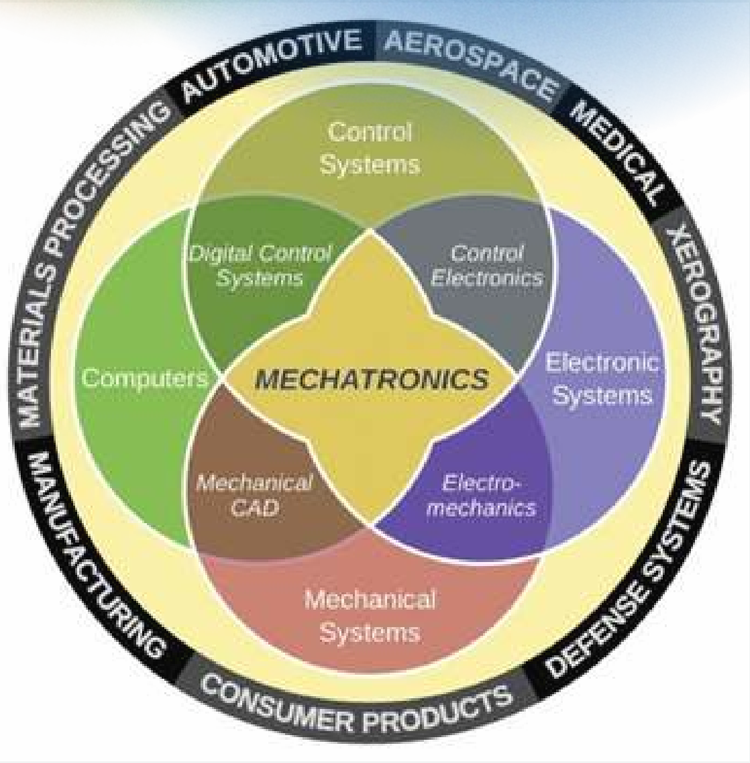
School of Mechatronics and Robotics

INDIAN INSTITUTE OF ENGINEERING SCIENCE AND TECHNOLOGY, SHIBPUR

Innovation Through Integration



Brief History

- The beginning of this century is marked with multi-disciplinary technological advancement which has not only revolutionized Indian and global industrial market but also has put an impact on engineering education system. – – BESUS responded (2006) to the changed technology scenario by introducing a new specialized multidisciplinary engineering school – School of Mechatronics & Robotics.
- The Anandakrishnan Committee also recommended for the formation of a centre in the area of Mechatronics in its proposed scheme of upgrading BESUS into IIEST.

Scope of Mechatronics

Mechatronics is centered on the synergetic integration of disciplines of mechanics, electronics, instrumentation, controls, computers and numerical methods to make possible the generation of simpler, more economical, reliable and versatile commercial and industrial products and process with built–in intelligence.

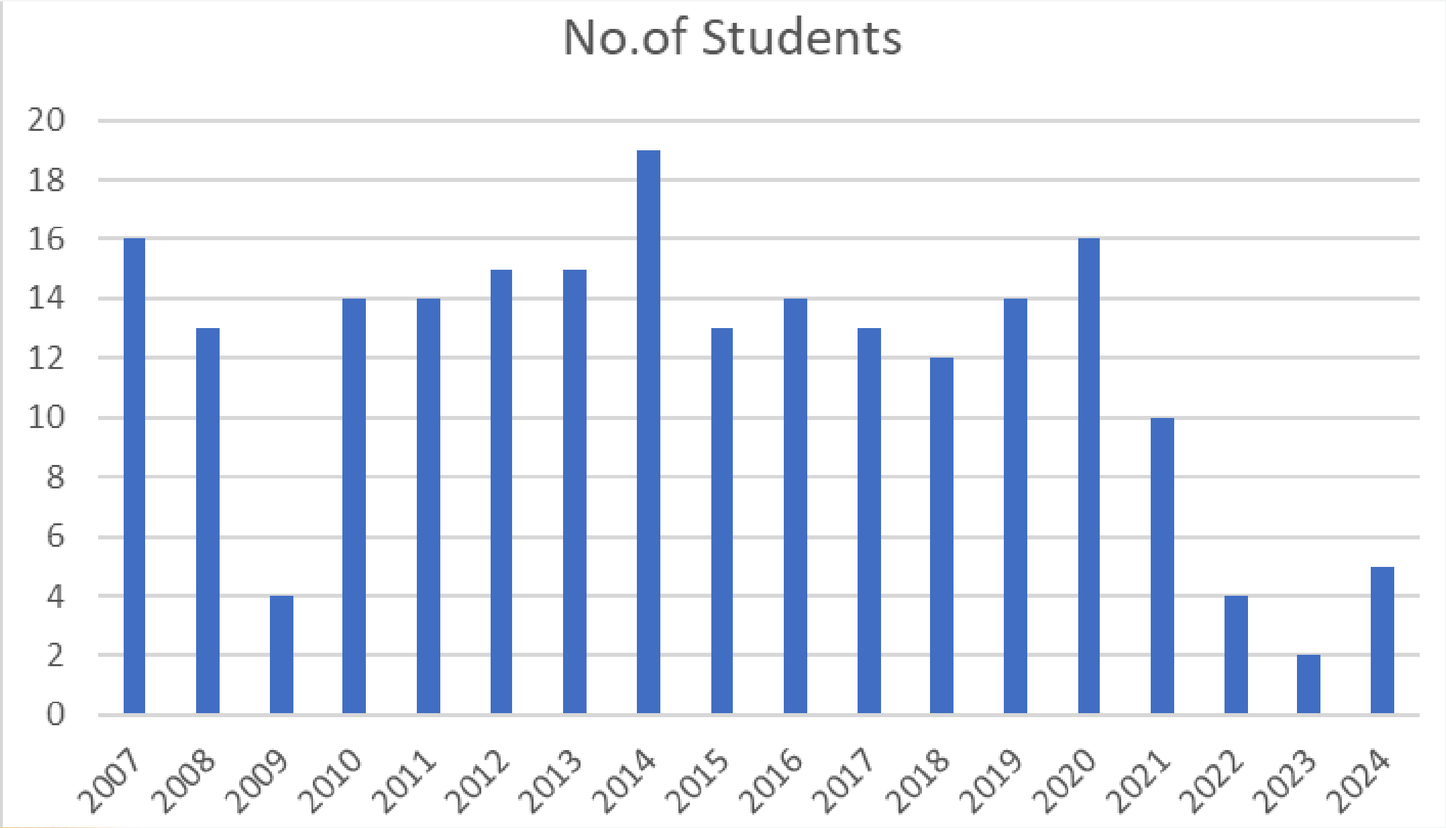
PG PROGRAM IN MECHATRONICS

The school offers a two-years degree program for M.Tech. in Mechatronics awarded by IIEST, Shibpur. Students are admitted into this course through CCMT (GATE qualified students in Electronics / Electrical / Mechanical /Instrumentation with appropriate background).
Sanctionedstudents intake is 22.

