

Mechanical Undergraduate Placement Brochure 2018-19 Indian Institute of Technology Patna

For more info: www.iitp.ac.in/placement

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# 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
- 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.

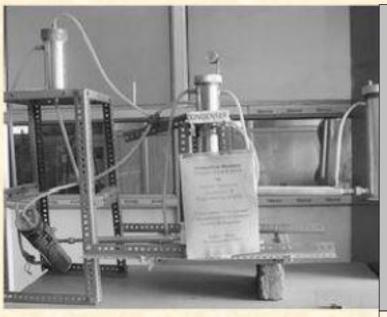
# Incubation Centre

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**

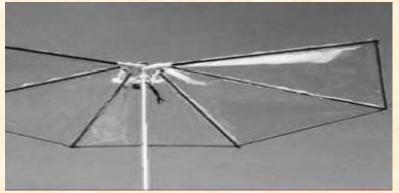
Title	Application No.
Biaxial stretching device	985/KOL/2013
Whirl detection of shaft coupled with	1026/KOL/2014
an induction motor using full spectrum	
analysis of motor current signature	
Manual Wheat Harvester	261817
New design application-Handle	272013/D/NF/SKM
operated garbage and soil collector	



# 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
  - Keeps students engaged in practical mechanical related activities via regularly organized workshops, events and competitions.
- SAE INDIA IIT Patna Collegiate Club

In-house vehicle designing and fabrication is done by students, based on the set parameters and proposed marketing models. These vehicles compete in national competitions like SUPRA, BAJA etc.

Rural Technology Development Club (RTDC)

A club dedicated to development of technology providing solutions to difficulties faced by rural India. It governs an educational initiative named "Adhyayan" to provide basic education to students of village government schools.

Tinkerer Club

Under this club, students attend various educational workshops and participate in national competitions like ASME HPVC and ROBOCON. Robocon focuses on designing and manufacturing of robot to complete an assigned task.

# **Achievements**

- Team INVINCIBLES IITP secured overall rank of 14 out of 102 teams registered in Enduro Student India 2018 along with 7<sup>th</sup> rank in "Endurance Race" and 9<sup>th</sup> rank in Business "COST" Event.
- ➤ IIT Patna's HPVC became "Overall Second Runner up" in ASME Human Powered Vehicle Challenge (HPVC) Asia Pacific 2017 along with 3<sup>rd</sup> rank in "Male Drag Race" and 4<sup>th</sup> rank in "Design event".
- >IIT Patna's HPVC team secured All India 4<sup>th</sup> 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 fourth consecutive time in "Design event" of ASME HPVC (2015 & 2016-India and 2017 & 2018-Asia Pacific).

# **Achievements**

- ▶ Best paper award to our mechanical students Vishal Nagarkoti and Omprakash Sahu in the 6<sup>th</sup> International and 43<sup>rd</sup> National Conference on Fluid Mechanics and Fluid Power (FMFP) 2016.
- Team SUPRA IIT Patna successfully participated in Student formula racing main event "SUPRA SAEINDIA 2018" held at Buddh International Circuit, Noida and secured 22<sup>nd</sup> rank out of 112 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 Team came 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 have done Internship at:

### > Research Internship

- Council of Scientific & Industrial Research
- National Chung Cheng University, Taiwan
- DRDO
- Research Design & Standards Organization
- Bhabha Atomic Research Centre
- IIT Bombay
- IIT Kanpur
- IIT Varanasi (BHU)
- IIT Guwahati
- IIT Delhi

### > Industrial Internship

- TATA Motors
- IOCL
- IRICEN Training Institute, Indian Railways
- Steel Authority of India Limited (SAIL)
- Pricol Ltd
- Maruti
- BHEL
- Chittaranjan Locomotive Works
- Plasser India
- Mahindra & Mahindra
- NTPC
- Makino Auto Industry
- Bosch India Ltd

