MECHANICAL ENGINEERING

INDIAN INSTITUTE OF TECHNOLOGY PATNA

Mechanical Undergraduate Placement Brochure 2017-18
Indian Institute of Technology Patna

For more info: www.iitp.ac.in/placement Email: tpc@iitp.ac.in

Department of Mechanical Engineering

Vision: Our aim is to engage in the frontiers of the field and channelize the state of art knowledge to train personnel who can solve problems of relevance to the society at large. While imparting high-quality education, the emphasis is being imparted on taking up innovative ideas from concept stage to final product development stage via the route of basic technology research, feasibility studies, technology improvement, demonstration and product development.

About: Since its inception in 2008, Department is advancing towards the frontiers in the field of Mechanical Engineering. Presently the department is offering B.Tech, M.Tech and PhD degrees. The personnel in the Department venture in diverse multidisciplinary fields including surface engineering, soft tissue mechanics, non-traditional manufacturing, laser material processing, condition monitoring, biomedical robotics, biomedical bone drilling, computational mechanics, fracture finite element modelling, composites, fire, micro and nano-scale heat transfer, boiling and condensation, two-phase flows, refrigeration and air conditioning, computational fluid dynamics, colloids and interfacial science, soft computing and microgravity, among others. Such activities are aptly supported by 16 state-of-the-art research cum teaching laboratories. Significant no. of patents and publications in various top multidisciplinary journals is an evidence of the flourishing research environment in the department. Department has received over 5.0 crores of funding support in terms of sponsored projects and consultancy works from various government and industry agencies including Aeronautics Research Development Board (ARDB), Defence Research Development Organization (DRDO), Board of Research in Nuclear Science (BRNS), Department of Electronics and Information Technology (DeITY), Department of Science and Technology (DST), Indian Space Research Organization (ISRO), among others.

Course Curriculum

Major Core Courses

- Solid Mechanics
- Fluid Mechanics
- Thermodynamics
- Machine Drawing
- Engineering Materials
- Manufacturing Technology
- Mechanical Measurements
- Advanced Solid Mechanics
- Mechanical Workshop
- Design of Machine Elements
- Kinematics of Machinery
- Heat and Mass Transfer
- Mechanical Engineering Laboratory
- Applied Thermodynamics
- Machine Design
- Dynamics of Machinery
- Control System
- Industrial Engineering and Operation Research

Major Elective Courses

- **Computational Fluid Dynamics**
- **Dynamics of Structural Members**
- **Finite Element Method**
- **Laser Material Processing**
- **Refrigeration and Air Conditioning**
- **Robotics and Robot Applications**
- **Robotics: Advanced Concepts and Analysis**
- **Turbulent Shear Flows**
- **Aerodynamics**
- **Composite Materials and Engineering**
- **Rotor Dynamics**
- **Mobile Robotics**

Research activities

Few recent entrepreneurial student projects:

- Design and fabrication of automated GMAW process and analysing welded zone through image processing.
- Smart hybrid IOT based solar cooker.
- The design of Wind Turbine.
- The design of magnetic microbot.
- Design and fabrication of hybrid harvester.
- Development of robot for municipal waste sorting.
- Robust motion planning of bio-inspired amphibious robots.
- A mechanistic model for prediction of cutting forces in the mechanical micro-drilling process.
- Multi-sensor based intelligent tool condition monitoring in mechanical micromachining.
- Evaluation of burst criteria of zircaloy cladding.
- Studies on Maxwell stress and hysteresis characteristic of poly-acrylic and silicon-based elastomers.
- Design analysis of composite patch repair of structural members by the mesh-free method.

