportunities with the help of a de-husking machine for a minor millet (Warai) growing in that area. The project was inspired from De-husking Machine designed by an NGO, Madhya Pradesh Vigyan Sabha (MPVS), Bhopal. RuTAG IIT Bombay proposes to make suitable modifications to the existing machine (Figure 9) and make it suitable for dehusking Warai, Nachani, and Kangi which are minor millets growing in Maharashtra.



Figures 10(a): Clay Emitters



Figures 10(b): Clay emitters connected with the help of rubber tube

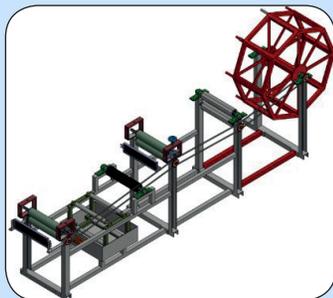


Figure 11: CAD model of modified Street Sizing System for Handloom Cluster



Figure 12 (a): Modified Tulsi Mala Making Device



Figure 12 (b): Modified Tulsi Mala Making Device in action

### 8. Designing a Tool for Efficiently Manufacturing Clay Emitters

**P.I. – Prof. R. Sandesh (Industrial Design Centre), IIT Bombay**

**Collaborating NGO – *Center of Science for Villages (CSV), Wardha, Maharashtra***

This project addresses the need of farmers in Vidarbha area of Maharashtra. CSV at Wardha has designed emitters made of clay through a DST funded project. These emitters are used for drip irrigation purpose. The irrigation system consists of emitters (of varying shapes and size) connected serially with the help of rubber tubing [Figures 10 (a) and (b)]. Making the emitters is a difficult task and since the productivity of workers is low, effectively the cost of making one emitter works out to be very high. The objective of the project is to design a machine or tool to manufacture emitters efficiently so that its cost is minimized.

### 8. Development of More Ergonomic and Efficient Street Sizing System for Chirala Handloom Cluster

**P.I. – Prof. Samrat Mukhopadhyay, Dept. of Textile Engineering, IIT Delhi**

**Collaborating NGO – *Rastra Chenetha Jana Samakhya (RCJS), Andhra Pradesh***

The process of sizing is a very crucial step in weaving. Sizing is done to give temporary strength to single count cotton yarn to withstand the rigor of weaving while keeping the characteristics and properties of cotton yarn intact. It directly affects the production rate and number of breakages and faults in fabric. Street sizing is one of the two most common ways to do it, other being Hank sizing. The operation mainly consists of coating long warp sheet from starch paste by using handheld spray and heavy brush. It strengthens the yarn so that it can endure the various forces exerted in weaving loom. A field visit was conducted at Chirala to understand the problem. Based on the field study, a modified version of street sizing system is proposed. At present, CAD modelling (Figure 11) of the same is completed and the fabrication work is going on.

### 9. Design Improvement of Tulsi Mala Making Device

**P.I. – Prof. Subir Kumar Saha, Dept. of Mechanical Engineering, IIT Delhi**

**Collaborating NGO – *Human Social Welfare, Moh. Ganesh Ganji Lalla Wala Nohara, Hathras***

In a workshop to demonstrate Tulsi Mala Making device conducted by RuTAG IIT Delhi in collaboration with Human Social Welfare at Jait village in Mathura, it was found that around 2000 families in the villages near Mathura make Tulsi Mala beads to earn their livelihood. Around 80% of the beads produced have size less than 15mm and remaining 20% of the beads produced have size ranging between 15 to 25 mm. So, a new design of Tulsi Mala Bead Making Machine [Figure 12 (a)] has been developed which runs on 100W AC motor. The Machine has been successfully tested to cut bead size of 25mm dia. Linear Bearing Guide Rail combination has been incorporated for the motor to translate linearly which absorbs vibration and sound. It provides smoother experience. Spindle is redesigned to grip the Tulsi stem firmly. The traditionally forged pin to make holes in the beads is replaced by off-the-self available 1.5 mm round bit. An adjustable tool post has been designed to cut the bead size ranging from 5mm to 25mm. Wooden hand rest is incorporated in the design to avoid direct contact of hand with the motor which gets heated during the operation. Effort has been made to make the device compact and portable. The device has been tested in Jait Village of Mathura, U.P. [Figure 12(b)] and has gone through multiple modifications as per the feedback received from the users. As per observations during the testing, users learn to operate the new machine within 5 minutes. The machine has been demonstrated during Tech4Seva 2019 workshop and Industry Day 2019 at IIT Delhi.

