



National Innovation Foundation

# *Assam Innovates*



Honey Bee Network

# ASSAM INNOVATES



## **National Innovation Foundation**

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## **HONEY BEE NETWORK**

**Regional Collaborator**  
IIT, Guwahati



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# PREFACE

National Innovation Foundation has been pursuing the mission of making India innovative and a creative society since 2000 with the active support of Department of Science and Technology, Government of India. Till date NIF has been able to scout innovations and traditional knowledge practices from 507 district across India.

Thanks to the support of volunteers of Honey Bee network, we have been able to discover many unsung heroes and heroines of our society who have solved local problems without any outside help.

Despite various constraints, NIF has put together a small book celebrating creativity, innovations and traditional knowledge from Assam. I am conscious of its limitation in terms of coverage and outreach. But if we could uncover so many examples of the ability of local communities and individuals to solve problems on their own without outside help, how

much more can be done if state and private sector agencies join hands with NIF actively.

I invite the state government and its various organs to actively support our quest to uncover many more creative communities and individuals in rural and urban areas. NIF will then help in building value chain around them.

The book is divided in three parts. The mechanical innovations developed by innovators from Assam are covered in part one. Selected examples of herbal traditional knowledge are given in part two. The innovations from other parts of the country suitable for the development of Assam are given in part three.

By no stretch of imagination, could we claim that we have achieved a great deal. We have merely made a simple point. There are a large number of knowledge rich people who may not have been educated much, may in fact be

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economically poor also, but still have the ability to solve a few problems so well.

The challenge really is to work out a synergy so that no creative voice remains unheard, and no solution remains localized and unrecognized. By adapting public policy in support of grassroots innovators and traditional knowledge holders, we can make economic development process more inclusive and sustainable.

This book on innovations has been compiled at the request of Dr. Vijay Kelkar, Chairman, Finance Commission and Member, Governing Council of the National Innovation Foundation as a tribute to the creativity and innovation at grassroots. This presentation is part of a series of innovation compendium prepared for each State of India. We hope this will be followed up in the form of concrete policy and institutional initiatives in each State to empower creative

people to improve the quality of life of common people and thus promote inclusive growth.

It is my belief that such examples will act as spur for other State government departments to look for creative efforts of their staff and users at ground level. I hope that NIF will have the opportunity to work closely with the State government in future and expand knowledge base, add value to selected technologies and help them diffuse through commercial and non-commercial social channels for improving the livelihood of the majority of the people.



R. A. Mashelkar, FRS  
Chairperson, Governing Council  
National Innovation Foundation, Ahmedabad  
mashelkar@nifindia.org

## Building a Bridge with Grassroots Innovators in Informal Sector

To make the Indian development process more inclusive, there is no escape from building upon creative and innovative experiments pursued by common people at village or semi-urban level. Many of these experiments lead to development of innovations, which can improve productivity and generate employment. However, the purpose of a particular innovator may often be to solve his problem. There is no mechanism available for him to share the knowledge, innovation or practice with other people in different regions. Sometimes, ideas and innovations get diffused through word of mouth. But many times, these ideas remain localized. In the process, potential growth and social development gets constrained. To overcome this constraint, Honey Bee Network with a handful of volunteers triggered a movement, twenty years ago to scout, spawn and sustain the unaided innovations and outstanding traditional knowledge from the informal sector of our country.

Drawing upon this experience, NIF (National Innovation Foundation) was set up in 2000 with the help of Department of

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<sup>1</sup> The Honeybee collects pollen from the flowers but they are not impoverished, in the process links one flower to another enabling cross-pollination. Similarly, the Honey Bee Network strengthens people-to-people contacts, learning and networking by pooling the solutions developed by individuals across the world

Science and Technology, Government of India to scale up the idea of learning from grassroots innovators.

Under the inspiring leadership of Dr. R. A. Mashelkar, Chairperson NIF and former Director General, Council of Scientific and Industrial Research (CSIR), NIF has taken major initiatives to serve the knowledge-rich, economically poor people of the country. It is committed to make India innovative by documenting, adding value, protecting the intellectual property rights of the contemporary unaided technological innovators, as well as of outstanding traditional knowledge holders. It aims at promoting lateral learning among local communities to generate low cost affordable solutions of the persistent and emerging problems, and enhance the diffusion of innovations on a commercial as well as non-commercial basis.

### How does NIF work?

Primarily, NIF has five functions: (a) Scouting and documentation, (b) Value addition and research and

in different sectors. The network acknowledges the innovators, traditional knowledge producers and communicators so that they do not remain anonymous.



## ASSAM INNOVATES

development, (c) Business development and Micro Venture, (d) Intellectual Property Rights protection and (e) Dissemination, database development and IT applications.

NIF has been entrusted with the responsibility of building a National Register of Grassroots Innovations and Traditional Knowledge. It is not enough to document or disseminate the innovations or outstanding traditional knowledge. Value addition is very important for harnessing the full potential of the idea. NIF has entered into MOU with CSIR and Indian Council of Medical Research (ICMR) besides other organizations. CSIR has allocated funds to support research on grassroots innovations in CSIR labs. Similarly, ICMR supports research on such herbal healing knowledge, which has not been documented in the classical texts and formal institutional literature. NIF also helps in generating a very large pool of open source / public domain technologies. A small number of innovations are also protected by patents and other IPRs.

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The Honey Bee Network strongly believes in sharing knowledge among the providers of innovations in their own language, which is achieved by publishing local language versions of Honey Bee newsletter. It also ensures that a fair

For most innovators, attracting risk capital for converting innovations into enterprise is very difficult. They neither can offer much collateral nor are they able to develop business plan or deal with formal R&D system.

A Micro Venture Innovation Fund (MVIF) has been set up with the help of SIDBI to provide risk capital for technologies at different stages of incubation. Under single signature, innovators are trusted and investments are made to help them commercialise their innovations. Most innovators do not make good entrepreneurs. For entrepreneurship, one has to make consistent batch by batch production of products. Innovators are often incorrigible improvisers. They seldom make two things alike. NIF has helped such innovators to license their technologies to third party entrepreneurs. Most of the licenses have been given to small entrepreneurs and in a few cases, to medium enterprises.

A very elaborate benefit sharing system has been developed, governed by the Prior Informed Consent (PIC) of the knowledge

share of benefits arising from commercial exploitation of local knowledge and innovations reaches the innovators and knowledge providers.

providers. Attempt is made to share benefits not only with the innovators but also with their communities and for nature conservation. In addition, a small part is kept for contingency support to needy innovators, for R&D stakeholders, promoting women's innovations and meeting overhead costs.

It is remarkable that grassroots innovations are generating global demand, as evident from inquiries from around fifty-five countries for various technologies, NIF has succeeded in commercializing products across countries in six continents apart from being successful in materialising thirty cases of technology licensing with the help of partner agencies.

### **What has it done?**

With major contribution from the Honey Bee Network, NIF has been able to build up a database of more than 1,00,000 ideas, innovations and traditional knowledge practices from over 507 districts of the country.

