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GTU Students have shown high innovation index in the projects of this academic year and we wish they have to look further for innovations like below which solve real challenges of industries and society

3. 'Technological Edge Innovation' Awards on pages 11-14 (5 Awards)
2. 'More from Less for Many' Awardson pages 5-10 (4 Awards)
1. 'Social Innovations' Awards on pages 1-5 (4 Awards)

GTU students won **6 awards** out of 14 National Awards during Gandhian Innovation Award 2012 and it shows that given a chance our young innovators can set new benchmark in innovation era where they can meaningfully develop inclusive solutions for SMEs /industries and society in large. We believe that our students can certainly take an inspiration further to develop solutions/innovations which are at par with the innovations of the established institutes of the country. By bagging a series of awards recently by students on their innovation we certainly see that we have achieved significantly but still by raising our own expectations we can raise our own innovation index significantly. We are sharing the winning innovations with all our young students to take an inspiration so that they can develop frugal, inclusive and true India class innovation for mass.

Gandhian Young Technological Innovation Awards 2012 Winners including teams from GTU

Social innovations- Award Winners:

1. Vardaan: Stair climbing wheelchair :

Shanu Sharma, IIT Kanpur
Project Guides: Dr. J Ramkumar, Dr. Satyaki Roy

Wheelchairs are extensively used by disabled people to enhance their personal mobility. One of the basic problems of user on manual wheelchair is overcoming architectural barriers like kerbs stairs etc. on its way. Vardaan facilitates climbing up and down the stairs by using an innovative 'Y' shaped wheel that provides better grip and optimum braking along with a ratchet and a braking system.

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The 'Y' shaped wheel has been designed to mimic the human gait while climbing up. For climbing up the user pulls and pushes the lever ratchet attached on the axle of the Y shaped wheel. The design makes use of the fact that people with lower limb disability have high upper body strength and therefore pulling/pushing the ratchet lever can be conveniently operated by them. While during the climbing down the user can use brakes to control the motion of the wheelchair as the 'Y' shaped wheel rolls down the steps.

The braking system along with the 'Y' shaped wheel is likely to make the wheelchair a safe solution for climbing stairs for the user. The initial prototype has been tested under various circumstances like step sizes of stairs, people with different weight (58 kg-89kg) and it has shown satisfactory results. The wheelchair can navigate stairs with 350-230 mm width and step heights from 110-185 mm. As per National Building Code Specifications for step sizes of staircase of public building VARDAAN can climb all the public stairs.



2. Image, Speech Recognition and Speech Synthesis for physically disabled

Saurabh Saket and Rahul Ranjan , Bhutta College of Engineering & Technology, Ludhiana
Project Guide: Er Inderdeep Singh Grewal

Project Hope is an Image, Speech Recognition and Speech Synthesis system. It aims to aid people suffering from hearing and orating /vocal impairments.

Often people suffering from such disability have normal vision and therefore they are able to communicate through sign or gestures. This system through a webcam converts signs into text. The other person who may not know sign language can read this text. It can also be heard through text to speech. Further, when the other person speaks, the system will convert into a text which the deaf and dumb person can read,.Presently the system supports English. The device consists of a wearable camera along with speaker. The vocally disabled person can keep his hand in front of the camera and make gestures using sign language. The camera may capture the gestures and the onboard electronic system will identify and convert the gestures into text. The Onboard voice synthesizer will convert the text into voice. For the hearing disabled the onboard system may record the external voice and convert the same into text that will be displayed for the user.

The device may be lightweight and therefore the user may wear the system on his body. The innovators are also in process of developing a Gestural API, so those using this platform can directly proceed to make use of the platform's functionality. The team needs support to make the functionalities more smooth, develop viable prototypes and take it to market.

3. Multi Desire Wheelchair

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Chintan Patel, Mayank D Patel, Mayank I Patel and Biren Patel

Laljibhai Chaturbhai Institute of Technology, Mehsana, **A GTU-AFFILIATED COLLEGE**

Project Guides: Prof YL Raol, Prof AB Patel



India has some 40 to 80 million persons with various kinds of lower limb disabilities. Wheelchairs are a very common mobility assistance system for people with lower limb disability. However wheelchairs cannot serve people with upper both upper and lower limb disability. It is suited for persons with both upper and lower limb disability. It is a battery driven wheelchair, which can be operated through joy stick or using tongue and head movements depending upon the kind of disability the person has. The chair sports sensors attached on the seat at the neck position and these can be operated by the movement of the neck to maneuver the wheelchair. Similarly the tongue may also be used to provide inputs to the wheelchair's mechatronical system through sensors. It can also be easily elevated to a convenient height. This wheelchair facilitates easy movement for people with spinal injuries, as they can navigate it using their tongue.