## RuTAG Management Development Programme at IIT Delhi during October 2-4, 2019 (In association with IIT Kharagpur)

Rural Technology Action Group (RuTAG) is continuously working on the transformational practice of technology development incorporating Government agencies, NGOs, Researchers and Academicians with an intent to deliver innovative interventions in rural sectors. The prime mission of RuTAG is to ameliorate the rural systems to the most efficient level for upgrading the rural economy.

A three-day program entitled “*Management Development Program (MDP) on Rural Entrepreneurship*” was organized from October 2-4, 2019, at IIT Delhi [Figures 13 (a), (b), and (c)] that took the participants through an engaging discussion that would help in facilitating people interested in becoming a competent rural entrepreneur and setting up a rural enterprise. The inauguration session was graced by Dr. Ketaki Bapat, Scientist ‘F’, Principal Scientific Adviser to the Government of India; Prof. S. K. Saha, Coordinator and Principal Investigator, RuTAG IIT Delhi; Mr. Varun Vidyarthi, Director, Manovodaya, Lucknow, U.P. The MDP was coordinated by Prof. Varun Ramamohan of IIT Delhi and Prof. Bhaskar Bhowmik from Rajendra Mishra School of Engineering Entrepreneurship, IIT Kharagpur. Prof. Bhowmik gave a brief insight about the orientation and theme behind this program. Prof. Bhowmik mentioned the theme of this program centered around the question as to how one goes from a technological solution developed to solve a local rural problem to a full-fledged enterprise that manufactures, markets, and distributes a product to make a sustainable outcome.

The participants were made aware of the basics; what is a product, difference between product and service, what is a rural enterprise and its importance, what are the various business models, critical success factors for setting up rural enterprise, assessing marketability. The program also offered the participants an excellent idea to various theories of Techno-Management practices such as Finance, Marketing, Human Resources, Information Technology, Skill-Development, Supply Chain Management, Quality Improvement. The participants also got an exposure to various complexities, uncertainties, challenges associated with rural enterprises.



Figure 13 (a): Participants during RuTAG IIT Delhi MDP Programme



Figure 13 (b): Group photo of the participants of RuTAG IIT Delhi MDP Programme



Figure 13 (c): RuTAG IIT Delhi Technologies (Tulsi Mala Making Devices) at the exhibition during MDP Programme

### Demonstration of Sheep Hair Shearing Machine developed by IIT Delhi at CSWRI, Avikanagar, Rajasthan

Mr. Ashish Dahiya, Mr. Mangal Sharma, Mr. Srijan Prabhakar, and Mr. Sumit Kumar visited CSWRI, Avikanagar, Rajasthan (Figure 2) during September 22-24, 2019 for demonstration of Sheep Hair Shearing Device developed by IIT Delhi. RuTAG Team, CSWRI Team, and some traditional shearers were present there. A total of 5 sheep were sheared by the device in front of all. A trained shearer, Mr. Balraj from Central Sheep Breeding Farm, Hisar (Figure 14) was present there for the training and demonstration of the mechanized device. The device performed very well throughout the day. Traditional shearer who use scissors for shearing also got exposure to the device. There was a group of new trainees who got the exposure of the mechanized device developed by IIT Delhi. Traditional shearers tried the mechanized device for the first time and handled it very well. The trainees were very happy and keen to use the mechanized device. The CSWRI team also appreciated and wanted to procure four such devices developed by IIT Delhi.