# **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
- TimeTooth Technologies

- 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**

# आईआईटी पटना के छात्रों ने बनायी फॉर्मूला स्टूडेंट रेसिंग कार

#### पटना | चारुस्मिता

आईआईटी पटना के मैकेनिकल इंजीनियरिंग विभाग के 25 छात्रों की टीम ने फॉर्मला स्टडेंट रेसिंग कार बनायी है। कार की लागत पांच लाख है। खास बात यह है कि कार की डिजाइन और सारा मैनफैक्चरिंग इसी टीम ने किया है। सस्पेंशन सिस्टम से लेकर चैसिस व टायर तक खंद छात्रों ने बनाए हैं। सेकेंड इयर के छात्र आशीष उपाध्याय व रौशन की टीम ने दिन-रात एक कर कार को तैयार किया है। यह रेसिंग कार 11 से 16 जन तक

#### उपलब्धि

• मैकेनिकल इंजीनियरिंग की

टीम ने तैयार की है लाइट वेट रेसिंग कार कॉम्पिटिशन में इस रेसिंग

कार से करेंगे भागीदारी

चलने वाली सुप्रा एसएई इंडिया कॉम्पिटिशन में भाग लेगी। ग्रेटर नोएडा के बद्धा इंटरनेशनल सर्किट में इसका आयोजन होगा। देश से करीब 122 टीमें इस कॉम्पिटिशन में भाग लेंगी। **छह माह में बनी है कार :** इस कार को बनाने में क्छह महीने लगे हैं। टीम के कैप्टन आशीष ने बताया कि यह मिनी फॉर्मला रेसिंग कार है जिसमें केटीएम

इन छात्रों ने की है कड़ी मेहनत इंजन एंड ट्रांसमिशन आशुतोष मिश्रा नितिन कश्यप रौशन गुप्ता आशीष पिरा

**05** लाख लागत आई है फॉर्मूला स्टूडेंट रेसिंग कार तैयार करने में

390 की इंजन लगाई गई है। इसकी रफ्तार 105 किमी प्रति घंटे है। इसे हल्की रखने के लिए एल्यमिनियम का दस्तेमाल किया गया है। फॉर्मला वन रेसिंग कार काफी हल्की होती है जिसके कारण यह महंगी भी होती है। हमने इस कार को हल्का रखने के लिए एल्युमिनियम के पार्ट का इस्तेमाल किया है। इसकी बॉडी मात्र 43 किलो

ऐसा है स्ट्डेंट रेसिंग कार

01 सीट वाली है कार 390 इंजन के साथ केटीएम

105 किमी प्रति घंटे की रपतार

06 सेंकेंड में 90 किमी रपतार

है और टायर भी छोटे रखे गए हैं। बॉडी बनाने में ऐसे स्टील रॉड का प्रयोग किया गया है जिसमें कार्बन कंटेंट होते हैं। इसके पारमें लाने में काफी टिक्कत हुई क्योंकि ये पटना में मिलते नहीं हैं। इसके लिए कई जगहों से जाकर पार्ट लाने पड़े। कार की स्पांसरशिप रेडिक कंसल्टेंसी और नेशनल इन्स्योरेंस कॉरपोरेशन ने की है।



रेसिंग कार के साथ आईआईटी पटना के छात्र। • हिन्हरता

#### आशीष ने बताया कि इस कॉम्पिटिशन में तीन हजार छात्र भाग लेंगे। इसमें कार

की डिजाइन की एनालिसिस और रेसिंग की भी टेसिंटम होगी। अगर इस कार को अक्वा रथान मिलता है तो हम अपना आइंडिया किसी कंपनी के साथ शेयर

#### सबसे बेहतर प्रोजेक्ट

स्टडेंट रेसिंग कार अन्य कॉर्मला रेमिंग कार से अल्या है। कारों की हि.सहन पर्र तरह छात्रों की टीम करती है। छात्रों क मेटेरियल स्टक्चर. एयरोडायनेमिक्स. सर्गेशन डायनेमियस इंटरनल कंब्रश इंजन के बारे में परी तकनीकी जानकार्र होती है। मैकेनिकल इंजीनिसरिंग के छात्रों के लिए स्टडेंट रेसिंग कार बनाने को सबसे बेहतर प्रोजेक्ट माना जाता है