Incubation Centre

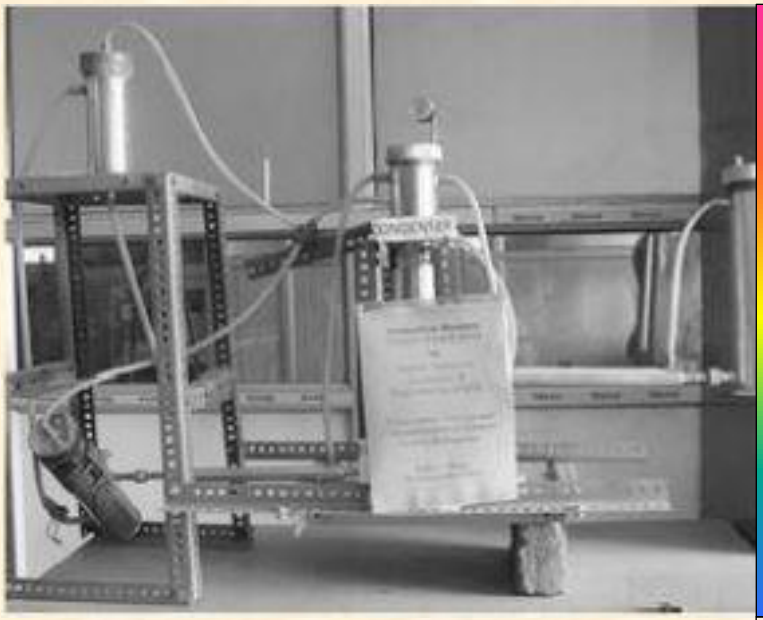
Incubation Centre at IIT Patna has been established to set up state of art infrastructure for nurturing technology, Ideas and Innovation in the areas of Electronic System Design and Manufacturing (ESDM) with a focus in medical electronics.

Incubation Centre is funded by Dept. of Electronics and IT, Govt. of India and Govt. of Bihar to the tune of Rs. 471.20 Million

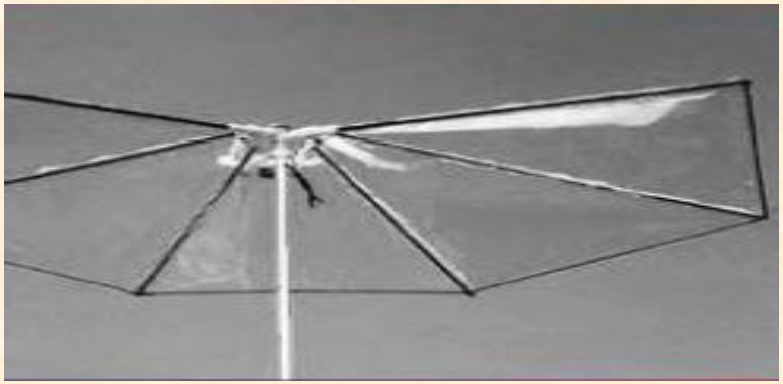
PATENTS

Title	Application No.
Biaxial stretching device	985/KOL/2013
Whirl detection of shaft coupled with an induction motor using full spectrum analysis of motor current signature	1026/KOL/2014
Manual Wheat Harvester	261817
New design application-Handle operated garbage and soil collector	272013/D/NF/SKM

INNOVATIVE PROJECTS



A prototype to test the feasibility of thermodynamic cycle proposed by Einstein and Szilard. Flexible design concepts are implemented thus allows accommodating future accommodations (if any). The experiments on the designed setup confirmed the feasibility of Einstein-Szilard Refrigerator.



"Innovative Student Project Award 2013" by Indian National Academy of Engineering (INAE). "Flapping wing air vehicles" at the conceptual and application level, an attempt on miniaturized ornithopter mechanisms focusing on expanding their usage as surveillance and spying bots.

The robot gripper is capable of identifying any objects using computer vision, position itself using the wheels and pick up the object with the help of inverse kinematic and distance sensor. The bot uses a raspberry pi as high level processor and Arduino for low level control.