CURRICULUM

- Mechatronics System Design
- CAD/CAM for Product Development
- Control Systems for Mechatronics
- Machines and Mechanisms
- Mathematics for AI
- Electronic Design and Simulation
- Industry 5.0
- Product Design and Development
- Robotics
- Machine Learning in Mechatronics
- Embedded Signal Processing
- Biomechatronics
- Computer Vision
- MEMS
- Biomedical Instrumentation
- Artificial Intelligence for Robotics

Number of Students received Degree since Inception



Featured Laboratories

- Robotics and Automation Laboratory
- Mechatronics Laboratory
- Simulation Laboratory
- Bio-robotics, Haptics and VR Laboratory
- Bio-Signal Processing Laboratory
- Rehabilitation Robotics Laboratory
- Smart Sensor and Actuator Laboratory
- Additive Manufacturing Laboratory
- Control System Laboratory
- Design Innovation Laboratory

Co-Innovation Centre (CiC)

I-Hub Foundation for Cobotics (IHFC), Technology Innovation Hub of IIT Delhi, was established partnering with the Department of Science Technology (DST), Ministry of Science and Technology, Govt. of India under National Mission on Interdisciplinary Cyber Physical Systems (NM-ICPS).

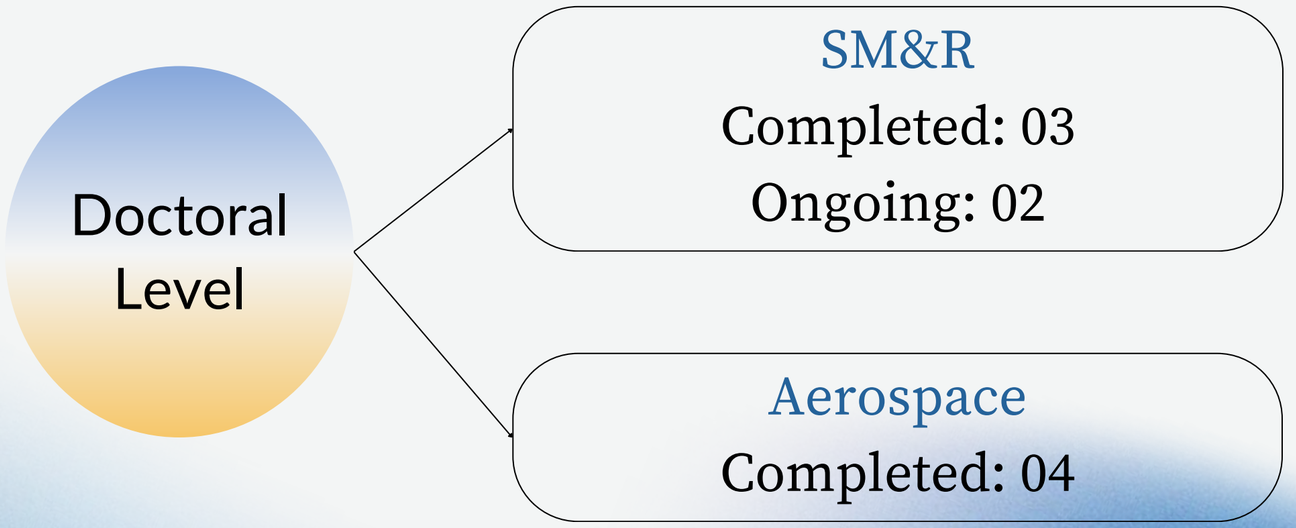
School of Mechatronics and Robotics has taken the lead role in establishing CiC, in collaboration with IHFC. Part of the work of IHFC will be conducted from CiC.

-MOU signed between IIEST and IHFC in January 2025.

Doctor of Philosophy

Research Facilities:

Bi-handed robot, humanoid robot, KUKA Industrial Robot, Kinova MICO2 Robot, MTAB XL-Mill & XL-Turn, EEG & EMG data acquisition system, drives and control, sensors, image processing, mechanical motion transmission devices, data gloves, laser sensors, smart materials, haptic devices, embedded systems, Techscan pressure sensors, data acquisition system, virtual instrumentation, modeling and simulation software, Hydraulic and Pneumatic System, Automation Production System