NIF has filed 182 patents in India and seven in US and one PCT application. Out of these, 33 patents have been granted to grassroots innovations in India and four in US. NIF has funded 113 projects under MVIF to the extent of Rs.1.3 crores. Hundreds

of technologies have diffused through farmer to farmer social network.

NIF has proved that Indian innovators can match anyone in the world when it comes to solving problems creatively. Where they perform better than rest is in generating more affordable sustainable solutions by using local resources frugally.

Those who see poor only as the consumer of cheap goods, miss the knowledge richness at the grassroots level. The Poor can be the Providers also.

The Grassroots to Global (G2G) model that NIF is propagating is all set to change the way the world looks at the creativity and innovations at grassroots.

### **How can state government join hands with NIF?**

- a. NIF has no field extension unit nor does it want to have one. However, state government has several field functionaries in the field of agriculture, education, industry, rural development, women and child care, forestry, etc. There can be a very fruitful partnership between NIF as a source of innovative ideas and technologies and state government as partner in dissemination, value addition and



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- even commercialization through incentives, promotion, subsidies, etc.
- b. State government can join the national campaign for scouting innovations and traditional knowledge and motivate its grassroots functionaries to join hands with NIF in uncovering the talent at the community level.
  - c. Students in schools and colleges can be motivated to scout creative and innovative people in their neighbourhoods and send the entries to NIF (Post Box No.15051, Ambavadi, Ahmedabad 380 015, [campaign@nifindia.org](mailto:campaign@nifindia.org)). Examples of innovations can also be included in the curriculum of the school children.
  - d. Demonstrations and trials can be organized at various regional research stations, KVKs (Krishi Vigyan Kendras) so as to create awareness about the creative potential of common people.
  - e. The research institutions can be mandated to add value to the knowledge of innovative people and help in protecting their knowledge rights.
  - f. On the state's website, link to NIF can be given and the innovations from the region can be displayed to put forward the creative face of the state before the people.

- g. Some of the innovative people identified by NIF and/or state government could be awarded at district and state level besides giving them support for further work.
- h. A nodal officer could be appointed to keep a dynamic touch with NIF to ensure that all the areas of possible cooperation are explored.

I hope that NIF would be able to develop a functional, fruitful and fulfilling relationship with the Government of Assam state. Tremendously rich knowledge of biodiversity, minerals and environment can be leveraged through the proposed association. We need to discover far more innovations and traditional knowledge from Assam where our record has been good . This has been possible largely because of the generous support of IIT Guwahati. We hope that this cooperation will grow in times to come.



Anil K Gupta  
Executive Vice Chairperson, NIF, Ahmedabad  
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**“Innovation opens up new vistas of knowledge and new dimensions to our imagination to make everyday life more meaningful and richer in depth and content”.**

**- Dr. A.P.J. Abdul Kalam**



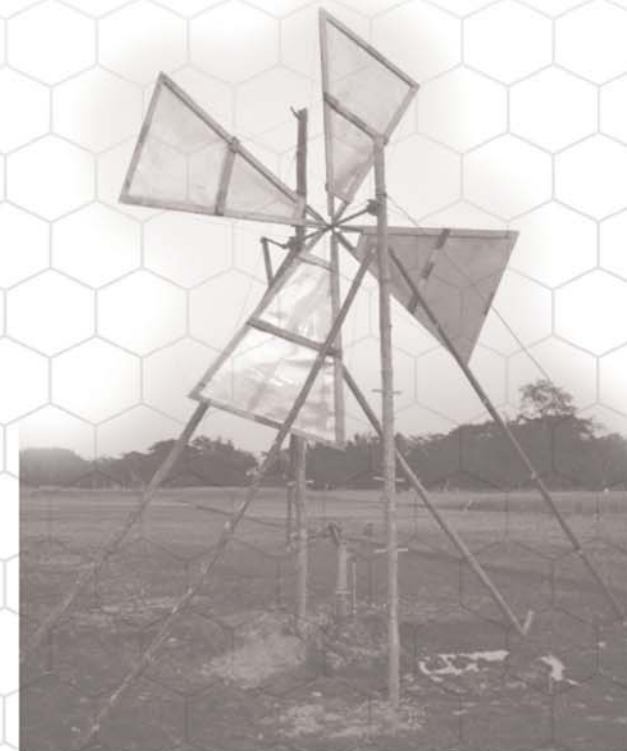
**“By adapting public policy in support of grassroots innovators and traditional knowledge holders, we can make economic development process more inclusive and sustainable”.**

**- Dr. R.A. Mashelkar**

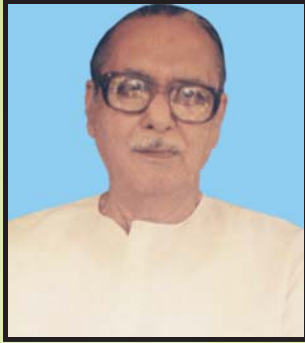
# PART I

# INNOVATIONS from ASSAM

This section contains grassroots innovations  
originating from ignited minds of Assam





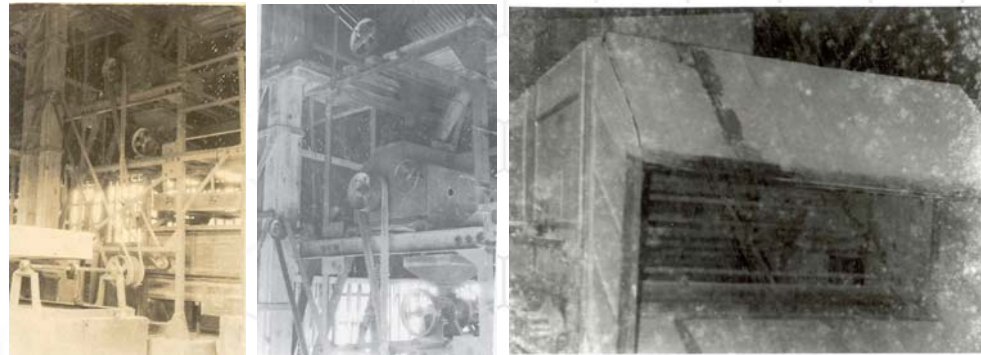


**Late Bhubaneshwar  
Barthakur**  
Sibsagar

## A life full of creativity: Machines for agricultural processing, wood processing, public and personal utilities

Barthakur undertook research in the field of improvement of rice milling in 1961. There are four areas in which the innovator developed innovative technologies in his life long pursuit of greater efficiency.

**a) Agricultural processing:** The innovator developed a modern rice mill which had emery and rubber roller sheller with very low wear and tear; sliding cone polisher for paddy imparting uniform pressure; drier for parboiled paddy and other grains; machine for parboiling of paddy under pressure; improved process for the parboiling of paddy in which water soaking time was reduced and thereby fermentation was eliminated. In addition he also developed a high frequency stirrer; soluble tea manufacturing process; device for separating light materials by oscillation and impact; grading of paddy with conical rollers; Oil extractor; cattle driven power tiller; thresher using belt, grain sheller with variable speed rollers of abrasive; sheller for de-husking paddy by variable speed abrasive and rollers with posed grain feeder, etc.