*Mr. Ashish Dahiya, Jr. Project Assistant (Tech.), RuTAG IIT Delhi*



Figure 14: Mr. Balraj demonstrating the device

### Regional Workshop of RuTAG IIT Delhi at Mathura, U.P.

RuTAG IIT Delhi, in association with Human Social Welfare Society (HSWS), Hathras, organized one-day Regional Workshop in Hotel Wingston, Mathura on December 16, 2019 [Figures 15 (a) and (b)]. This workshop primarily focused on Tulsi Mala Bead Making Device. Around 20 artisans who make Tulsi beads for their livelihood attended the workshop. Artisans hailed from a nearby village Jait, and some came from Bharatpur, Rajasthan. Apart from the artisans, there were representatives from various government and voluntary organizations such as DC Handicrafts, NABARD, RUDSETI, Ministry of Textiles, MSME, Lupin Foundation, Jan Vikas Sansthan, and Adarsh Yuva Samiti.

Mr. Davinder Pal Singh (Project Associate, RuTAG IIT Delhi) greeted the participants. Prof. S. K. Saha, Coordinator – RuTAG IITD, welcomed the participants and mentioned that this workshop would be primarily focussing on the Tulsi Mala device. He then requested the participants to introduce themselves so that the participants get acquainted with each other. Prof. R. R. Gaur, Chairman, Core Group, RuTAG IITD delivered the welcome address wherein he stressed the importance of premier institutes like IITs channelizing their research towards the improvement of rural livelihoods. He also mentioned how field-based need identification is a crucial part of problem-solving. He also thanked the govt. organizations for attending the workshop and apprised the audience about the role of govt. organizations and ministries in the development and dissemination of technologies. Prof. Saha and Prof. M. R. Ravi later explained in brief about various technologies developed and disseminated by RuTAG IIT Delhi. In the next session, organizations presented their work, schemes available for the artisans, and they put forward some of the technical difficulties faced by the artisans.

Post lunch, Mr. Yashwant Prasad conducted a game where the artisans formed groups of five and tried to assemble the Tulsi Mala Device, whose parts were kept in a disassembled state on the table [Figure 15 (c)]. Later, Prof. Saha, Mr. Raj Kumar Gupta, and Mr. Yashwant Prasad, took the audience through the journey of Tulsi Mala Bead Making Device with the help of presentations. After that, Mrs. Omwati and Mr. Laxman demonstrated the use of the new Tulsi Mala Bead Making Device to other artisans. Later, each of the artisans was trained to use the device and make beads. Artisans liked the new device and were eager to try it out more so that they could use the device on a regular basis.

Prof. Saha and Prof. Gaur concluded the session by taking feedback and comments from the audience. Mr. Dharmender from HSWS proposed the vote of thanks.



Figure 15 (a): Regional Workshop of RuTAG IIT Delhi at Hotel Wingston, Mathura, U.P.



Figure 15 (b): Group photo of RuTAG IITD Team with Participants of the Workshop



Figure 15 (c): Demonstration and Training of Tulsi Mala Bead making device during the workshop

### Internship at RuTAG IIT Delhi

In my one-month internship at RuTAG, IIT Delhi I gained an understanding of the functioning of RuTAG and the various technological interventions made to enhance rural livelihood by promoting rural entrepreneurs.

During the internship, I had the opportunity to visit Bharatpur and Mathura, where I observed various clusters such as Tulsi mala makers, Furnace for jointless glass bangles and Pottery kiln. Here, I observed their processes and the technological interventions provided by IIT Delhi. With regards to Tulsi mala maker, I made observations and tried analyzing as to why the users behaved in a certain manner eg. social norms, rumors, traditional thinking, resistance to change etc., and have also made recommendations to enhance the acceptability of the product among the rural consumers. I definitely had an enriching experience at RuTAG, IIT Delhi.

I had a great privilege working under Prof. S. K. Saha and Prof. Richa Kumar and also the amazing team of RuTAG IIT Delhi, who have always supported, encouraged and inspired me, and have been very patient in explaining me everything. Thank you!