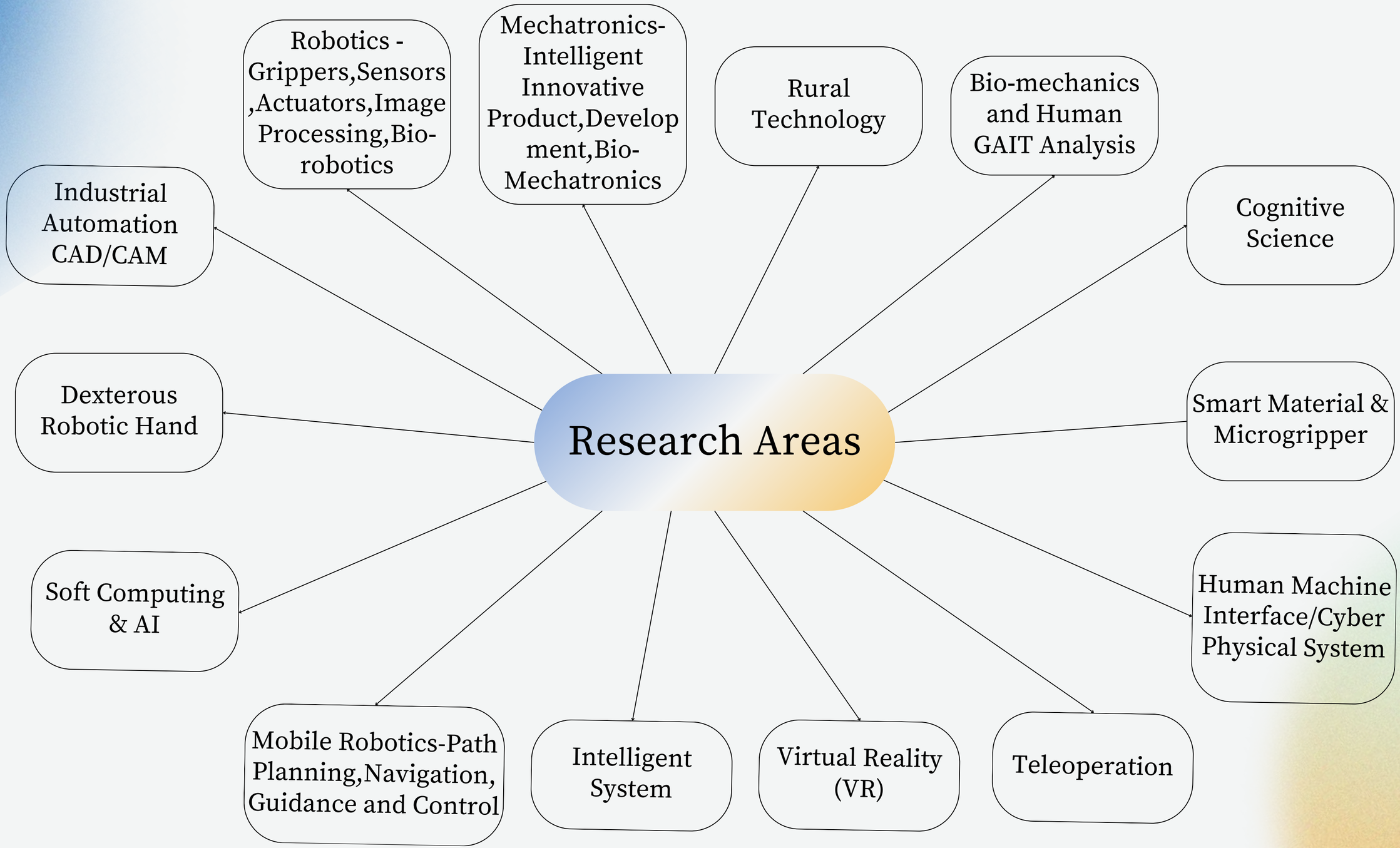


Publication

Journals: 28

Conferences: 23

Book Chapters: 5


Research Areas
Robotics - Grippers,Sensors ,Actuators,Image Processing,Bio-robotics
Mechatronics-Intelligent Innovative Product,Development,Bio-Mechatronics
Rural Technology
Bio-mechanics and Human GAIT Analysis
Industrial Automation CAD/CAM
Cognitive Science
Dexterous Robotic Hand
Smart Material & Microgripper
Soft Computing & AI
Human Machine Interface/Cyber Physical System
Mobile Robotics-Path Planning,Navigation, Guidance and Control
Intelligent System
Virtual Reality (VR)
Teleoperation

Facilities at School

AI & Humanoid Robot Lab

Its primary purpose is to develop and implement different soft computing techniques for biped (two-legged) robots.

Additive Manufacturing Lab

It is equipped with industrial 3D scanners for reverse engineering and imaging, along with high-quality 3D printers capable of printing with various industrial filaments like PLA, ABS, and Polycarbonate.

Facilities at School

Automation Production System Lab

It is designed to demonstrate real-world industrial automation and production line processes and the lab provides practical training on the automated feeding, drilling, and sorting of both metallic and non-metallic objects.

Bio-Robotics, Haptics & VR Lab

This lab is dedicated to the design, development, and testing of advanced bio-inspired robots. The robotic systems developed here are specifically aimed at assisting medical professionals with clinical diagnosis and treatment.

Facilities at School

Bio-Signal Processing and Rehabilitation Robotics Lab

This lab is developed for the purpose of designing and testing of Assistive-Robotic Device. Primary focus of this lab is to design and develop the lower and upper limb exoskeleton, 32-channel EEG acquisition system, 2-axis Goniometer, 8-channel EMG acquisition system, Kinect Xbox, smart gloves, and tip-force sensor.

Control System Lab

This lab is equipped with benchmark control testing set-ups: single and double link Rotary inverted pendulum, flexible link, gyroscope, twin-rotor system, humanoid robot with multiple sensors and actuators.

Facilities at School

Electro Hydraulic Lab

This laboratory focuses on the integration of fluid power systems with electronic controls, providing practical exposure to heavy-duty industrial automation.