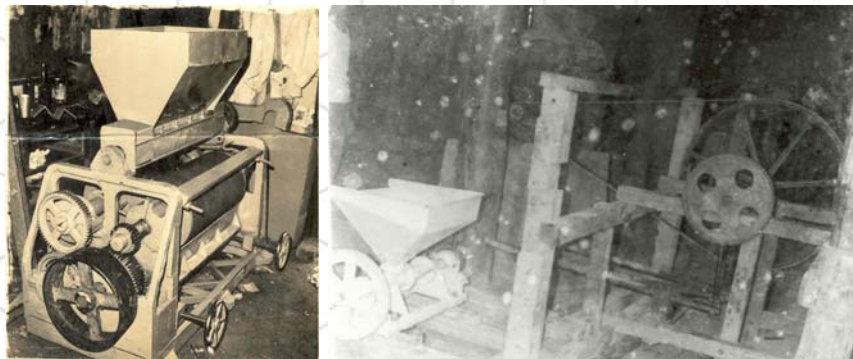


**b) Wood processing:**The innovator developed a saw mill and timber seasoning plant.

**c) Public utility equipment:** An overhead dumping platform for the reloading of solid materials to carriers in bulk; holder for tram; bus and other thin tickets; controlling system for railway unmanned crossings; oscillating frame saw; and composing systems for printing press.

**d) Household equipment:** An improved safety razor assembly; improved hand loom equipment; improved water taps; small sewing machine; new equipment for tobacco intake to replace cigarette smoking.

NIF honored him posthumously with a life time achievement award at the hands of former President, Dr APJ Abdul Kalam. Stories like his should be part of the school and college curriculum to inspire the youth to become innovative. A museum of his innovations, may be along with other legendary innovators, could also have been built to provide real life examples to youth.





**Kanak Das**  
Morigaon

## Bicycle which runs faster on the bumpy roads

Normally speed of the bicycle reduces when there is a bump on the road. But the bicycle developed by Kanak Das uses the rider and terrain induced forces to propel it forward. He has also developed a kit which can be retrofitted to any normal bicycle. Most shock absorbers are designed to dissipate the energy. In this cycle, the energy of the springs is harnessed as supplemental force to propel rear wheel.

Using the same principle the innovator has also developed an E-bike, a modified electric bicycle that utilizes terrain induced force (movement), for charging the battery.

Kanak Das is a serial innovator who has a lot of other innovations to his credit. He has also developed other innovations like a power tiller, wrench for unlocking the fly wheel of diesel pump etc.

The innovator was given the first award in the Second National Competition of NIF and was supported for a year under the NIF-CSIR Fellowship scheme. He could easily become a role model for others in his region, if supported properly. He could in fact be a hub of an 'innovator based incubator' model in which he could provide fabrication and design support to many other innovators in his regions.





## Low cost bamboo windmill

Looking for a low-cost alternative to pump water in the fields for the winter crops, the brothers devised the simple windmill made up of bamboo and tin sheets. NIF facilitated its testing at IIT Guwahati. They were supported under the MVIF scheme and also under the micro incubator scheme. A few units were also installed with farmers in the surrounding villages.

The innovators were awarded in the Fourth National Competition of NIF.

Looking at its potential in Gujarat, Grassroots Innovations Augmentation Network- West (GIAN –W) has installed several units in the salt farming area of Kutch in Gujarat for pumping up brine water and also for simple farm irrigation purposes. The designs have been considerably improved with the help of innovators and other experts. It is an excellent example of transfer of technology from north east to western tip of the country.



03



**Mohammad Mehtar Hussain  
and Mushtaq Ahmad**  
Darrang



**Uddhab K Bharali**  
North Lakhimpur

## A serial inventor: Pomegranate de-seeder, arecanut peeler, bamboo splitting machine and other innovations

Bharali is a serial innovator who has achieved a lot in life notwithstanding the constant challenges and struggles that life has thrown at him. When he started his engineering degree course, the Assam agitation started and he had to drop out after a few months. When he had barely finished part 1 of his AMIE in Chennai, his father expired and he had to go back to N Lakhimpur and take over his debt ridden workshop to look after the family. From then on as a result of his grit, creativity and perseverance he has managed to reach the position that he is in today.

A few of his innovations from a list of 100 are:



**Pomegranate De-seeder:** Bharali has designed and developed a pomegranate de-seeder, which separates the granules of pomegranate from the outer cover and thin inner membrane without damaging the seeds. It has a capacity of de-seeding 50-55 kg of pomegranate per hour. The machine has been exported to two countries, viz. Turkey and USA. DSIR, Govt. of India has provided support to the innovator for developing value added product under TePP scheme through National Innovation Foundation, Ahmedabad.

**Arecanut Peeler:** Annoyed by the injuries caused while peeling the areca nuts manually, the innovator has designed and developed an areca nut peeling machine.

The machine has a capacity of peeling 100-120 nuts per minute. The technology has been licensed to entrepreneurs based in several states.



**Cassava peeler:** The cassava peeling machine developed by Bharali is a portable electric machine that can process up to five kg of cassava in as many minutes. NIF facilitated the technology licensing to a Guwahati based entrepreneur. One unit has even been sold to a customer based in Kenya.

**Bamboo processing machines:** Bamboo processing by hand is a very time consuming and difficult process. Looking at this need Bharali has developed an assembly of machines that can perform operations from splitting long lengths of bamboo, sizing, surface finishing and polishing etc. These units have been installed with the help of NIF in CFC (Common Facility Centre) of the NERCRMP (North Eastern Region Community Resource Management Project) at North Cachar hills.



The innovator has also come up with a garlic peeling machine, tobacco leaf cutter, paddy thresher (licensed to an entrepreneur based in Guwahati), safed musli peeling machine, Jatropha de seeder, passion fruit juice extractor, trench digger chopper for cattle and fisheries feed and portable *dheki* among other innovations.

For many of his innovations the innovator was supported under the *MVIF* scheme of NIF.

He is an excellent example of public spirited innovator whose experience can easily inspire technical and non technical students all over the country.







**Mohammad Aminuddin  
Ahmed**  
Sibsagar

## Dual security alarm and mobile phone based systems for industrial establishments and infra-red signaling device for railways

The dual security alarm is a two-way alarm system, which signals from a main station to sub stations and vice versa. It can also give simultaneous alarm signal to any other desired remote location. Once the alarm is set off, only the operator in the main station can switch off the alarm, signaling that the message has been received. The system is specifically designed for oil drilling sites and can be very useful for the sites where loud noise and congestion problems persist. With the assistance from NE cell of NIF, innovator has supplied 15 units to ONGC. This was funded through MVIF. For this innovation Aminuddin was awarded during the Fourth National Competition of NIF.