*Sajja Sai Priyanka, Intern, RuTAG IIT Delhi, M. A., Social Innovation and Entrepreneurship, Tata Institute of Social Sciences, Tuljapur, Maharashtra*

## Events, Exhibition, and News

1. Mr. Raj Kumar Gupta and Mr. Mangal Sharma from RuTAG IIT Delhi visited Pithoragarh, Uttarakhand during July 5-9, 2019 for installation, demonstration/training of weavers/artisan on metallic carpet loom developed by RuTAG IIT Delhi.
2. RuTAG Club IIT Delhi participated in ‘Tour of Stalls’ during July 27 – 28, 2019. The aim was to sensitize the new students joining IIT Delhi about the activities of RuTAG Club of IIT Delhi.
3. RuTAG IIT Delhi demonstrated its technologies in Tech4Seva at LHC, IIT Delhi campus during August 10 – 12, 2019.
4. RuTAG Club Orientation and Felicitation programme was held at LHC, IIT Delhi on August 30, 2019 (Figure 1).
5. Mr. Raj Kumar Gupta and Mr. Mangal Sharma from RuTAG IIT Delhi visited Jaipur, Rajasthan during September 11 – 13, 2019 for installation, demonstration and training of weavers/artisan on metallic carpet loom developed by RuTAG IIT Delhi.
6. RuTAG IIT Delhi presented posters of its technologies in Industry Day at IIT Delhi campus on September 21, 2019 (Figure 3).
7. Mr. Ashish Dahiya and Mr. Mangal Sharma from RuTAG IIT Delhi visited CSWRI, Awikanagar, Rajasthan for demonstration of Sheep Hair Shearing Device developed by RuTAG IIT Delhi during September 22 – 24, 2019 (See Page 5 for more details).
8. Mr. Suraj Bhat presented a paper entitled “Design Analysis of Wooden Palanquin used in Yamunotri Dham” in IEEE Global Humanitarian Technology Conference at Seattle, USA during October 17-20, 2019.
9. Mr. Suraj Bhat and Mr. Davinder Pal Singh visited EPICS at Purdue University in Indianapolis, USA during October 22-25, 2019 (See page 8 for more details).
10. Mr. Davinder Pal Singh and Ms. Sajja Sai Priyanka (an Intern) visited Bharatpur for field survey regarding Bangle Making furnace, Potter’s Kiln, and Tulsi Mala Making Device on November 18, 2019.
11. Mr. Yashwant Prasad and Ms. Sajja Sai Priyanka visited Jait village, Mathura, U. P. for testing of Modified Tulsi Mala Making Device and field survey on November 25, 2019.

## Feedback and Students’ perspective

### LEGACY STILL HAS TO BE CREATED

#### *Journey for a Decade*

An initiative of government of India for dissemination of technology or in other words to provide technical solution to rural problems, the Rural Technology Action Group (RuTAG) was established at many IITs. It was established at IIT Delhi in 2009. After completion of a successful decade, RuTAG is pacing up to reach into the streets of rural areas. RuTAG has done various successful projects, organized various workshops across many regions of Gujarat, Rajasthan, Madhya Pradesh, Uttar Pradesh, Delhi and Haryana, and collaborated with many NGOs to solve problems in rural societies. RuTAG is continuously increasing its network to know and assess the problem across the country, and vigorously attempting to trickle down technology with the help of several other IITs. The RuTAGs do attempt in providing such a solution which is economically viable, judicially tenable, environmentally sustainable and socially acceptable. RuTAG is trying to make its members more sensitive towards society and environment to sensitize their problem through various surveys.

#### *My Experience*

I have been a part of the group for the last one year and did a project regarding problem related to stone mine workers of Rajasthan. I have been a part of a survey of stone mines in Karoli district of Rajasthan and have communicated directly with workers which helped me to understand the problem thoroughly. Then after, me, as a part of the team of three students attempted the solution for workers. Through the course, I learned problem solving skills and became more sensitive towards the problems of society. Professor Subir Kumar Saha (coordinator of RuTAG club) was very encouraging and motivating for me through my way of one year. After being a part for just one year, I am feeling joyful and more aligned with the vision of the RuTAG club and want to take our endeavour to a journey of whole India.