Electro Pneumatic Lab

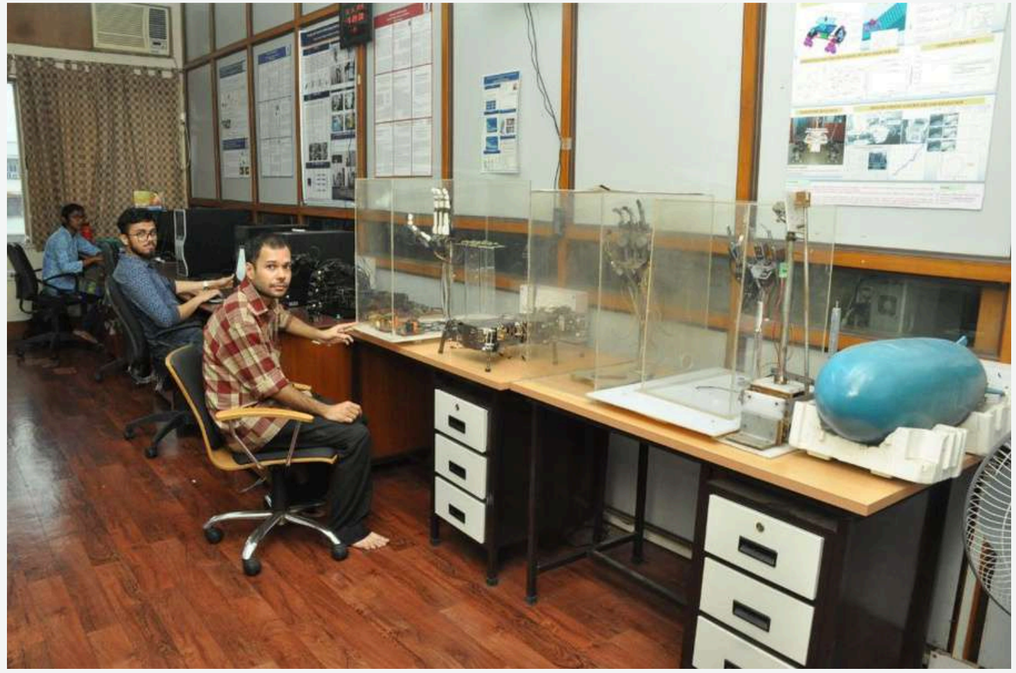
This lab focuses on the integration of pneumatic (air-driven) systems with electronic controls, simulating real-world industrial automation.

Facilities at School

IoT Smart Health Lab

This laboratory is dedicated to the study and research of Bio-Medical Signal Acquisition and Processing. It provides hands-on infrastructure for integrating these biomedical signals with IoT (Internet of Things) devices to develop smart health monitoring systems and applications.

Mechatronics Lab



This lab is designed to integrate software programming with physical hardware to create comprehensive mechatronic solutions. It is fully equipped with advanced robotic platforms and tools, including haptic devices, omni-3D systems, robotic hands, hex-crawlers, and aerial surveillance robots.

Facilities at School

Robotics and Automation Lab

This laboratory is to study industrial automation using robotic manipulators and CNC machines. This lab is equipped with 6-DoF robotic manipulators; MICO and KUKA robots and CNC machines for turning and milling operation.

Simulation Lab

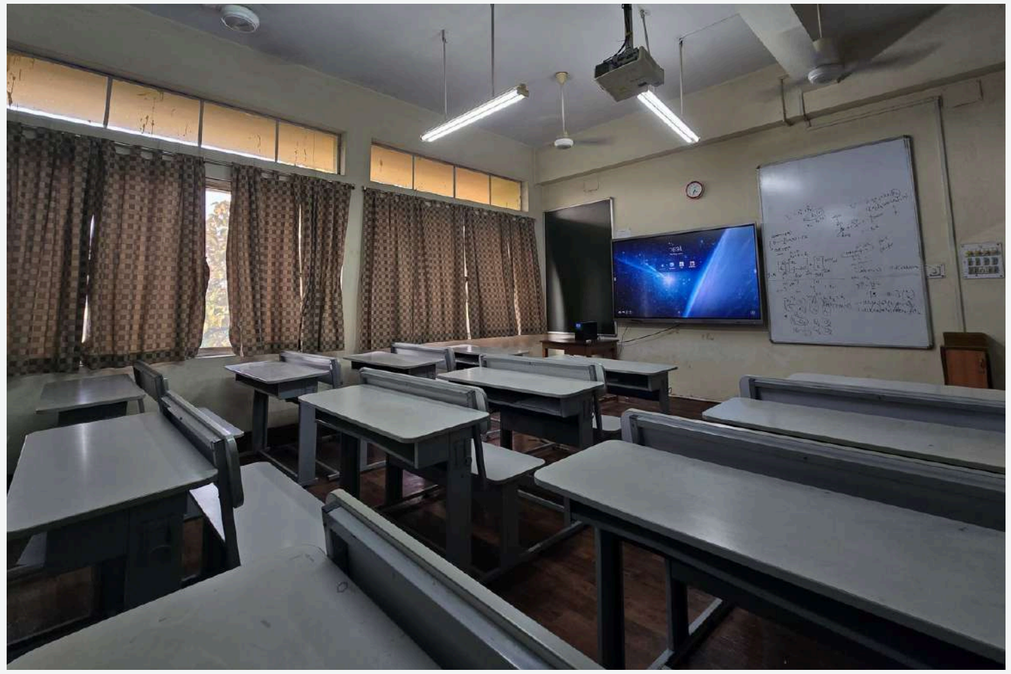
Software available in this lab are Workspace, Automation Studio, Visual Nastran 4D, LabVIEW, MATLAB, IMAQ Vision, Simcenter Amesim, COMSOL Multiphysics, ALGOR, Altair HyperWorks , 20-Sim, SIMM, Webots, V-REP.

Facilities at School

Smart Sensor and Actuator Lab

This lab is equipped with S7-300, S7-1200 PLC CPU, HMI, High configuration host station, Sensor Trainer Kit (Temperature, Position, Ultrasonic, Optical fibre), Actuators (electric, pneumatic), control modules (washing machine, traffic light control, temperature control, position control)

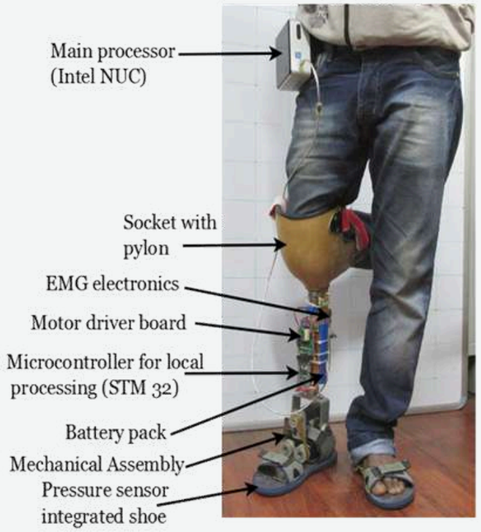
Class Room



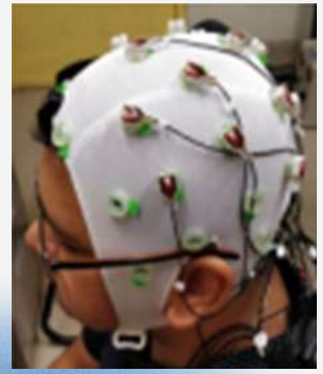
The classroom is equipped with a large interactive smart display and a ceiling-mounted projector to facilitate multimedia presentations and digital learning.