A lot of train accidents occur due to missing signals or not receiving signals due to fog and sometime due to carelessness. The solar power operated automatic audio-visual alarm system developed by Ahmed is to solve this problem. Out of the three units, one is placed near the level crossing and rest two are placed about 3 - 5 km away from the level crossing on either side of the railways track. When an

approaching train crosses any of the units placed along the track, it sends a signal to the unit placed at the level crossing, which switches on the hooter and the flasher to alert the level crossing users. The hooting and flashing continues till the train completely crosses the level crossing. NIF has facilitated evaluation of this technology at North East Frontier Railways.

He has also developed mobile phone based vehicle security system, on unauthorized starting/ theft incidence.

## Modification in engine to make it more fuel efficient

The innovator has modified the engine, transmission system and wheels of auto-rickshaw to make it more efficient. The intake air and charge are preheated using exhaust gas. The gear ratios and wheel size have also been changed to improve the efficiency of the vehicle. Facilitated by National Innovation Foundation Ahmedabad, IIT Guwahati has tested the modified engine and has confirmed that it gives around 35 % higher mileage than the conventional engines.

He was invited to make a presentation at a workshop organized by IIMA at TATA Innovation Awards.

Sibsankar with the help of his brother Jaysankar has also developed a helical spring shock absorber for rickshaws and noodle making machine.



**Sibsankar Mandal**  
Kokrajhar





**Deepak Bharali**  
Kamrup

## Extra-weft insertion in handloom fabric ornamentation device

Conventionally the task of the insertion of weft threads needed to make a variety of designs is done manually by tying knots, which is tedious, cumbersome and time consuming. The thread is also wasted in the connection between one motif to another.

The device consists of three components; base frame, magnet-bearing shaft and specially designed bobbin. These components can be fitted to any handloom Jacquard machine.

The innovation reduces the time required for making designs to one third of the time required in traditional way.

IIT Guwahati, has been looking into the design issues in this technology and it is likely to make a major impact on the similar looms in coming years.





## A maverick inventor: Hover craft, amphibious craft, rumble strip for generation of electricity, car run with compressed engine

The innovator is a 47 year old self made business man who attained his present status in life due to his grit and hard work and a 'never say die attitude'. After setting up his family in a comfortable financial position, he started a workshop in 1996 at his house to fulfill his childhood dreams of pursuing creative experimentation. He employed three workers and dedicated his workshop fully to R&D works only. From then on he has come up with a lot of innovations to his credit.

Some of the important innovative devices developed so far are: Hover craft, amphibious craft, rumble strip for generation of electricity, small three wheel car TrigoX, gravity bicycle, treadmill bike, hybrid car (electricity, solar and petrol), car run with compressed engine etc.

The innovator has received offers from countries like the United States for possible technology transfers for his technologies. With the assistance of NIF the innovator has also attended a conference around Fab Lab organized by the Massachusetts Institute of Technology, at Chicago USA in 2007



08



**Kanak Gogoi**  
Kamrup





**Umesh Chandra  
Sharma**  
North Lakhimpur

## Interlocking bricks

Umesh Chandra is a simple metric pass who makes a living by selling sand stone chips, cement etc., to villagers for constructing houses.

At the time of constructing his own house, Sharma had to face a lot of problems with the masons. Hiring them was not only expensive but also very problematic as they often went out to look for better opportunities.. He then started thinking of a simple way to make bricks without the help of these masons. After a series of trial and error process, he developed the interlocking bricks of several designs. He constructed his and neighbors compound walls using the interlocking bricks.

The materials used for making the bricks are concrete, cement and sand of specific shape and size, taken in required proportion and mixed with water to form a homogeneous mass.

Interlocking is achieved by projections and depressions in the blocks on the upper and lower faces of the brick. The utility of the interlocking bricks is that it facilitates construction even by unskilled labor, reduces consumption of mortar, labor and construction time.

NIF facilitated a visit by faculty from Design dept. IITG along with a few students who



made suggestions for improvement on quality and design. The innovator was supported through the MVIF scheme of NIF for enterprise formation.

## Production of soft *muga* silk

The innovator has mechanised the process of *muga* silk weaving by way of making modifications in the conventional mechanised loom. *Muga* silk weaved with the device becomes soft as well as blocks UV radiations up to 80 % as per laboratory tests at Tezpur University.

The innovator has made various products like shirts, belts, caps etc. with the *muga* weaved from this loom. He has also made an umbrella out of this material which is durable, stain free, and water proof. It has a pleasing golden shine which illuminates colour, better than that offered by conventional umbrellas.

NIF had facilitated the technology transfer of this *muga* umbrella to Assam Silk Development Centre.



**Dulal Choudhary\***  
Kamrup

\*As per its mandate, NIF does not consider such professionals for awards or financial support, but only helps in providing visibility or linkages.





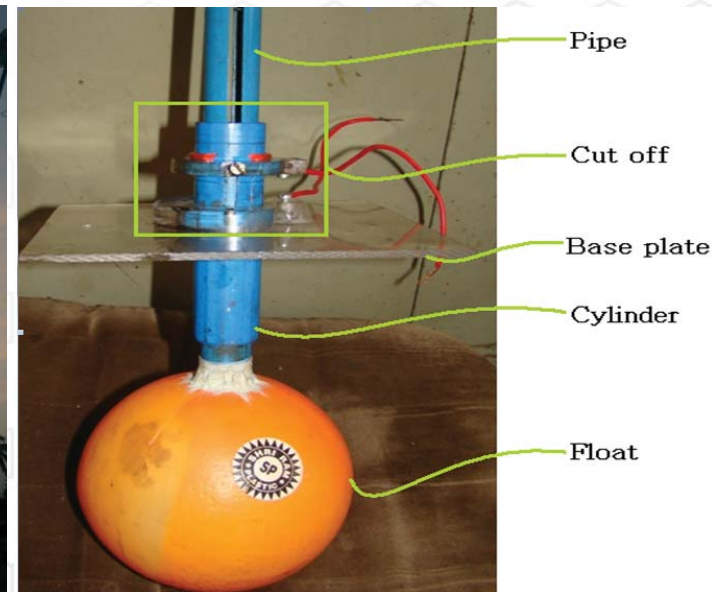
**Subhash Das and Amlan  
Bhattacharya\***  
Nagaon

\*As per its mandate, NIF does not consider such professionals for awards or financial support, but only helps in providing visibility or linkages.

## Badminton stroke practicing machine

The beginners require assistance in playing badminton without having to pick up the shuttle cocks every time it falls. Looking at this requirement, the innovators have developed a simple machine for practice which does not require an additional player on the opposite side of the net. The innovation essentially includes a motorized belt mounted on pulley with grooves holding shuttle cock in each groove. Once the belt goes on the top and moves downwards, the shuttlecocks fall one at a time to be hit across the net.

Apart from this innovation, Subhash has also developed a modified water pump operating system.



## Transmitting music signals through power lines

Trilokya and his brother wanted to hear the same song at the same time but in different rooms with a very short deck cable. The only solution of their problem was to transfer signals to the other room.