#### *My Opinions*

Last two or three decades have seen rapid industrialization across the globe, and in India industrialization led rapid urbanization which transferred focus of all institutions towards problems centered in the urban areas, and the rural areas remained neglected. As we all know, today, most of Research & Development (R&D) expenditure of private firms goes in regard to solve issues of urban areas and to maintain or improve living standards of urban societies. If we see rank of India in global innovation index provided by World Intellectual Property Organization (WIPO), it is the 51st across the globe which shows an ample scope in diffusion of technology throughout India. Keeping these considerations, we as a group are motivated to flourish our rural societies. We are motivated to create a techno-friendly environment which will ensure role of technology in human development. We see the technology as the fruit which must be delicious to each strata of unequal society. Why must only an economically strong section utilize this fruitful instrument to solve their problem? Why living at the same point of time, we have been discriminately distributing benefits of technology? These are some ethical questions which are confronted by humankind and we are resolute to answer them. There is a need to create a social and technical awareness and develop scientific temperament by manifesting technical solutions to the problems faced by economically weaker sections in their day to day life. After completion of one fruitful decade we are still not in a strong position to change the locus of nation’s concern. So, we must endeavour by organizing various competitions all over India and by continuing our expansion in IITs and other eminent institutions of the country. There were strong attempts in diffusion of technology, but I shall say that “legacy still has to be created” for diffusion of technical benefits to different strata of society.

*Mr. Nitesh Meena, RuTAG IIT Delhi Club Member, B. Tech. Student, IIT Delhi*

## RuTAG @ USA

### RuTAG IIT Delhi's Collaboration with Purdue's EPICS Programme

We are a team of students working as a part of Purdue University's EPICS program. We are currently collaborating with RuTAG IIT Delhi to create a design for a bullock driven tractor which will aid rural farmers in India. We started this project as a way to not only build a strong relationship between IIT Delhi and Purdue, but also to make a difference in the quality of life of struggling farmers in India. Through our collaboration with the RuTAG group, we have discovered that we need to improve the design of an existing bullock driven tractor in three main ways:

- By creating a consistent, and mechanically simple mechanism for lifting farming attachments which will allow the tractor to make turns without draining the bullock's energy.
- By designing wheels which will allow the tractor to drive across multiple different surfaces since currently the tractor struggles to plow through clay or wet soil.
- By improving the overall ergonomics of the tractor via improvements to sitting condition over the course of long-term usage.

We are currently coming up with design ideas for creating an efficient lifting mechanism for farming attachment by pulling inspiration from simple machines such as levers, pulleys, and gear systems. We are able to make great progress on our project with the assistance of the RuTAG group, and their invaluable feedback and critique. The whole experience our team has had working with the RuTAG group thus far has been overwhelmingly positive due to their responsiveness, expertise, and support. We are excited to continue our relationship with the RuTAG group and IIT Delhi and provoke real change throughout India.

*Mr. Mrigank Sharma, Mr. Evan Hultman, Mr. Joshua Brody, Mr. Vivek Talapeneni, and Ms. Ali Brown, B. E. Students, Purdue University, USA*

### A visit to the USA by RuTAG IIT Delhi

Mr. Suraj Bhat, Ph. D. student at IIT Delhi, presented a paper entitled "Design Analysis of the Wooden Palanquin Used in Yamunotri Dham" in the IEEE Global Humanitarian Technology Conference held in Seattle, WA during October 17- 20, 2019. The conference was focused on humanitarian activities going across the globe and there were presentations on different technologies developed with a focus of betterment of the society.

Mr. Suraj Bhat and Mr. Davinder Pal Singh (Project Associate, RuTAG IITD) later visited EPICS (Figures 16 and 17) at Purdue University in Indianapolis, USA during October 22-25, 2019. EPICS Purdue program solves community problems globally. Since September 2017 EPICS has acquainted students to RuTAG program and ever since students have taken up three different problems and have tried to provide solutions with different perspectives. The objective of the visit was to have a personal experience of the EPICS program by meeting students, staff, faculty and visiting their labs. Also, EPICS and Shah Global Innovation Labs at Purdue university have expressed their willingness to jointly solve the community problems along with RuTAG IITD.

*Mr. Suraj Bhat, Research Scholar, Dept. of Mechanical Engineering, IIT Delhi*



Figure 16 (Left to Right): Evan Hultman, Joshua Brody, Vivek Talapeneni, Davinder Pal Singh, Suraj Bhat, Mrigank Sharma, and Ali Brown



Figure 17: Mr. Suraj Bhat and Mr. Davinder Pal Singh with Ms. Heather Fabries (left) and Prof. William Oakes (Right)

### RuTAG CENTERS

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