Laboratory Facilities

Mechanical Workshop

Instrumentation and Control Laboratory

Heat and Mass Transfer Lab

CAD-CAM Laboratory

Dynamics and Vibration Laboratory

Advanced Manufacturing Laboratory

Fluid Mechanics and Machining Laboratory

Material Testing Laboratory

Computational Fluid Dynamics Laboratory

IC Engine Laboratory

Robotics and Automation Laboratory

Metrology Laboratory

Fire Research Laboratory

Tribology Laboratory

Microfabrication Laboratory

Student Clubs and Events

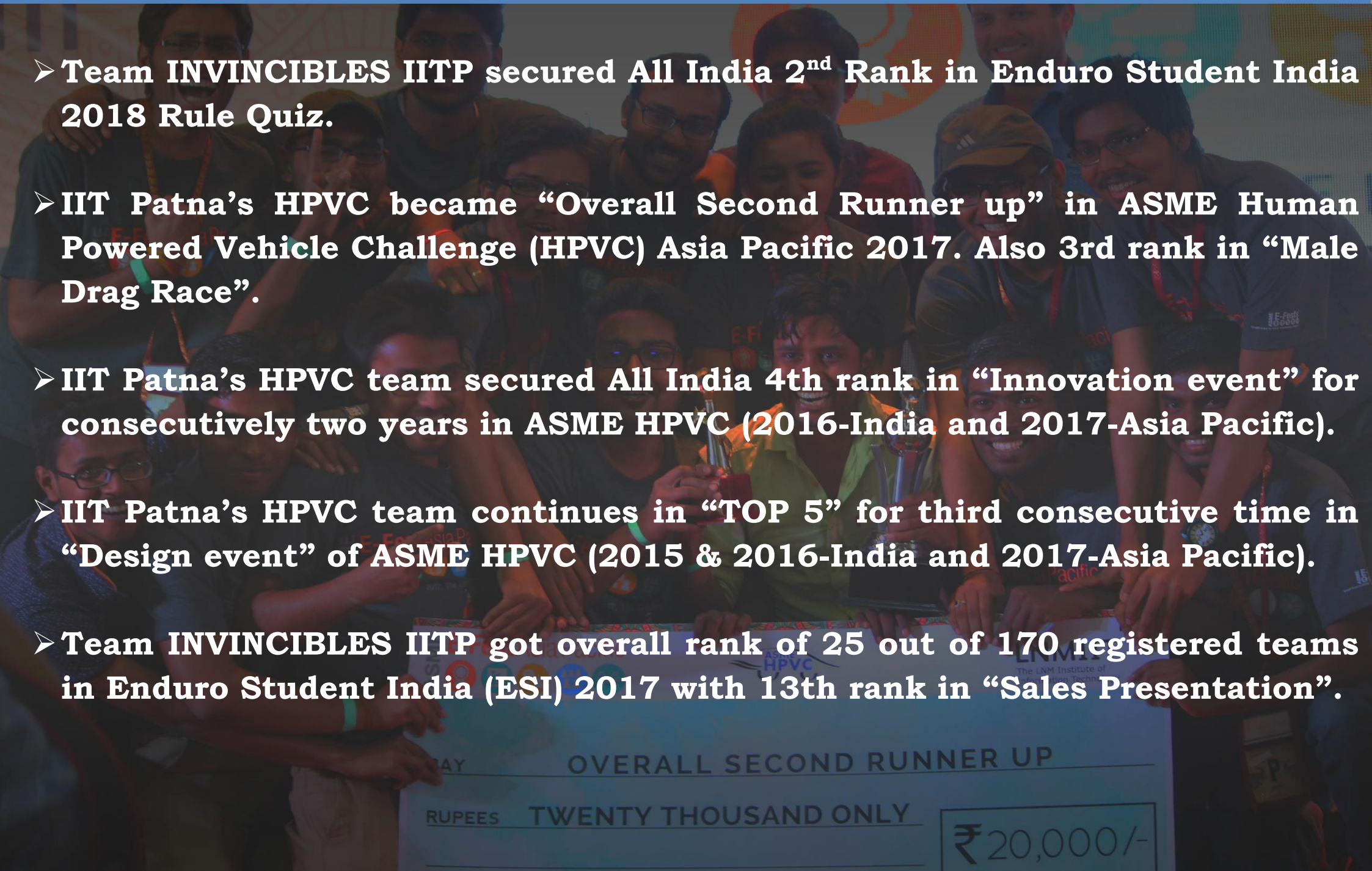
- ***Student Council of Mechanical Engineers (SCME)***
  Keep students engaged in robotics activities throughout the year through lectures, workshops and events.

- ***SAEINDIA (Society of Automotive Engineers) IIT Patna Collegiate Club***
  In-house vehicle designing and fabrication is done based on set parameters and marketing models are proposed. This vehicles compete in national level events like SUPRA, BAJA and Enduro Student India.

- ***Rural Technology Development Club (RTDC)***
  A club dedicated to development of technology providing solutions to difficulties faced by rural India. Also conducts events like “Adhyayan” to teach students at village government schools.

- ***Tinkerer Club:*** Under this club in HPVC, Students team design and fabricate futuristic human powered vehicles and compete in American Society of Mechanical Engineers (ASME) HPVC events held at national level annually.