4. Jeevan Dhara – handpump with integrated filtering system

Kirti Ranjan, Sankhya Mohanty, Sushant Sachan, IIT Kharagpur

Lack of access to clean drinking water is a major problem in India. Jeevan Dhara is an innovative water purification system is a promising idea that aims to solve this



problem by making a low cost water purification solution that uses electricity. It is still at a conceptual stage with only minimal testing.

'More from Less for Many' innovations- Award Winners

1. LPG based Refrigerator

The Gandhian awards received prototypes from two teams based on this concept.

TEAM 1:

Chintan Patel, Mayank D Patel, Mayank I Patel and Biren Patel

Laljibhai Chaturbhai Institute of Technology, Mehsana **A GTU-AFFILIATED COLLEGE**

Project Guides: Prof YL Raol, Prof AB Patel

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TEAM 2:

Jainil Bhatt, Dhruvin Kagdi, Tirth Jani, Kunjal Jadav

Project Guide: Prof. Tushar Patel

LDRP-ITR College, **A GTU-AFFILIATED COLLEGE**

Continuous electricity supply is still not available in large parts of the country. Still the people in these regions require refrigeration for a variety of socially relevant purposes such as cold storage or storing medical supplies. This project has the novelty of using LPG instead of electricity for refrigeration. This solution is convenient for refrigeration in regions without proper electricity. It works on the principle that during the conversion of LPG into gaseous form, expansion of LPG takes place. Due to this expansion there is a pressure drop and increase in volume of LPG that results in the drop of temperature and a cooling effect. This cooling effect can be used for refrigeration purposes.

The technology can provide refrigeration for socially relevant needs in areas where continuous electricity supply is absent. It can also replace refrigerators currently using CFCs and HFCs, which are causing global warming.



Team 1: The team from Laljibhai Chaturbhai Institute of Technology made a prototype in which the evaporator temperature reached -5°C at an ambient temperature of 12°C .

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Team 2: The team from LDRP-ITR utilised this principle to develop a heat exchanger comprising network of pipes through which LPG gas can pass, covered by thin and closely spaced fins. The addition of fins help in effective and faster cooling. The insulating material helps in storing the cooling effect for a

longer period of time.

2. Incense stick maker (Appreciation)

Keshav G, IIT Gandhinagar

Project Guide: Prof Murali Damodaran, Prof. K. Sudhakar

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Agarbatti making is a large industry in India employing 800,000 people. An agarbatti making worker- who are mostly women and children- has to bend down and work on a wooden board for 8 to 10 hours a day in order to roll 5,000 Agarbatti. This kind of hard labor leads to spinal pain, abdominal pain and pain in the hands and legs.

This prototype aims to mitigate this hardship of agarbatti workers through a low cost agarbatti maker which can be used at home also to make agarbattis. This machine is a low-



cost, semi-automatic and hand driven machine which may double the production capacity. The machine is ergonomically designed to mitigate back pain and other spinal problems. Using this machine, a woman may be able to roll about 6000 sticks a day.

The prototype consists of a roller mechanism in which dough is fed. In the

machine, the black agarbatti paste is flattened using calendar rolling systems. The flat paste is then cut into strips of required width using cutting roller, which is later wrapped around the bamboo stick using wooden roller.

The final assembly consists of rollers made up of wood, rubber conveyor belts, steel pipes. Therefore owing to the simple component and assembly the cost of final machine may be low.

3. Domestic Refrigerator with Water Heater (Appreciation)

Dhruv Patel ,Project Guide: Dr Nilesh M Bhatt ,*Gandhinagar Institute of Technology, Gandhinagar* **A GTU-AFFILIATED COLLEGE**



Modified Domestic refrigerator has two interesting novel functions. The waste heat of compressor is used to heat water, through a heat exchanger and in the process of removing heat, the life of compressor is extended and its efficiency goes up. Thus the power consumption also goes down because compressor has to work less.

The lukewarm water thus generated can be used cleaning kitchen utensils, washing clothes, bathing etc. Through this modified design daily 100 liters of lukewarm hot water can be produced while the cooling capacity of the

refrigerator is increased by about 20 per cent . This may also reduce the consumption of electricity.

