



*Wishing You a Happy New Year 2016*

## From the Editor's Desk

### RuTAG@IITD: Over Half a Decade of Exciting Experience

First time I heard about RuTAG was at IIT Madras, when I spent a year there in 2007. A student from my Design course introduced me to a RuTAG project for which I visited Coimbatore Agricultural University. It was a great learning experience. I was thinking why IIT Delhi cannot have such a programme. In fact, on my return to IIT Delhi in 2008, I found that the dialogue on RuTAG had already started at IIT Delhi. Finally, it came into being in 2009 under the coordinator-ship of Prof. Rajendra Prasad of CRDT. I took part in several projects and later on took charge of coordinator-ship from 2014. Other than participating in various projects, the most exciting moments for me were those when the students mentioned that they enjoyed RuTAG projects because they could see their designs actually working which otherwise may not be possible in many academic projects or many of them felt that it is a great learning experience about the society, etc. Such experiences will actually connect their minds with the society, which is one of the main objectives in any educational field including engineering. Because of such impacts there are many universities around the World who have started similar programmes. One such initiative is "Engineering Projects in Community Services" or EPICS in short at Purdue University, USA who are in constant conversation with RuTAG at IIT Delhi for collaborative projects by the students of both countries. In my opinion, this is a positive step as young generation of the World will be ready to take up the global challenges of the global societies. Let us wish such endeavours a very best!

Prof. Subir Kumar Saha

## Chairman's Column

### Harnessing the RuTAG experience for Unnat Bharat Abhiyan

As you may be aware, Unnat Bharat Abhiyan (UBA) is now gradually taking shape. All IITs which have well established RuTAG units will be among the mentoring institutions or the nodal centres to take up the lead and the responsibility of providing orientation and guidance to other technical institutions in their vicinity joining the Unnat Bharat Abhiyan. The RuTAG units by now have good experience of interacting with voluntary organizations in the process of need identification and also towards making field-worthy innovations in various important technology areas of rural relevance. They are also conversant with the difficulties and challenges of dissemination of these innovative technologies. All this experience will be valuable in kick-starting the Unnat Bharat Abhiyan and helping it to gain momentum.

As the interaction with the grass root institutions in rural clusters increases, there will be greater demand for innovative technical support and accordingly the RuTAG units will have to be strengthened to cope with this challenge. A few suggestions in this regard are as follows:

- Evolving a suitable mechanism for dissemination of innovative technologies.
- Greater involvement of students through RuTAG projects.
- Enhancing the funding support and increasing the strength of core staff.
- Proliferation of RuTAG units in other prospective institutions.

In this way RuTAG units will be able to play a significant role in Unnat Bharat Abhiyan.

Prof. R. R. Gaur

## Senior Project Consultant's Column

RuTAG Programme was initiated by the Office of the Principal Scientific Adviser to the Government of India during the year 2003-04. RuTAG units are operational in seven IITs now. It has been a very interesting experiment to bring in institutions of excellence to work closely with NGOs for technology up gradation for rural application. Apart from the successful technology models that have been developed under the programme, another interesting feature has been the willingness of other technology and research institutions to become partners in this effort. However, one area of concern is the number of faculty members who are involved in the programme. In spite of our best efforts, the number is much less than what one would have liked. It is hoped that as the network of institutions and also the NGOs grows and new and interesting research challenges will be identified, we will have more faculty participating in the programme.

Major Sabyasachi Chatterjee

## From Student Editor's Desk

RuTAG at IIT Delhi has entered in seventh year of its existence. The year 2015 was eventful, as it marked the development of new technologies for the rural front. This issue gives the glimpse of the technologies developed by IITs under RuTAG. The RuTAG club thanks you all for the constant motivation and feedback; it has really helped us to grow more effectively.

Happy New Year to all the readers!

Harsh Harlalka

## RuTAG CENTERS

IIT DELHI [www.rutag.iitd.ac.in](http://www.rutag.iitd.ac.in) IIT KANPUR [www.iitk.ac.in/rutag/](http://www.iitk.ac.in/rutag/) IIT KHARAGPUR [www.iitkgp.ac.in/rutag](http://www.iitkgp.ac.in/rutag) IIT MADRAS [www.rutag-tn.org.in](http://www.rutag-tn.org.in)  
IIT MUMBAI [www.ctara.iitb.ac.in/rutag/](http://www.ctara.iitb.ac.in/rutag/) IIT GUWAHATI [www.iitg.ac.in/mech/Rutag-pal/index1.htm](http://www.iitg.ac.in/mech/Rutag-pal/index1.htm) IIT ROORKEE [www.rutagiitr.wordpress.com](http://www.rutagiitr.wordpress.com)