Achievements



- **Team INVINCIBLES IITP secured All India 2nd Rank in Enduro Student India 2018 Rule Quiz.**
- **IIT Patna's HPVC became "Overall Second Runner up" in ASME Human Powered Vehicle Challenge (HPVC) Asia Pacific 2017. Also 3rd rank in "Male Drag Race".**
- **IIT Patna's HPVC team secured All India 4th rank in "Innovation event" for consecutively two years in ASME HPVC (2016-India and 2017-Asia Pacific).**
- **IIT Patna's HPVC team continues in "TOP 5" for third consecutive time in "Design event" of ASME HPVC (2015 & 2016-India and 2017-Asia Pacific).**
- **Team INVINCIBLES IITP got overall rank of 25 out of 170 registered teams in Enduro Student India (ESI) 2017 with 13th rank in "Sales Presentation".**

Achievements

- **Best paper award to our mechanical students Vishal Nagarkoti and Omprakash Sahu in the 6th International and 43rd National Conference on Fluid Mechanics and Fluid Power (FMFP) 2016.**
- **Team SUPRA IIT Patna successfully participated in Student formula racing main event "SUPRA SAEINDIA 2016" held at Buddh International Circuit, Noida and secured 53rd rank out of 173 registered teams.**
- **IITP Mechanical Engineering Student's won bronze medals in business event "Markovation" event held during "Inter IIT Tech Meet 2017".**
- **IITP Mechanical Engineering Student's Ravi Kumar and Ravi Anand were Runners up in Patna region of "TATA Crucibles Campus 2017" quiz.**

Internships

Students of IIT Patna are encouraged for industrial exposure and student exchange programs. Students of sixth semester need to have a mandatory internship experience.

Students have done Internship in:-

- **Research Internship**
  - Simon Fraser University, BC, Canada
  - Nanyang Technological University Singapore
  - Bhabha Atomic Research Centre
  - IIT Bombay
  - IIT Kanpur
  - IIT Roorkee
  - IIT Guwahati
  - IIIT Hyderabad
  - Rakshak Foundation
  - IIT Delhi
  - Embryyo Technologies, Pune
- **Industrial Internship**
  - Gas Authority of India Limited (GAIL)
  - Steel Authority of India Limited (SAIL)
  - Goa Shipyard Limited
  - Indian Railways
  - TATA Motors
  - BHEL
  - Hybridtronics Pvt. Ltd.
  - Mahindra & Mahindra
  - Vuelogix
  - RBOL

Past Recruiters

- Indian Space Research Organization (ISRO)
- Indian Oil Corporation Ltd.
- TVS Motor
- Tata Motors
- Mahindra and Mahindra
- Capgemini
- Skylark Drones
- EdCIL (India) Ltd.
- L&T ECC
- Future First Info Service Pvt. Ltd
- Bharat Petroleum
- Coal India
- Hindustan Petroleum (H.P.)
- Hero MotoCorp
- Defence Research and Development Organisation (DRDO)
- Indian Navy
- TCS Innovation Lab
- Polaris
- Morgan Stanley
- Samsung
- Bank Bazaar
- Tata Technologies
- Flytxt
- Resonance
- Snapdeal
- Deloitte
- Aakash Institutes

IIT Patna Student works in News

THE TIMES OF INDIA, PATNA • SATURDAY, MARCH 11, 2017

TIMES CITY 3

IIT-P students shine at int'l innovation event

TIMES NEWS NETWORK

Patna: IIT-Patna shone at the Human Powered Vehicle Challenge with its team 'Alacrity' bagging the third position and winning Rs 20,000 as prize at the competition organised by the American Society of Mechanical Engineers from March 3 to 5 in Jaipur.

The annual international competition sees participation of engineering students who have to design, innovate and fabricate a human-powered vehicle. At least 41 teams, shortlisted from 61, participated in the event this year. The competition had different levels, including design, innovation, speed (for female and male) and endurance.

IIT-Patna's 'Alacrity' members all smiles after the Jaipur event

"It took us almost 45 days to design our human-powered bicycle for the competition. We are happy that our hard work didn't go in vain," said a beaming Dharmesh Kumar Dewangan, a third-year mechanical engineering student of the IIT-Patna.

Dharmesh was in the 15-member team from IIT-Patna, which manufactured a lightweight, efficient, dexterous semi-recumbent vehicle which can safely and effectively be used for everyday transportation. The vehicle, which cost Rs 10,000, was sponsored by the Research and Development Unit of the IIT-Patna.