4. Automobile Air Conditioning using Engine Exhaust Heat (Appreciation)

Harish Tiwari, Mechanical engineering, Pimpri Chinchwad College of Engineering (PCCEP)

Guide- Professor Parishwad



An automobile AC consumes about one-tenth of the total fuel. This is a significant cost for the vehicle owners such as truck drivers who travel round the clock running. It addresses this challenge by designing an AC that may be able to run itself by using waste heat from the automobile exhaust. It may therefore make the running of an automobile more economical.

It achieves this by using an adsorption refrigeration system powered by exhaust heat with only two control valves. A prototype of 1 kW cooling capacity has been designed and developed in the laboratory. The adsorbers use

an innovative double pipe heat exchanger to enhance heat transfer and reduce the heating and cooling time. The system dimensions have been obtained and found to be suitable for Automobile and the system can operate in mobile applications.

The overall weight of the system for a cooling capacity of 1 kW is around 30 kg. The heating time required to achieve the cooling effect is around 10 minutes. The number of valves is just two which gives reliability to the system and reduces the likelihood of leakage. The project requires support in fabricating a full-scale prototype.

'Technological Edge' innovations- Award Winners

1. Smart Grid Forecasting Technique

V S K Murthy Balijepalli ,IIT Bombay

Today renewable energy generation is increasing at a rapid pace. This will gradually lead to the creation of a decentralized electricity grid which will pose greater challenges of grid stabilization. Stabilizing such a decentralized grid requires integrating the ability to forecast grid parameters and respond appropriately within the grid.

This project has developed a forecasting technology called km-technology (km-tech) that



uses **golden search interpolation techniques, Fibonacci functions, robust regression algorithms and novel advanced neural networks** to give accurate forecast of electricity price, effective load, wind energy and grid frequency.

Km-technology can be applied with any forecasting tool to improve the accuracy of predictions/ to improve the performance of the existing forecasting tools, which uses sophisticated proprietary mathematical functions to read the system behavior. Accurate, near real-time price and load predictions may eventually lead to shifting of transmission peaks, better outage management and distribution system.

2. Tiles Measurement and Grade Classifying Equipment

Dulari Kothari, Khyati Kotecha, Deep Bhimani, Jasmin Nandaniya, Chirag Patel
Government Engineering College, Rajkot **A GTU-AFFILIATED COLLEGE**

It uses an embedded system to classify tiles in different grades using digital image processing and measure the thickness of tiles using ultrasonic waves. The ceramic tile industry is almost completely automated with the exception of the last step of visual inspection, which is undertaken for the classification of tiles into different grades. In this system designed by the innovators, images of tiles are captured, digitized and an algorithm used to compare it against a standard tile image and accordingly the tiles are classified.

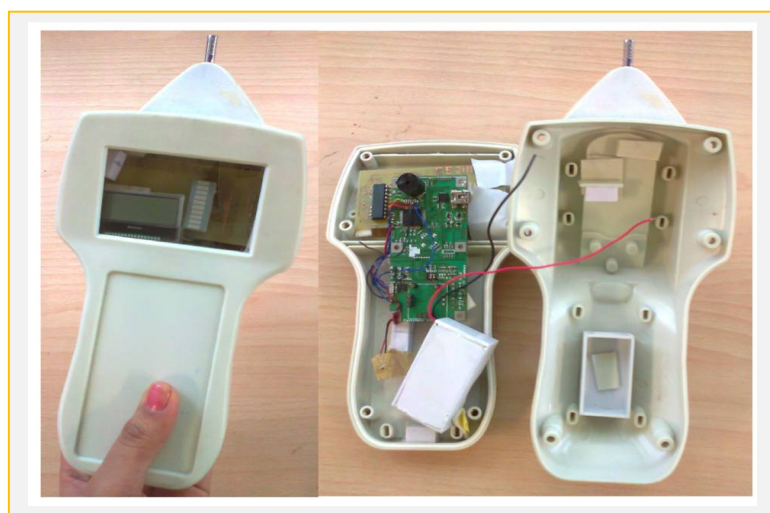
To measure the thickness of a tile, ultrasonic waves involving pulse echo method are used. The measurement unit uses a continuous signal in the transmission frequency range of ultrasonic transducers. The team designed the systems for a Tile manufacturer based in Morbi, Gujarat. The students had identified this problem as 'industry defined problem' while on an industrial shodhyatra at the local unit of tile manufacturer. The automation of the tile grade classification may reduce the time and improve the reliability of tile grade classification.