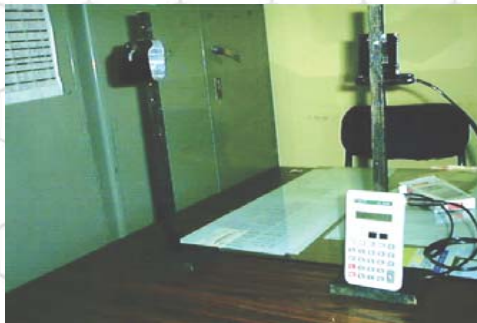
Trilokya and Champak developed an adapter through which the neutral line and earth line of conventional electrical system are used to transmit audio signals within the house. Audio output from a tape recorder or radio is connected to a plug adapter in which the live point is disconnected. The output of the audio signals is collected through the adapter and connected to the audio output device like speakers at any other location within the house. The cost of the adapter is only Rs. 15. It can provide a high fidelity sound at low cost without having a network of additional cables in a building.

The brothers have also modified a simple electronic calculator by attaching a visual light sensor to perform counting operations. It can be used to count how many people or industrial products have moved across it.

The brothers were awarded during the Third National Competition of NIF.



**Trilokya and Champak Bora**  
Kamrup





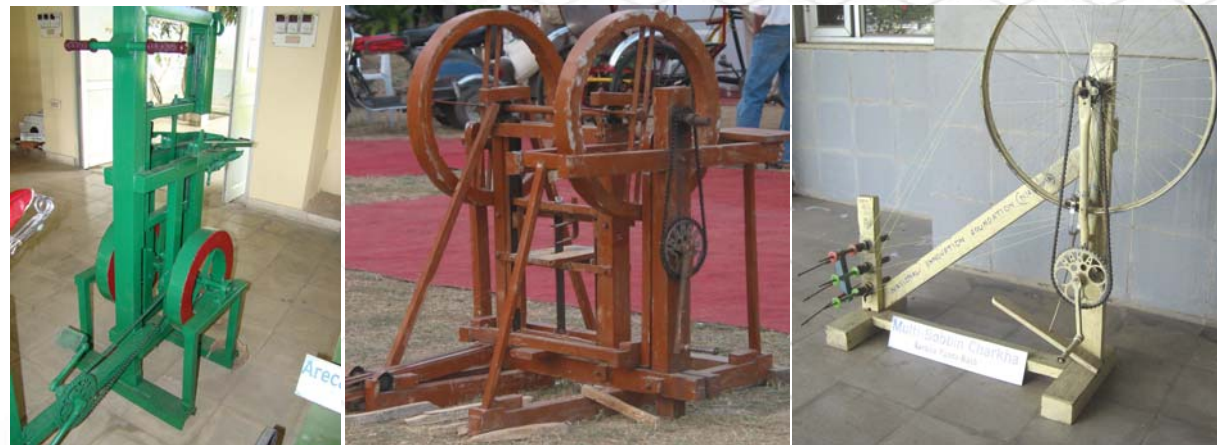
**Karuna Kant Nath**  
Darang

## Manual wood cutting

Cutting of wood effectively and efficiently is achieved by this machine. The equipment is cost efficient, and can be manually operated with both hand and foot pedal options. Most importantly it is portable, and can be taken to any worksite and has more productivity compared to manual sawing.

This equipment consumes lesser time and labour compared to available saws and has a mechanism and linkages similar to manually operated sewing machine. The work of three labourers can be done by one labour using this machine. The innovator has also developed a multi bobin *charkha* and a bamboo cross cutter. He has been supported under the *MVIF* scheme of NIF and has been doing modest business in the area.

Karuna was awarded during the Third National Competition of NIF.

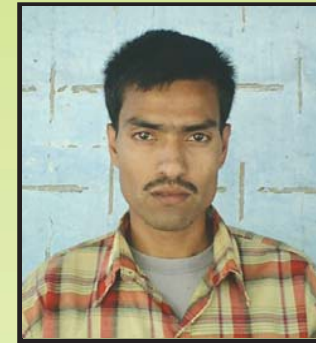




## Egg incubator

Eggs need controlled heat and humidity to incubate properly. The innovator has developed an incubator, which is made up of plywood lined with thermocol. The unit is divided into two chambers. It can be heated by electric light as well as the kerosene lamp. The kerosene lamp is used in case of power failure. There is a regulator to control the intensity of the light.

NIF has facilitated the marketing of a few units in the surrounding area and to DRDA, Sibsagar along with one unit to a NGO in Manipur. The innovator has also been supported under the *MVIF* scheme.



**Milonjyoti Das**  
Kamrup



**Nasim Ahmed**  
Kamrup

## Bamboo polishing machine

Nasim has developed a machine that polishes bamboo sticks used for making bamboo curtains and mats. The bamboo sticks are rubbed mechanically for smoothing. It can polish 100 kg of bamboo sticks at a time within 90 minutes. It reduces labour cost many folds. Only one labour is required for running the machine and adjusting the bamboo sticks.



## Multi purpose wood-working machine

Small carpentry workshops have difficulty in purchasing and using multiple machines due to high initial costs, space constraints and maintenance considerations.

This multipurpose machine with minimal footprint, is built to address all major workshop needs, allowing completing the sequence of wood-working operations in one place, and allowing better control on finished product.



**Ghonakanta Gogoi**  
Dhemaji







**Sondhan Saharia**  
Darrang

## Paddy huller and manual rice flakes machine

The conventional de-huskers utilize electric power or diesel engines for operation. However poor electric-supply and costlier fossil fuels are the limitations. To solve this problem Saharia innovated this device which is manually run and ensures very low extent of breakage of grains.

The device has a handle and crank mechanism at the upper end and small openings in the rollers from which grains can pass onto the collection chamber at the lower end. The movement of the rollers results the grains pinched and the husk is torn off from a grain particle, leaving the internal tissue intact.

The manual rice flakes machine can powder rice and make flakes from rice and corn.



## Innovative fan blades made of bamboo

The innovators have developed a double-layered four blade fan for blowing air. They had originally made the fan in order to separate rice and husk in the winnowing machine. It is a unique fan with specific geometry, size, number and the offset arrangement of the blades with respect to each other. Unlike normal fans having set of blade circumferentially on the axis, it has two set of larger and smaller blades located circumferentially on the same axial shaft. Vortex created by this fan seems to have much higher power than the conventional fans.

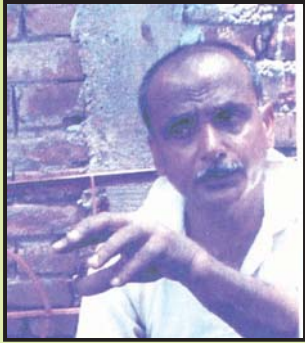
Department of Energy, Tezpur University, showed that its performance is almost at par with that of the conventional pedestal fans (electrically operated) of higher sweep. The brothers were awarded in the Third National Competition of NIF.

The brothers popularly known as '*Vishwakarma*' in their village have also come up with a bamboo rickshaw, bamboo umbrella and a locking arrangement for power tiller.