Figure 1. A Potter using Developed Prototype



Figure 2. Ground Water measuring Device



Figure 3. Bicycle for carrying High Load



Figure 4. Motorised Sabai Grass Rope Making Machine

### 1. Pedal Driven Potter's Wheel (RuTAG IIT Kharagpur)

Traditional Potters carry out their honoured craft by practising age old methods which is very labour intensive. Due to low prices of their products in market and limitation of availability of electricity, there was an upper cap on their productivity. The wheel developed by IIT Kharagpur (Fig. 1) is using bicycle pedal as the source of power; the bicycle pedal is familiar, easy, comfortable and non-electric, enabling the potter to throw limbs of clay in a comfortable sitting position (decided by Ergonomics Consideration) with little strain on the back. The wheel head allows throwing large limbs of clay and making large pieces if needed. It consists of a circular turntable rotating at 250-300 rpm. Moulding of the pot and driving of the wheel are carried out simultaneously. Five such potter's wheels are being used by potters of Bamunmura village of Lodhasuli, Jhargram, Paschim Medinipur (West Bengal).

### 2. Design and Development of a Low Cost Ground Water Level Measuring Device (RuTAG IIT Delhi)

The water table measuring agencies generally use various kinds of ground water measuring device for measuring water table in the monitoring well. The commercially available water table measuring equipments are expensive. There is a constant demand from the rural agencies/ NGO's for the low cost and robust ground water measuring device. Therefore, RuTAG IIT Delhi developed low cost ground water measuring device (Fig. 2) which helps and encourage the ground water user/stake holders at grassroots for their effective participation in water management practices and developing ethical concepts for making efficient use of water resources available for agriculture.

### 3. Improvisation in Bicycle for Carrying Higher Capacity (RuTAG IIT Guwahati)

Transportation Cost is one of the major costs for vendors selling fruits and vegetables. Darrangiri (Assam) is the biggest market for Banana in Asia where vendors use bicycle to reach the market area along with fruits and Vegetables. The modified bicycle by IIT Guwahati (Fig. 3) requires less human effort even when the load is high and the carrying capacity of the bicycle has been enhanced from 8 to 14 -16 bunches of banana. It also helped vendors to save up to Rs 150 per day.

### 4. Motorized Sabai Grass Rope Making Machine (IIT Kharagpur)

The earlier machines were leg-driven and one has to operate and feed grass simultaneously. The quality of motorised product is better and production rate is 10 kg/day as compared to the 3 kg/day by hand operated machine. The machine modified by IIT Kharagpur (Fig. 4) is operated at a speed of 1440 rpm, driven by 0.5HP electric motor. The process is carried out with the help of V-belt, pulley drives and set of bevel and pinion gears, which rotate the bobbin with ideal angular velocity. Hence, this machine reduces the menial work involved to a great extent and provides good working conditions. The working situation is ergonomically safe, thus increasing the level of productivity 4 times. One such machine has been given to SHG, Kharika village, Nayagram, Paschim Medinipur, West Bengal.

## 5. Production of Charcoal by Pyrolysis of Prosopis Juliflora (IIT Madras)

In Ramanathapuram and adjoining districts of Tamil Nadu are mostly water starved districts. The major occupation of the people is production of charcoal from Prosopis Juliflora (which is a wild plant), by Earth Mound Process. The drawbacks of the process were that; it was very labour intensive, low quality of charcoal production, cannot be carried out in rainy season and was not portable. Since the process adopted was conventional and low in efficiency, a local NGO approached RuTAG IIT Madras with a request to develop a more efficient and safe kiln. The objective was to design a portable kiln for charcoal production aiming at reduced labour, better yield and higher efficiency. With these objectives in mind kinetic studies were conducted to control operational parameters, a pilot kiln (Fig. 5) was designed to hold about 80 kg of wood. It consists of two butterfly valve at the top and bottom to control air, perforated multiple pipe air distributor, special designed Kiln and recirculation of volatiles. Results have been very encouraging and the NGOs have given positive feedback. A scaled up model of capacity 1-2 tonnes of wood is in process.

## 6. Technology for production of Bamboo charcoal and extracting of Bamboo Vinegar (IIT Guwahati)

Charcoal is an important source of heat in many households and even in some industries. 20 kg bamboo charcoal can be obtained from 100 kg of raw bamboo while 5 litres of bamboo vinegar can be produced as a by-product with the help of new technology. The designed technology is Environment friendly causing minimum air pollution and also facilitates in-house production. Several batches can be processed in a day. This type of innovation was introduced for the first time in the North- Eastern India by consistent effort of IIT Guwahati (Fig. 6). Its impact on the bamboo based rural economy is fascinating, particularly in the hill states, like Meghalaya, Mizoram, Arunachal Pradesh, Nagaland and Manipur.