3. Ultra sensitive, low cost Hand held Explosive Detector System

Neena Gilda, Sandeep S, Seena V, Sheetal Patil IIT Bombay
Project Guides: Prof V Ramgopal Rao, Prof Dinesh K Sharma, Prof Maryam S Baghini

It has developed a low cost device that can detect explosive materials like TNT and RDX using the same technique as sniffer dogs. TNT & RDX materials generate vapors which are present in the atmosphere. The hand held device developed can

selectively detect these vapors using micro-cantilever based sensors and ultra sensitive instrumentation. This hand held, 9V battery operated device costs about 5% of the cost of the existing instruments in use. The portable system has alarm along with LCD display and measures 6 cm X 12 cm. Also, it can be used by layman on field. **Sensitivity down to 10 parts per trillion is achieved with novel ultra sensitive current excitation method and novel micro-cantilever based**



piezoelectric sensors fabricated at CEN lab, IIT Bombay.

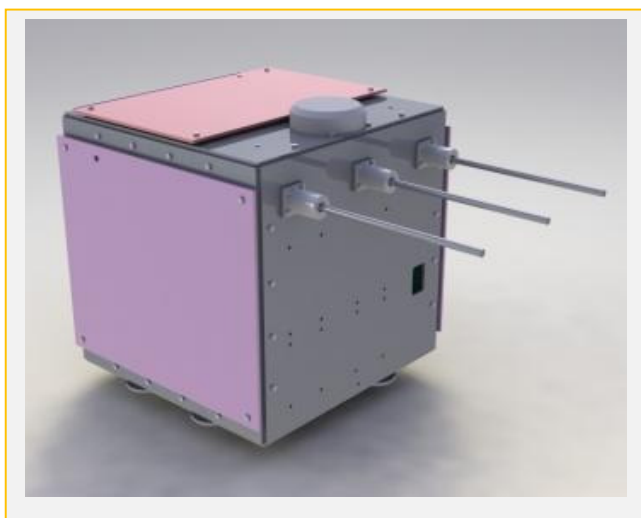
Any explosive casing blast can be detected within few seconds & can raise alarm with this system. This system has been tested in lab conditions and is working perfectly fine on field also. The instrumentation work

has been patented

5. A Tsunami warning system using ionospheric measurements (Appreciation)

Jhonny Jha, Sanyam Mulay, Deepika Thakur, Husain Manasawala, Tushar Jadhav IIT Bombay
Project Guide: Prof. K. Sudhakar

The project uses a novel technique for ionospheric tomography using the TEC data. The TEC data for this system is obtained from Pratham, a satellite developed by IIT Bombay. The TEC data is being generated using ten ground stations in India and one in France. The algorithm reconstructs the distribution of electron density across various layers of the ionosphere with more than 85% accuracy. This allows forecasting tsunami with a good deal of accuracy.



It has devised a new technique for providing tsunami forecasting. Accurate forecasting of Tsunami can be very vital in issuing warnings and evacuating the people from regions with the possibility of being hit by tsunami.

The cost of this tsunami warning system may be a hundred times cheaper than the existing systems due to the very low

cost of obtaining TEC data from satellite pratham.

5. Design, Synthesis & Evaluation of Novel Steroidal Aromatase Inhibitors in Breast Cancer (Appreciation)

Dr. Prafulla M. Sabale

Parul Institute of Pharmacy, Vadodara **A GTU-AFFILIATED COLLEGE**

The project has designed a novel drug formulation that inhibits breast cancer causing agent using carbinitrile group. Inhibition of aromatase, a cytochrome P-450 enzyme responsible for biosynthesis of estrogens, is an effective approach for the prevention and treatment of estrogen-dependent breast cancer. Carbonitrile containing compound shows enhancement in aromatase inhibiting activity. The present work aims to introduce carbinitrile group in ring-D and to observe its impact on the aromatase inhibiting activity of the molecule. A novel A- and D-ring substituted steroid 16 β -cyano-17 β -hydroxy-4-phenylthia-4-androsten-3-one (7) has been synthesized and evaluated for its potential as aromatase inhibitor using human placental microsomal preparation as the enzyme source and [1 β -3H]androstenedione as substrate.