**Nipul Bezbora & Bipul Bezbora**  
Jorhat





**Ganesh Ghimire**  
Sonitpur

## Solar boat

The innovator had seen solar boats but found many inadequacies in their functioning. He developed a submersible motor attached with propeller for the solar boats with lighter material like aluminum instead of iron. He has also modified the steering control system. The modifications have improved the transmission efficiency of the boat.

NIF helped the innovator to fabricate a 10 seater model for Lumbini Water Parks in Bangalore. Renewable energy being so much in need, such innovations require a lot of encouragement.

Ganesh Ghimire has also developed an 'auto walker' which runs with the help of two small battery operated 36 watt DC motors. The device has been provided with a three way speed control and runs smoothly at a comfortable speed.





## Zero head water turbine and portable *Muga/Eri* reeling machine

The innovator worked on the basis that the conventional turbines have poor efficiency due to partial submergence of blades. To improve it, he arranged the blades spirally keeping the axis of the turbine parallel to the flow direction. The turbine is completely submerged below the flow of water. The water passing through the turbine forces the turbine to rotate with low speed but at a high torque. A generator is used to extract the electrical energy. A submersible pump is also coupled in the turbine set for irrigation purposes. For this innovation the innovator was awarded in the Third National Competition of NIF.

NIF facilitated the technology license to a Tinsukia based businessman. The deal though did not work out well and further improvements in the technology are called for.

The innovator has also developed a portable *Muga/Eri* reeling machine . It works similar to the traditional spinning of 'drop needle' or '*charkha*'. For this he was supported under the *MVIF* scheme of NIF. NIF helped in the standardization of design at the Design Dept. IIT Guwahati



**Nripen Kalita**  
Kamrup

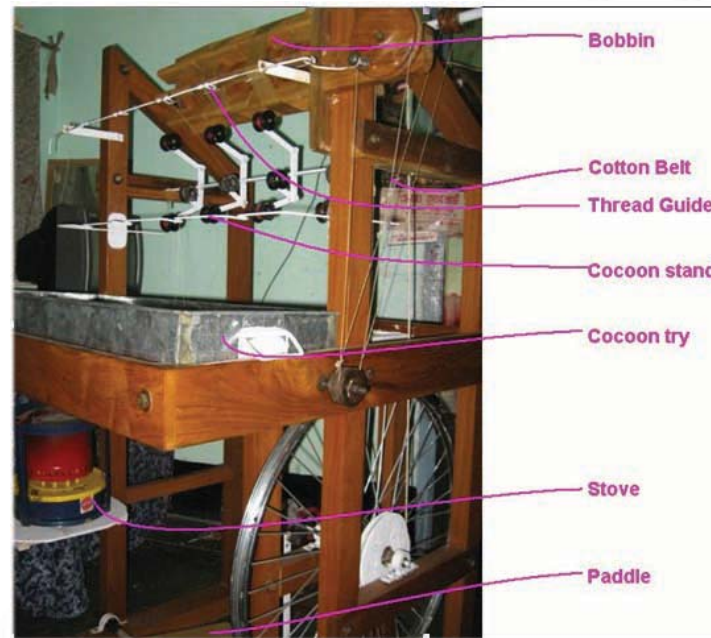




**Probin Kalita**  
Kamrup

## Weft thread making machine

Weaving involves the interlacing of two sets of threads at right angles to each other i.e. the warp and the weft. Generally it has been done through a tedious manual process. Probin Kalita innovated a wooden machine, with which yarn can be reeled efficiently for making the weft of Muga cloth. The Cotton belt reduces breakage and tearing of threads while processing.



## L-drop auto protector: the two-way anti-locking device

After reading about a reported burglary case at Guwahati, where burglars locked inmates inside a room (having L-drop) from the outside, while ransacking the house in 2000, the innovator came up with the two way anti locking device as a solution. The device prevents the door being locked from outside or from inside depending upon the user's wish. It can be used by a person whether he is inside or outside the room and can be adaptable for all types of doors. The innovator claimed that it is very helpful for the rooms/ toilets used by mentally challenged patients and persons suffering from epilepsy as unauthorized/ accidental locking can be prevented. The innovator was awarded in the Third National Competition of NIF.



**Late Gobinda Chandra  
Gogoi**  
Kamrup







**Dilip Bhagabati**  
Nagaon

## Monkey trap

Sometimes monkeys destroy the crops, kitchen garden and even the grocery of kitchen. To get rid of this, the innovator has developed a trap. The naughty monkey can be trapped and released in the dense forest.



## Bamboo auto rickshaw

The innovator used to make sculptures from his childhood. With the expertise so gained, he made an auto rickshaw completely out of bamboo components with exception of the engine. He used a scooter engine for the auto rickshaw. He has named his vehicle as “Marvelous Three Wheeled Car”, weighing around 70 kg.



**Bobby Mant**  
Dibrugarh





**Md. Mustafa Ali**  
Darang

## Innovative use of recycled tyre

After seeing cots in local *dhabas* made of jute, the innovator thought of experimenting with the tyre strips. He started making cots with tyre strips nets. These cots last for seven to eight years. These cost much lesser than the other normal jute rope cots. Due to elasticity of tyre stripes, these are much more comfortable to the users.





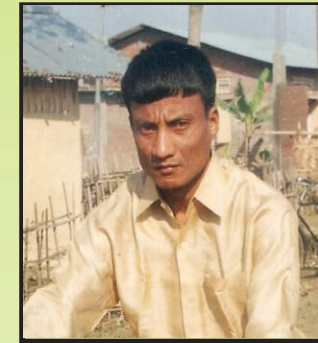
## Bamboo motorcycle

Dhaniram wanted a motorcycle but could not afford one. In order to realize his dream, he started experimenting with various materials. Looking at the abundant availability of bamboo in his area, he fabricated the frame and chassis of his motorcycle with the same. He then salvaged an engine of an auto rickshaw and fitted it to the frame. Using locally available electrical wires and bulbs, etc., he put an entire motorcycle together.

As of now Dhaniram proudly rides his self fabricated motorcycle around his locality.