## 7. Technology Development of Fine Korai Mat Weaving for the benefit KoMat Weavers of Pathamadai & Veeravanallur (Tirunelveli) (IIT Madras)

In the existing handloom, for weaving Fine Korai Mat the use of peculiar primitive handloom technology continues to prevail in making costlier fine korai mat using fine korai grass weft, while the cheaper coarse korai mat weaving using coarse korai grass has stepped up to power operated automatic weft selection and insertion technology. Hundreds of families living in rural areas of Pathamadai & Veeravanallur, near Tirunelveli earn their livelihood by engaging themselves in crafting fine korai mat using primitive handloom technology (Fig. 7). The modified technology, developed by IIT Madras, known as Ergonomically Improved Jacquard Handloom for Fine Korai Mat Weaving (Fig. 8) eliminated the manual lifting of individual warp thread one by one, as mechanical jacquard takes care of thread selection according to punched design card; thereby lot of korai weft insertion time is saved. By utilising 92 hook of the 120 hook jacquard for the 36" width mat that contains 184 warp thread and going for V-drop arrangement for harness, non-symmetrical motif of size 18" width (that is half the full width of the mat) and symmetrical motif of size 36" (full width of the mat) could be produced. No expertise is specially required for weaving design portion and uniform time is obtained for the insertion of korai weft in design and plain mat portion weaving. This also added value to the product.



Figure 5. Newly Designed Kiln



Figure 6. Newly designed Furnace for producing Bamboo Charcoal



Figure 7. Traditional Process of Weaving Korai Mat



Figure 8. Developed Handloom for Weaving Korai Mat

### Sheep Hair Shearing Training Programme at Pipalkoti

RuTAG IIT Delhi organized a Training Program on 11th and 12th October 2015, at Pipalkoti, District Chamoli, Uttarakhand, to train shepherds with Sheep Hair Shearing machine developed by IIT Delhi. The program was attended by around 18 participants which included 8 shepherds from village Pipalkoti and Joshimath, 2 trainers from Sheep Breeding Farm Pipalkoti Chamoli, District, 2 Officials Mr. Pan Singh Panwar, B.E.O, Mr. S.P. Nautiyal, L.E.O. from Uttarakhand Veterinary Department, and Dr. Lokesh Kumar from Department of Animal Husbandry, Pashudhan Bhawan, Mothrowala, Dheradhun.



#### RuTAG IIT Delhi Regional Workshop

RuTAG IIT Delhi conducted a regional workshop on November 19-20, 2015 at Society for Rural Industrialization (SRI), behind Doctor's colony, Bariatu, Ranchi, Jharkhand. The program was attended by about 34 participants from about 12 NGOs, 2 faculty members from Xavier Institute of Social Service Ranchi, 2 faculty members from Xavier Institute of Polytechnic and Technology Ranchi, 1 faculty member and 4 students from BIT Misra Ranchi.



#### RuTAG IIT Delhi Field Visits

Mr. Raj Kumar Gupta, Mr Mangal Sharma and Mr. Tushar Goel from RuTAG IIT Delhi visited Dahina village, Rewari, Haryana on December 11, 2015 to test the newly designed lifting mechanism for Bullock Driven Tractor.



#### RuTAG IIT Club Delhi

Second RuTAG Club IIT Delhi orientation programme was organised on September 9, 2015. The Club aims to achieve a state where students can apply their knowledge and contribute to their nation with fun and joy.



#### Conference and Publication of Projects @ RuTAG IIT Delhi

Mr. Davinder Pal Singh and Mr. Shrey Gulati attended the 3rd International Conference on "Creativity and Innovations at Grassroots" at Indian Institute of Management Ahmedabad held during January 19-22, 2015. They presented a paper on "Design of an Efficient and Ergonomic Bangle-Making Furnace and Tools" authored by Davinder Pal Singh, Shrey Gulati, Subir Kumar Saha, M. R. Ravi, Sangeeta Kolhi. Raj Kumar Gupta, Mangal Sharma, Davinder Pal Singh, Bhivraj Suthar, Subir Kumar Saha authored a paper "Women Empowerment by Technology supported manufacturing of beads from Holy Basil" during Dec. 2015 in Current Science Journal under special section of Design for well-being.

#### Contacts:

**For technical advice and collaboration:** Prof. S. K. Saha, Editor, Ph. 011-26591135, E-mail: sahaiitd@gmail.com

**For general queries:** Mr. Davinder Pal Singh/ Mr. Raj Kumar Gupta, RuTAG IIT Delhi Office, Ph. 011-26591385; Email: davinderiitd@gmail.com, rajkumarddr@gmail.com.

"The help of Mr. Tushar Goel in finalizing this Newsletter is highly appreciated".