Research Outcome

Intelligent Active Ankle Foot Prosthesis using Multisensory Feedback

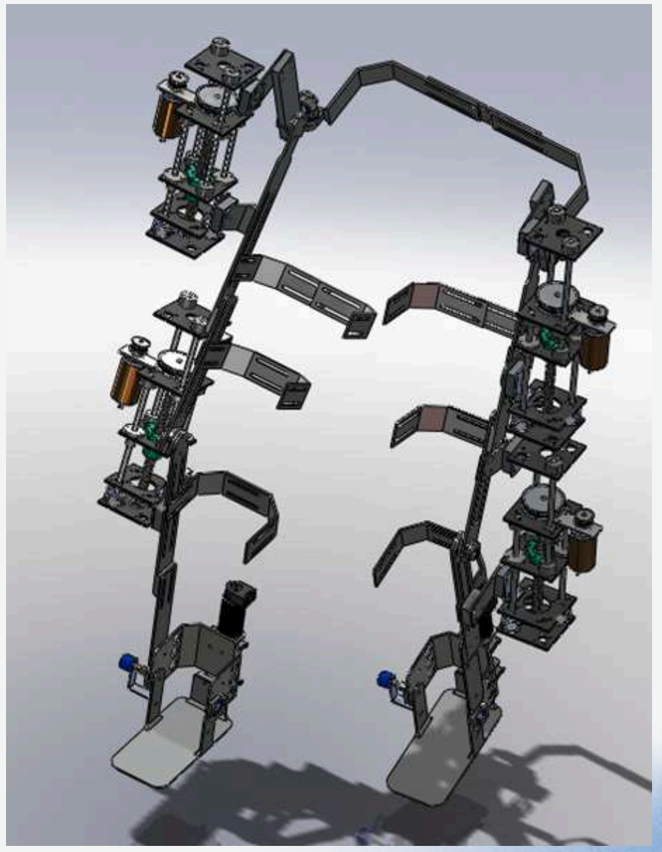


Brain Controlled lower limb exoskeleton device for mobility regeneration

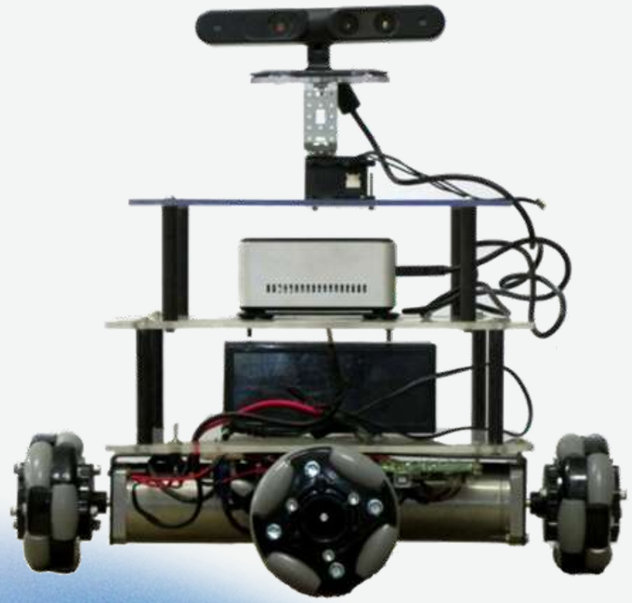


Research Outcome

Active Multi Modal Lower Body Exoskeleton for Mobility Enhancement and Regeneration

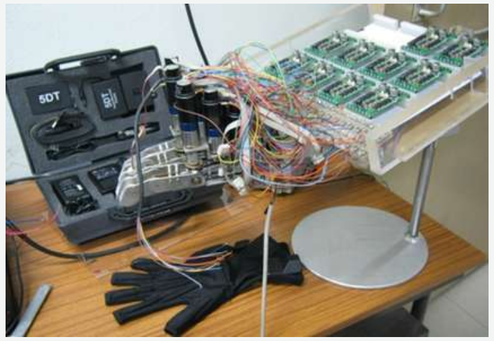


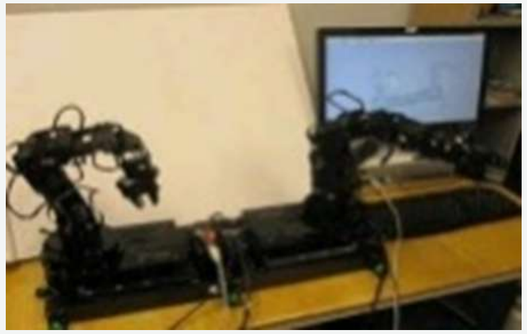
Multimodal Intelligent Wheelchair Based Transporter for Navigation in Dynamic Environment

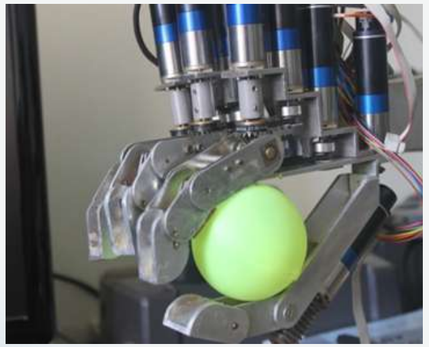


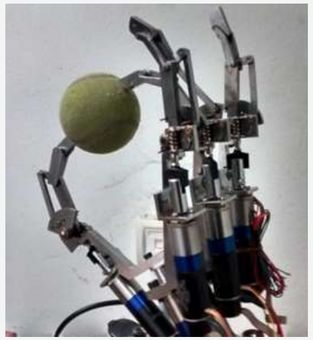
Research Outcome

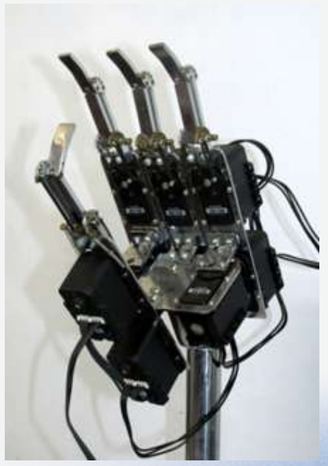
Sensor Integrated Multi-Fingered Dexterous Robot Hand with Data Glove Interface