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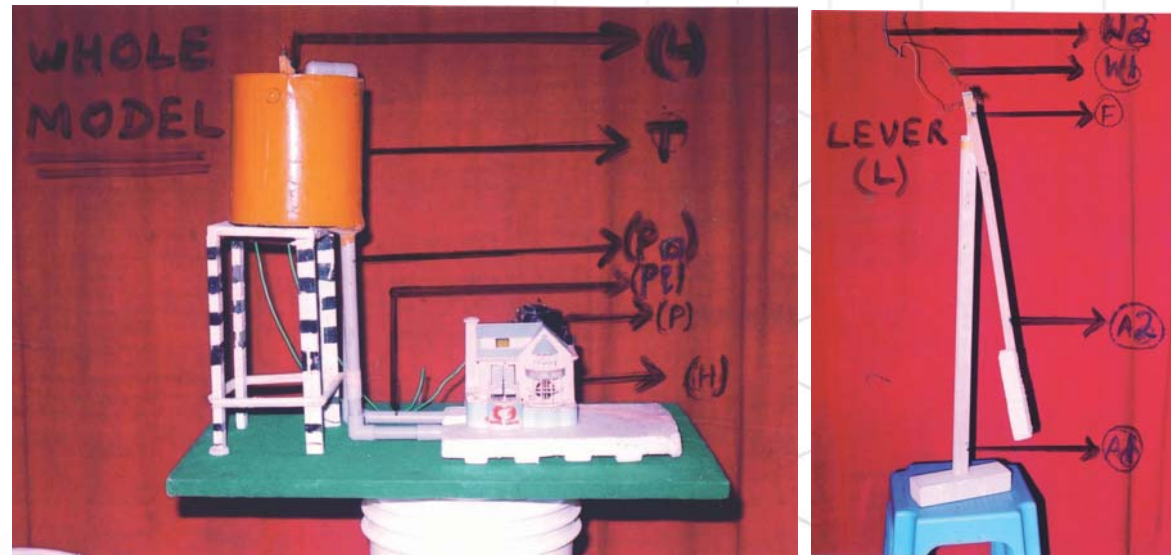


**Dhaniram Phukan**  
Tinsukia

## Automatic water level controller

Dhritiman a student of 10<sup>th</sup> standard (in 2005) has a very strong interest in making innovative things. He wants to become a science teacher or a scientist. He has come up with dozens of innovations. The water level controller was developed to monitor the level of water in overhead tank. He observed that most of the times the pump was not switched off promptly after water tank was full resulting in unnecessary overflow and wastage of water. The water level controller works on the simple float valve based switch system.

**Dhritiman Talukdar**  
Kamrup



## Oval compass

The conventional compass is meant for drawing circles, but not the oval designs. For designing oval shapes craftsman has to calculate and measures point to point or draw it in computer first and then copy it in the glass or wood. The innovator has developed a compass which can draw the oval shapes in wood or glass.



**Durlabh Kachari**  
Dibrugarh





**Ravi Jyoti Deka**  
Kamrup

## Low pollution bullet motorcycle

Deka, a commerce graduate, has a keen interest in the field of Automobiles. He has installed double spark plugs in the existing Enfield bullet motor cycle by removing the cylinder. Decomposition valve position is converted in to second spark plug and decompressor is shifted to the bottom of the cylinder head. Exhaust push rod, ignition coil and circuit have also been modified to adjust the spark plugs. Oil seal is fitted in valves to reduce the oil consumption. With this, he has overcome the problems of low mileage and high pollution.

It is interesting to note that the same concept has been adopted in new motorcycles launched in recent times by the established players in the country without any credit to him, of course.



## Bamboo torch

As a part time *mali* in a North Guwahati school the innovator was in need of a torch at night but could not afford one. Utilizing his dexterity with his hands and locally available material viz. bamboo, he fabricated a bamboo torch for his self use. Though the bulb and the batteries are the normal ones, the other components are made entirely from bamboo.

As an appreciation of his creativity he was given a job as a full time *mali* at the Faculty School in North Guwahati. This design was also appreciated and a few units purchased by visitors when NIF took him to participate at a design festival at IIT Mumbai.

**Jawaharlal Rai**  
Kamrup





**Mahendranath Datta\***  
Kamrup

## Floating water wheel for harnessing the energy from rivers

Coming from a poor background, the innovator had always thought of making a water wheel for harnessing energy. During his college days he developed his first model out of bamboo and produced electricity by fitting a cycle dynamo. After his retirement from the Assam Govt., he developed a refined version of his innovation.

The innovation has been tested with the help of the inland water transport dept. and a report has also been given to TERI (The Energy Research Institute), New Delhi.



\*As per its mandate, NIF does not consider such professionals for awards or financial support, but only helps in providing visibility or linkages.



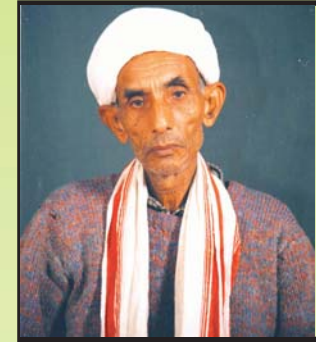
## Preserving a dying craft – ‘Sâncî paat’ & development of herbal ink

The ancient long–forgotten practice of using inner bark of the agar or aloe tree locally known as the ‘sâncî’ as writing material was revived by the innovator. For the preparation of the paper, the bark of a local tree called Sâncî gosh is removed; it is dipped overnight in water and taken out the next day to dry. After drying for one night, the bark pieces are pressed in a screw press and dyed with various locally available organic dyes. He has also developed herbal ink for writing on the Sâncî Paat.

The innovator was awarded in the Third National Competition of NIF.



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**Bishnuram Handique**  
Jorhat



**Akhil Chandra Mandal**  
Nagoan

## Vertex cutting of areca nut

Akhil Chandra Mandal has studied up to higher secondary and his main occupation is agriculture. He came up with an innovative practice for cultivating areca nut. When shoots of areca nut tree are around two inches after planting, its upper portion is removed. Then vertex or head is cut off when the same plant is three years old, leaving aside 2-3 branches at the extreme lowest region.

The plants treated this way mature ahead by two years as compared with other plants. The longevity of the plant extends up to three more years than other plants. Yield per plant ranges from 7-8 bunches / cluster. He was awarded a consolation award in 4th National biennial competition of National Innovation Foundation for this achievement.

The innovator has also developed a water pump operated by the energy of discharge of higher capacity pump. One or more water pumps (excluding motors) are operated by hydro power generated through a turbine.



## Traditional bone healer

Pushpalata Saikia hails from Pangria, a remote village in the Jorhat district of Assam. She has been dispensing her family's traditional treatment for backache and bone fracture successfully for many years, after her late husband. She learnt the practice from her late husband Sidanand Saikia and brother in law Dulal Saikia. She treats nearly 20 to 30 patients daily free of cost. She has treated more than 500 patients with nearly 95% success. Pushpalata was honored with appreciation award during the Third National competition by National Innovation Foundation.

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**Pushpalata Saikia**  
Jorhat





**Leena Talukdar and  
Shushanta Mahanta**  
Morigaon

## Herbal mosquito repellent

Leena Talukdar and Shushanta Mahanta hail from Morigaon, Assam. Leena has represented her school at various science fairs. She had won the Best Affiliated Science Fair Award for the model of a Cold Storage System at the Intel Science Talent Discovery Fair held at Mumbai in 2003. Shushanta Mahanta, a very shy girl, takes keen interest in science related activities and also takes part in various science fairs. Besides this mosquito repellent Shushanta has also formulated a *dantamanjan* (toothpaste) by using indigenous plants and presented it in a National Level exhibition held by NCSC at MIT, Pune.