The team's captain was Abhishek Singh and mentor Atul Thakur. "The bicycle has a Smart Automatic Gear Changing (SAGC) system controlled by a smartphone attached to the vehicle," said Zeeshan Alam, another team member.

A new mobile app, 'Alacrity SAGC', has been developed for the purpose. "The vehicle also has features like Rollover Protection System, Aerodynamic Fairing and 7x3 Gear System," added Zeeshan. During the drag race, the vehicle was driven by team member S Vijay Anand, who achieved the top speed of 45 kmph with an average speed of 35kmph. "It was not easy to accelerate it to such a high speed, but it was necessary to win the competition," recalled Anand.

The team's only female member, Pranjali Sharma, said the team went through many ups and downs as it prepared for the competition. Gaurav Srivastava, who was also in the team, added ours would be a merrier Holi this year.

The other members of the team were Karan Gupta, Ashish Kumar, Chandan Gupta, Avinash Kumar, Amrit Raj, Chaitanya Kumar, Sarthak Rastogi, Shiv Jee and Shashank Kumar.

Students build phone-powered all-terrain vehicle

IIT team vrooms with Queen

ROSHAN KUMAR

Students from Indian Institute of Technology-Patna came 25th in an all-India inter-college vehicle design competition by developing an all-terrain vehicle (ATV) with a smartphone-powered driver-suggestion system.

Twenty-eight second- and third-year students designed the single-seater vehicle, which they call The Queen and which has a system that receives signals like GPS coordinates, ultrasonic sensor readings to display the vehicle's speed, position and ground clearance.

The students call their team "Invincible IITP", and their leader is third-year mechanical engineering student Saurav Jain while Anirban Bhattacharya from the department of mechanical engineering is the faculty advisor.

The team had participated in the finals of Enduro Student India 2017, all-India inter-college vehicle design competition held in Coimbatore, Tamil Nadu, in January.

"Around 170 teams from different engineering colleges, including prominent ones like IIT-Hyderabad, Birla Institute of Technology & Science (BITS) and students from several NITs, participated at the event," Saurav said.

The all-terrain vehicle developed by IIT-Patna students

"The team from IIT-Patna finished with an overall rank of 25 in their first attempt at the event." The teams first had to clear a preliminary round in which IIT-Patna stood at 12th position. In the second round, 79 teams participated.

Though the IIT-Patna team came in 25th overall, in some specific categories they performed better.

For example, at the vehicle endurance race test in which the vehicle had to make a four-hour continuous drive to test its engine power and other features, the team came 17th out of 57 participating teams.

Saurav said The Queen's USP is it its driver-suggestion system. A smartphone is fitted in the vehicle in front of the driver's seat.

The smartphone through web applications receives signals like GPS coordinates giving detailed information such as the degree or curve at which the vehicle is titled.

The mobile, which receives ultrasonic sensor readings, displays the vehicle's speed, its position and ground clearance. Ground clearance, also known as ride height, indicates the height of the lowermost part of the vehicle with respect to the ground.

"In normal vehicles, the ground clearance is of six to seven inches, but The Queen has ground clearance of 11 inches which makes the vehicle safer and more durable in driving on difficult terrains as the vehicle doesn't touch the ground," Saurav said.

The vehicle uses lightweight pneumatic springs for better shock absorbing power.

"The pneumatic springs are around 2kg in weight, much less than coil springs which weigh 8kg," Saurav said.

The Queen can run 30km per litre and has a speed of 54km per hour.

Anirban, who acted as the faculty adviser for the team, said: "We have set a platform for the future. Teams from our institute will participate in such events at different institutes too."

He added: "IIT-Patna provided funds to the team for developing the vehicle, while the other sponsors were NTPC, BRPNNL, PNB, Allahabad Bank and Canara Bank."

ह्यूमन पावर्ड व्हीकल चैलेंज में तीसरे नंबर पर रही आईआईटी पटना की टीम

पटना| द अमेरिकन सोसाइटी ऑफ मेकेनिकल इंजीनियर्स के ह्यूमन पावर्ड व्हीकल चैलेंज (एचपीवीसी) 2017 में आईआईटी पटना की टीम तीसरे स्थान पर रही। तीन से पांच मार्च तक जयपुर में हुए इस चैलेंज में देशभर की 41 टीमों ने भाग लिया। इस संबंध में आईआईटी पटना के मेकेनिकल विभाग के डॉ. अतुल ठाकुर ने बताया कि आईआईटी पटना की टीम को ओवरऑल तीसरा स्थान मिला। जबकि मेल ड्रैग रेस में तीसरा, डिजाइन में चौथ, एंड्यूरेंस रेस में पांचवां और फीमेल ड्रैग रेस में 15वां स्थान मिला।

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IIT Patna pupils ready with Formula One vehicle

The vehicle, christened 'Jarvis', has multiple features for safety and speed and has bee designed under the guidance of Prof Manabendra Pathak.