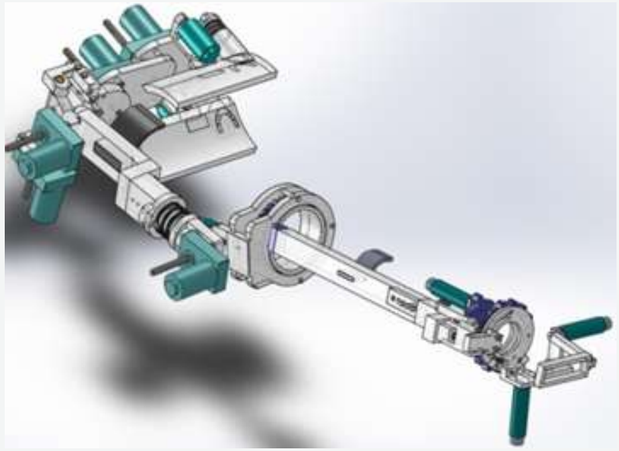


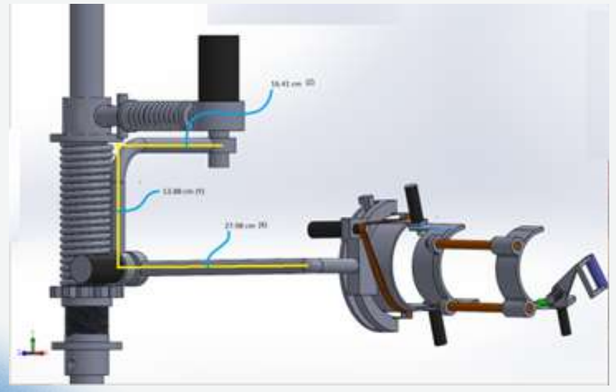






Autonomous Mobile Robot Vehicle for Stair Navigation

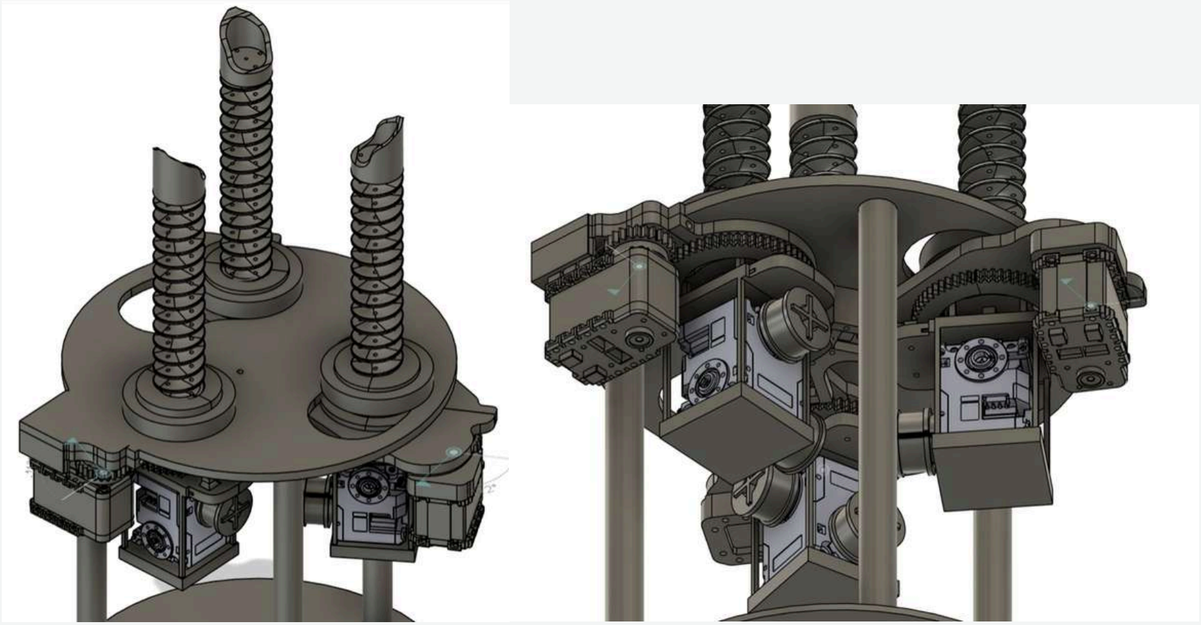




Research Outcome

Blimp for Areal Surveillance

Monolithic 3D printed continuum gripper



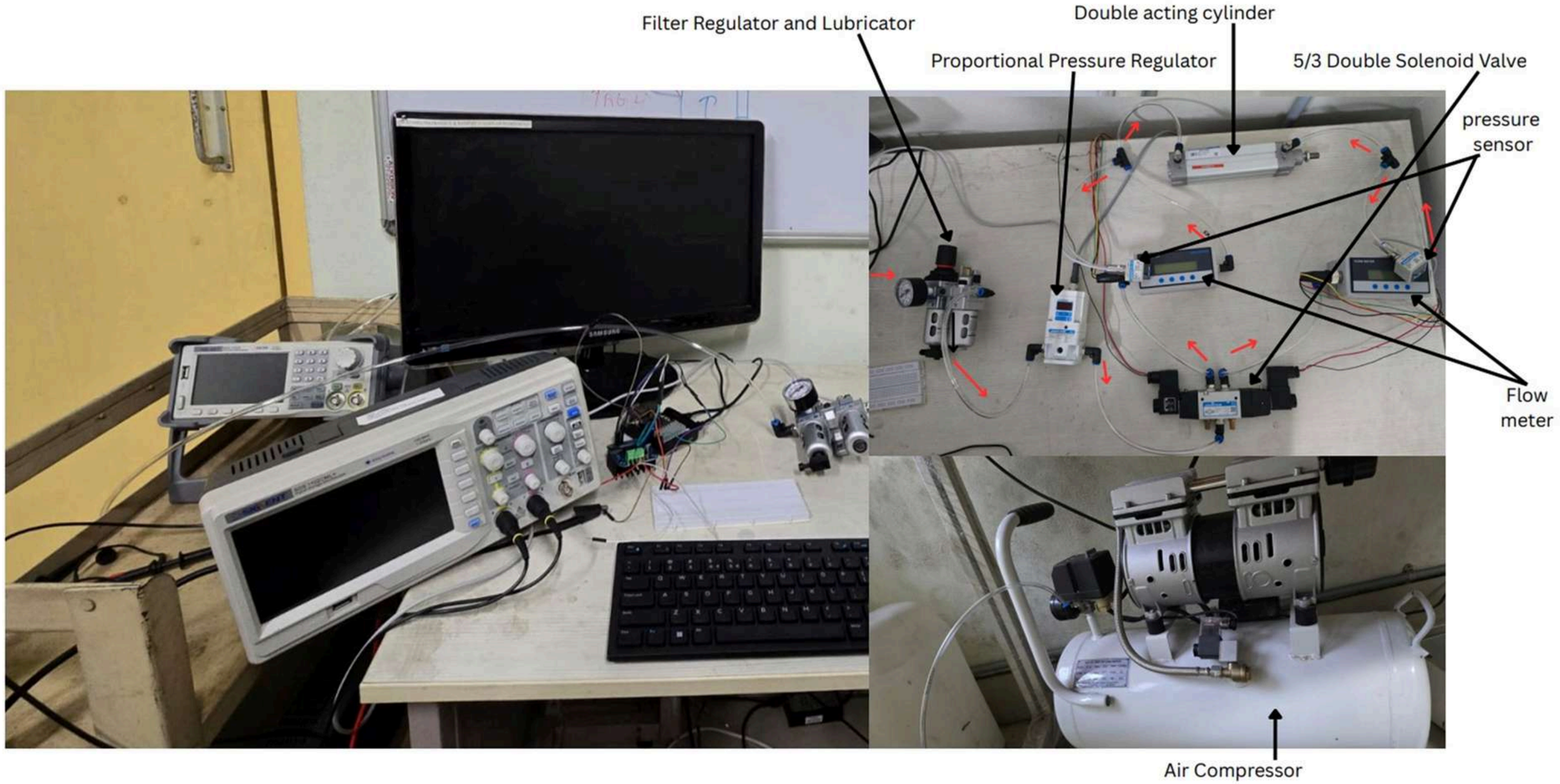
Research Outcome

Jalebi making machine

Dinosaur Tail mechanism

Research Outcome

Model-based Assisted Ventilation system



Featured in media

4 CALCUTTA TIMES, THE TIMES OF INDIA — WHAT'S UP, CAMPUS? — MONDAY 9 DECEMBER 2019

AGE IS NO BAR FOR THESE INNOVATORS

DEBARSHI MAITRA
JADAVPUR UNIVERSITY, SECOND YEAR, BE, PRODUCTION ENGINEERING

...CONTINUED FROM PAGE 1

Ever since he was a kid, a Rubik's cube has always been Debarshi's puzzle of choice. Having seen his friends doing projects on remote control cars and drones, he wanted to do something different. Having a bit of spare time in his first year of college, he thought of making a Rubik's cube-solving robot. "I had been solving cubes since I was in school. Being interested in coding, I thought of combining both and developed a code that could solve a Rubik's cube from any of its roughly 43 quintillion different combinations. It took about four months to construct the robot. I would like to thank my mates who helped me in understanding the basic concepts of robotics," he said. Talking about the basic functioning of the robot, he said, "Its function is just to solve a scrambled Rubik's cube. First we need to enter the colours of any scrambled cube manually to the program that I developed and it forms the algorithm to solve the cube from that particular combination in the form of a text. Then I send that algorithm to my robot and it performs that algorithm and solves the scrambled cube."

GANESH ROY
IIEST, PHD STUDENT, SCHOOL OF MECHATRONICS AND ROBOTICS