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



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

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### IIT-Patna students develop low cost Formula-1 racing cars

PATNA: As you walk around the campus of IIT-Patna, you can hear the noise of an engine humming in the distance through the mostly empty campus at this time of the year. With most of the students gone for their summer vacations, this group of students has been toiling in the excruciating summer heat working on

The team 'IIT-P Motorsports'. a group of 25 students including juniors and seniors, from department of mechanical engineering, IIT Patna, are gearing up to compete in the seventh edition of SUPRA SAEINDIA organised by Maruti Suzuki India Ltd (MSIL) in association with the Society of Automotive Engineers India (SAEINDIA). More than 3,000 stulents from 122 teams from all over the country are expected to compete in designing and developing the Formula Prototype

The competition will be held at the Formula 1 track at Buddh International Circuit in Greater Noida from June 11 to 16.

The Formula 1 models of car



The Formula 1 model car made by IIT-Patna students.

developed by IIT-Patna students. led by Ashish Upadhyay and Roshan has various unique speci-

"We have used aluminium instead of steel to manufacture some of the heavy components of vehicles. Due to this, the weight of the vehicle will be less without any significant loss of the strength. We have used KTM Duke 390 engine in Model A and TVS Apache RTR 160 4V for Model B. The total weight of the car is 43 kg and it cost up to Rs 5 lakhonly. Any other formula racing car available in market costs around Rs 2-5 crore. It took us six months to develop this car," said

The participants will also present a PowerPoint presentation. If the design and specifications are liked by jury, the team will share the idea with them for launch in Indian market.

SUPRA SAEINDIA is a unique event which blends the awe and beauty of motorsports with learning and experience in teamwork etc. Maruti Suzuki provides a platform to engineering students to conceive, design and fabricate a Formula prototype car giving them exposure to real-world challenges and opportunity to refine their skills and learn from mistakes to build on their talent

#### 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 driversuggestion 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 intercollege 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



"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 fourhour 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

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

The vehicle uses light weight pneumatic springs for better shock absorbing power.

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

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 insti tutes 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."

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

# टॉप गियर में दिखा आइआइटी छात्रों का 'इनोवेशन'

प्रौद्योगिकी संस्थान पटना (आइआइटी) के छात्रों की टीम ने वेल्लर इंस्टीटयट 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 ह्यीकल') का

सहित्या करते (समानकान्यट क्राकरते ) का प्रदर्शन करना था। 'सूमन पायर्ड क्टीकल चैलेंज (एचपीवीसी) इंडिया 2016' प्रतियोगिता का आयोजन प्रतिवर्ष 'अमेरिकन सोसायटी मेकेनिकल इंजीनियर्स' (अस्मे) करता है। आइआइटी पटना की टीम अलेक्रिटी को इनोवेशन इवेंट में चौथा एवं धर्मेश कुमार देवांगन के नेतृत्व में डिजाइन इवेंट में पांचवां स्थान हासिल प्रतियोगिता में भाग लिया। हआ। 22 सदस्यीय टीम ने फैकल्टी सदस्य

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 तिया था भाग

आइआइटी पटना के छात्रों की टीम ने

बीगिता में भाग लिया। केआइआइटी यूनिवर्सिटी भुवनेश्वर, चंडीगढ़ भाग लिया था। चंडीगढ़ विश्वविद्यालय की कंपीटिशन में एनआइटी पटना, विश्वविद्यालय, एनआइटी सिलचर समेत देश टीम को ओवरऑल प्रथम स्थान

• रास्ते में आने वाली बाधाओं को पहचानने के लिए इसमें लगा अल्टासॉनिक सेंसर चालक को अलर्ट

 हाईस्पीड के लिए इसमें कई गियर हैं। इसका स्टीयरिंग गोलाकार है।

सीट घम 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।

• अगले एवं पिछले पहिये का अनुपात 20:26 है ताकि चालक को सामने बेहतर दंग से नजर आरो।

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