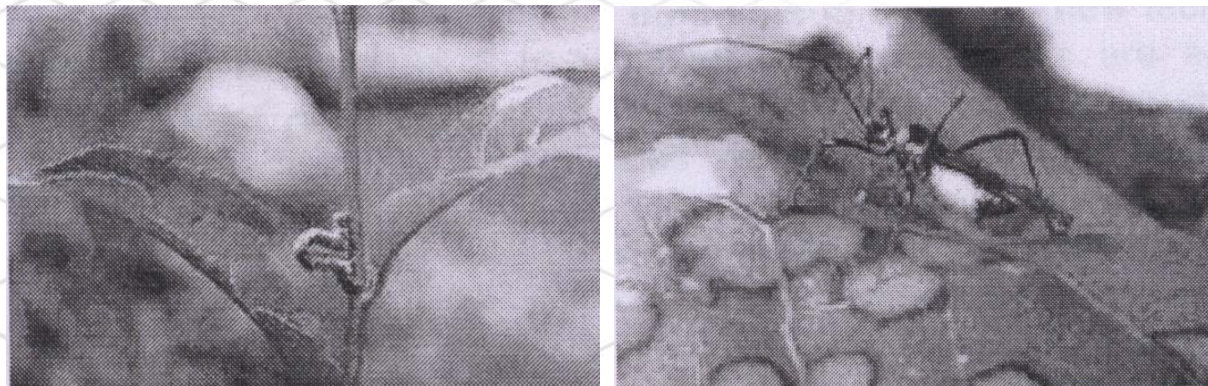
Leena and Shushanta undertook a project sponsored by “National Children Science Congress, 2001” with the theme of “Indigenous Scientific Knowledge for a better tomorrow” in the eighth standard at Muhila home Model School, Morigaon. They studied the use of medicinal plants, as mosquito repellent in Assamese society. They formulated a very effective herbal mosquito repellent by using some local herbs combination compared to some other repellants available in the market. Both the students had jointly won student award in the Third National Competition of National Innovation Foundation for their contribution.

## Control of tea pest

Dulal Borah is an innovative farmer who has studied up to the 10<sup>th</sup> std. He cultivates rice, sugar cane and also has a small tea plantation. He believes in organic farming, and prepared the herbal formulation for control of pest as well as growth promoter for tea plantation. The main ingredients of herbal formulation for controlling pest are *Albizzia procera* L., *Azadirachta indica* A. Juss. and *Moringa oleifera* Lamk., etc.



**Dulal Borah**  
Golaghat





**Upasana Talukdar and  
Arpita Devi**  
Morigaon

## Herbal pesticide for termite control

Upasana Talukdar and Arpita Devi from Morigaon are curious young environmentalist. Both these school students were concerned about the affect of chemical pesticides on animals and birds. They were equally disturbed about poisoning of peacocks in Rajasthan and similar fatal poisoning of birds in Assam. The ingestion of grain seeds treated with chemical pesticides triggers death of the birds. Bothered by these incidents they made a herbal formulation using Ipomea carnea Jacq. for controlling termites. The above formulation kills termites which destroy walls, within five minutes without harming other birds and animals.



## Bamboo bicycle, handpump and a tooth

The innovator's reliance on the 'Bamboo plant', an integral part of Assam's flora and fauna, has led to his many of his innovations.

Dodhi Pathak was a pioneer in developing bicycle frame made of bamboo. It was liked very much by the people in the First Award function by National Innovation Foundation. He has also made an artificial denture from bamboo which he himself uses and also makes for other needy persons who come to him. With this he can chew and eat all types of food including mutton and fish. One of the world largest dental appliance making companies in Germany had shown interest in his technology after reading about it. They were intrigued by the idea of a bamboo tooth.

He has also innovated a bamboo hand pump. Every part of the pump including the piston, valve, barrel and the handle is made from bamboo. Should not such people be encouraged to become brand ambassadors of Bamboo crafts.

The innovator was awarded during the Second National Competition of NIF.



**Dodhi Pathak**  
Nalbari





## NATIONAL INNOVATION FOUNDATION, INDIA

### The Sixth National Biennial Competition for Green Grassroots Unaided Technological Innovations and Traditional Knowledge

#### Co-sponsors



Honey Bee Network



CSIR



SRISTI



IIM-A

#### The competition

The NIF, set up by Department of Science and Technology, GOI, seeks entries of unaided technological innovations and traditional knowledge developed by an individual or group comprising farmers, artisans, fishermen and women, slum dwellers, workshop mechanics, students, local communities etc., in managing natural and/or other resources. The innovations can be in machines, gadgets, implements, or processes for farm operations, household utility, transportation, energy conservation or generation, reduction in drudgery, creative use of biodiversity, development of plant varieties, generation of herbal remedies for human or animal health or developing new or any other low cost sustainable green technology related to various aspects of survival in urban and rural areas. Creative ideas for innovative technologies which have not yet been reduced to practice are also welcome. Communities developing People's Biodiversity Register (PBR) or People's Knowledge Register (PKR) are encouraged to register/link their knowledge base with the National Register at the NIF.

#### The awards

The best three innovations and traditional knowledge practices will be awarded Rs 1,00,000, Rs 50,000 and Rs 25,000 each in different categories. In addition, individuals and/or organizations that make extraordinary contributions in scouting grassroots innovations and traditional knowledge may also get awards worth Rs 50,000, 25,000 and 15,000 respectively besides recognition to many others. There will be several consolation prizes of Rs 10,000 each in different categories depending upon the number of entries and incremental inventiveness and potential social and environmental impact. Three most outstanding innovative ideas may be given prizes of Rs 50,000, 25,000 and 15,000 in addition to consolation prizes of Rs 5,000 each. There are special prizes for innovations by or dealing with, physically challenged people. The innovations /ideas of professionally trained

persons are not considered for award or financial support. There are special awards for journalists writing about grassroots innovations and/or traditional knowledge and creating greater awareness about NIF's missions. *The award money may be revised in due course.*

#### Students

Young inventors and innovators are invited to send their ideas or innovations for a special category of awards for them. These should be unsupervised, an outcome of their own creativity, without any support from their teachers or outsiders. There will be prizes worth Rs 15,000, 10,000 and Rs 7,500 for the best three entries and several consolation prizes of Rs 5,000 each in this category.

#### How to participate

Individuals or groups may send as many entries as they wish on plain paper providing a) genesis of the innovation and traditional knowledge b) its background and c) educational qualification and occupation, accompanied by photographs and/or videos if possible and any other information that may help in replicating the innovations/traditional knowledge. Herbal entries may be accompanied by dried plant samples to enable proper identification procedure. The **Sixth National Competition started on February 1, 2007 and entries would be accepted till January 31, 2009.** Every entry should include the **full postal address** to facilitate further communications.

#### Where to send entries?

National Coordinator (Scouting & Documentation), National Innovation Foundation, Bungalow No. 1 Satellite Complex, Premchand Nagar Road, Ahmedabad 380015 Gujarat  
Toll Free No 1800 233 5555 Fax: (079) - 2673 1903  
email: [campaign@nifindia.org](mailto:campaign@nifindia.org); [www.nifindia.org](http://www.nifindia.org)