Contributing something to society was always his aim and so, Ganesh thought robotics to be the best way to directly interact with society as an engineer. He started working on a lower limb exoskeleton. "After an accident or a spinal-cord injury, people's legs often stop working and a wheelchair is the only way they can move around. I thought of this and decided to make a robotic device that could help them walk, because I feel it is important for a person to walk on their own two feet," he said. This robot has three joints – hip, knee and ankle, each of which is powered. "We are also thinking of trying to connect it with the brain. We want to achieve an interaction between mind and body using motor imagery. So that when a person is thinking of changing their position from sitting to standing, the robot can respond to the thought," he added.

HRITHIK MUKHERJEE
VIVEKANANDA COLLEGE, FIRST YEAR, ZOOLOGY HONOURS

As a child, Hrithik was always interested in knowing what went on inside electronic gadgets. Despite scolding and punishments, he would dismantle gadgets and see what's going on inside them. He would study circuit boards and the other connections and then reassemble them. He said, "I started doing this since I was 12 and I haven't stopped since. I have opened up almost everything from telephones and speakers to mobile phones. Out of these components, I have successfully been able to build a new speaker." However, that is not the end of his craft. For his final-term higher-secondary physics project, while almost all his classmates submitted a written practical project, Hrithik chose to make something by himself and ended up with an external battery-run power bank. "The transistor I put in this power bank helps convert the power from a 9V battery to 5V. This can charge any phone in an emergency. One of the most important features is that you can charge any phone with a battery worth ₹15 or ₹25. You can charge the battery as many times as you want and keep charging your phone," said Hrithik.