TNN | July 03, 2016, 13:02 IST

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Patna: Students of Indian Institute of Technology-Patna (IITP) are ready with the special Formula One vehicle to participate in the national round of "SUPRA 2016" to

Formula One's ruling body has this week clarified the rules on

Download complimenta copy of Whitepaper: Glo Indian Automotive Indu 2010 to 2020

Most Read | This Week

उपलब्धि : भारतीय प्रौद्योगिकी संस्थान पटना के छात्रों की डिजाइन की गई साइकिल को चौथा पुरस्कार

टॉप गियर में दिखा आइआइटी छात्रों का 'इनोवेशन'

जागरण संवाददाता, पटना : भारतीय प्रौद्योगिकी संस्थान पटना (आइआइटी) के छात्रों की टीम ने वेल्लूर इंस्टीट्यूट ऑफ टेक्नोलॉजी (वीआइटी), वेल्लूर में 17 से 19 मार्च तक आयोजित अंतरराष्ट्रीय प्रतियोगिता में इनोवेशन कैटेगरी में चौथा स्थान हासिल किया है। कंपीटिशन में भाग लेने वाली टीमों को अपनी डिजाइन की गई साइकिल ('सेमी-रिकम्बेंट बीकर') का प्रदर्शन करना था।

'ह्यूमन पावर्ड व्हीकल चैलेंज (एचपीवीसी) इंडिया 2016' प्रतियोगिता का आयोजन प्रतिवर्ष 'अमेरिकन सोसायटी ऑफ मेकेनिकल इंजीनियर्स' (अस्मे) करता है। आइआइटी पटना की टीम 'अलैक्रिटी' को इनोवेशन इवेंट में चौथा एवं डिजाइन इवेंट में पांचवां स्थान हासिल हुआ। 22 सदस्यीय टीम ने फैकल्टी सदस्य डॉ. अतुल ठाकुर के मार्गदर्शन एवं कैप्टन धर्मेश कुमार देवांगन के नेतृत्व में प्रतियोगिता में भाग लिया।

कंपीटिशन में एनआइटी पटना, बीआइटी पटना, आइएसएम धनबाद, एनआइटी राउरकेला, एनआइटी रायपुर, केआइआइटी यूनिवर्सिटी भुवनेश्वर, चंडीगढ़ विश्वविद्यालय, एनआइटी सिलचर समेत देश के 41 प्रमुख तकनीकी संस्थानों, विश्वविद्यालयों एवं विदेश की कुछ टीमों ने भाग लिया था। चंडीगढ़ विश्वविद्यालय की टीम को ओवरऑल प्रथम स्थान हासिल हुआ।

- डिजाइन इवेंट में पांचवां स्थान
- वीआइटी वेल्लूर में 17 से 19 मार्च तक आयोजित हुई थी कंपीटिशन
- टीमों को अपनी डिजाइन की गई साइकिल का करना था प्रदर्शन
- एनआइटी पटना, बीआइटी पटना समेत देश के 41 संस्थानों की टीमों ने कंपीटिशन में लिया था भाग

आइआइटी पटना के छात्रों की टीम ने डिजाइन की है यह साइकिल

ये हैं साइकिल की खूबियां

- रास्ते में आने वाली बाधाओं को पहचानने के लिए इसमें लगा अल्ट्रासोनिक सेंसर चालक को अलर्ट करता है।
- हाईस्पीड के लिए इसमें कई गियर हैं।
- इसका स्टीयरिंग गोलाकार है।
- सीट घूम सकती है। चालक के आराम के लिए इसे 30 से 75 डिग्री पर झुकाया जा सकता है।
- डिजाइन एरोडायनेमिक है ताकि घर्षण बल न्यूनतम रहे।
- आगे एवं पिछले पहिये का अनुपात 20:26 है ताकि चालक को सामने बेहतर ढंग से नजर आये।

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