SAGNIK CHATTERJEE
JADAVPUR UNIVERSITY, SECOND YEAR, BE, PRODUCTION ENGINEERING

Unlike other enthusiasts, who start off early with their interest in a subject, Sagnik has a different story. He was not at all into making or building anything until recently, when IIT Kharagpur organised a workshop at his university and he came to know of Arduino (an open-source electronics platform based on easy-to-use hardware and software). He recently built a wireless joystick. He said, "I was always interested in artificial intelligence and programming and just recently learnt about the Arduino family of single board computers. So I learnt the basics with the help of some teachers and a few YouTube videos. Then, gradually, I started building projects that started with a basic line following robot." Seeing a lot of wireless joysticks (powered by Bluetooth) available in the market, he decided to make one using a 2.4 GHz radio frequency. According to him, if one buys the components from a wholesale market, then the net cost of making it will be much lower than a commercially available joystick. He has also made an obstacle avoiding robot, remote-controlled racing car, remote-controlled crane and Bluetooth-controlled fire truck, all using Arduino Uno.

SAPTAK BHATTACHARJEE
IIEST, PHD STUDENT, SCHOOL OF MECHATRONICS AND ROBOTICS

Growing up watching all kinds of sci-fi movies, he was always interested in the mechanical part of science and wanted to create something new. Self-admittedly a big *Star Wars* fan, he is currently working on a continuum robot. "Most robots we are familiar with nowadays are rigid-armed robots. Their biggest problem is that they cannot reach everywhere. For example, in case of a natural disaster, or if someone is stuck under debris or any geological excavation, or even space exploration — continuum robots can move freely, unlike rigid-armed robots and function more precisely. Even in medicine, this robot can give new dimension to laparoscopic surgeries," he said. He further explained, "There are multiple types of continuum robots and we are working with tendon driven robots. We can also call them 'snake robots' because they are flexible like that. It works just like a muscle in our body. This robot can really make a lot of tasks easier for us."

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bazar / Education Career / IIEST Shibpur and IHFC, IIT Delhi inaugurated Co-Innovation Center to promote student entrepreneurship and start-ups in deep tech

রোবোটিক্স চর্চায় গতি আনতে মউ স্বাক্ষর, চালু হল কো-ইনোভেশন সেন্টার

রোবোটিক্স, কৃত্রিম মেধা, মেশিন লার্নিংয়ের মতো ডিপ টেকের বিভিন্ন বিষয় চর্চার পাশাপাশি, পড়ুয়াদের ব্যবসায়িক উদ্যোগ এবং স্টার্টআপ শুরু করার বিষয়েও বিশেষ ভাবে সহযোগিতা করা হবে।

Works of Alumini

R & D ORGANISATION

- TCS Innovation Lab
- Whodat Pvt. Ltd.
- C-DAC Pune
- VSSC-ISRO
- CSIR-CSIO
- CMTI

POST DOCTORATE

- Wageningen University and Research
- Victoria University of Wellington
- Hanbat National University
- University of California
- Hua University
- IIT Delhi

START UP

Agastya Buoyant Pvt. Ltd.

PH.D.

- IIT Delhi
- IIT Madras
- IIT Gueahati
- IIT Kharagpur
- IISc Banglore
- New York University
- Bournemouth Univeristy-UK
- Hiroshima University Japan
- INRIA-Rennes,France
- IIIT-Banglore
- IIEST Shibpur
- IIT Bombay
- IIT Kanpur
- IIT Patna

FACULTY

- BITS Pilani
- IIT Palakkad
- TKM College Kollam
- Army Institute of Technology
- C V Raman College of Engineering
- Defence Institute of Advanced Technology
- Tallinn University of Technology Estonia
- Canterbury Christ Church University
- Thapar Institute Patiala
- University of Essex
- Manipal University
- IEM Kolkata

Other programmes (workshops/conferences / seminar)

- Seminar on Mechatronics & Robotics held in 2017
- Guided the Summer Research Fellow Programme of the Indian National Science Academy / Indian Academy of Sciences (IASc–INSA–NASI)
- Presented the 6–RSS parallel manipulator at Inventiv–2025
- Organized a two–day Lab–to–Market Program at IIEST Shibpur in collaboration with IHFC on February 27–28, 2026
- Hosted the Engineers' Day on September 15, 2025
- Participated in the Capacity Building on Design and Entrepreneurship (CBDE) workshops at NIT Agartala and IIT (ISM) Dhanbad

Agastya Buoyant Pvt. Ltd. : A Successful Start-Up based on the Technology developed at the School

Intuitive Robotics : A Successful Start-Up based on the Technology developed at the School

- AI-driven & IoT-enabled product development
- Smart laboratory establishment
- IoT-based subscription monitoring services
- AI-powered data analytics

FACULTY MEMBERS

CORE FACULTY

Tanmay Pal - Head
Research Area: Control System Engineering, Bio-medical systems, Mechatronics

Anirban Nag
Research Area: Kinematics, Dynamics and Design of robotic manipulators

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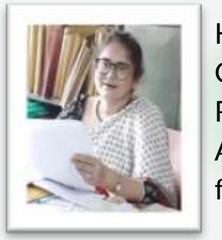
https://www.iiests.ac.in/IIEST/AcaUnitDetails/SOMR
ph:+91 98307 64060

ASSOCIATE FACULTY MEMBERS

Subhasis Bhaumik
Core Dept.: Aerospace Engineering and Applied Mechanics
Research Area: Mechatronics, Robotics, Orthotic and Prosthetic

Debasis Datta
Core Dept.:Mechanical Engineering
Research Area: Ultrasonic NDE, FEM based Simulation of Acoustic Wave propagation, Impact Phenomena, Composite Materials

Debjani Ganguly
Core Dept.:Electrical Engineering
Research Area: Power Quality in Power Electronics, Embedded Systems, Motion Control



Konika Das (Bhattacharya)
Core Dept.: Electrical Engineering
Research Area: Embedded System, Automation and Control, Micro Grid Studies for Rural and Urban Areas

Rana Roy
Core Dept.: Aerospace Engineering and Applied Mechanics
Research Area: Soil-structure interaction, Applied Mechanics, Probabilistic seismic analysis, Dynamic soil-structure interaction, Earthquake dynamics of structures

THANK YOU!