

**Anusandhan National Research Foundation (ANRF)**  
**sponsored**

**5-day National Symposium**  
**on**

**Bridging Academia and Industry**  
**for**  
**NextGen Technologies**  
**in Electrical Engineering**

**(AI-NxtGen-EE 2024)**

**Dec 3, 2024 – Dec 7, 2024**



**Organized by**

**DEPARTMENT OF ELECTRICAL ENGINEERING**  
**Indian Institute of Engineering Science and Technology, Shibpur,**  
**Howrah, West Bengal**



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# Committee

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(Associate Professor, EE, IEST Shibpur)  
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(Associate Professor, EE, IEST Shibpur)  
Dr. Reetam Mondal  
(Assistant Professor, EE, IEST Shibpur)

## ABOUT THE SYMPOSIUM

The Department of Electrical Engineering, IEST Shibpur, is proud to host the **Anusandhan National Research Foundation (ANRF) sponsored 5-Day National Symposium on Bridging Academia and Industry for NextGen Technologies in Electrical Engineering (AI-NxtGen-EE 2024)**. Scheduled from **3rd to 7th December 2024**, this premier event is designed to strengthen academia-industry partnerships, foster innovation, and enable a seamless career transition for students from academia to industry.

Aligned with the objectives of the **National Education Policy (NEP) 2020**, the symposium emphasizes experiential learning and collaboration, highlighting the critical role of bridging the gap between academic research and industrial applications. It aims to prepare students and young professionals for emerging opportunities in cutting-edge technologies, contributing to India's vision of **"Viksit Bharat 2047."**

The symposium will feature:

- **Technical Sessions:** Delivered by leading academicians from IITs, these sessions will spotlight groundbreaking research in **electric vehicles, smart grids, robotics, satellites and advanced control systems**.
- **Keynote Addresses:** Presented by eminent scientists from **ISRO**, and industry experts, these addresses will explore national priorities and innovations driving India's technological future.
- **Presentations:** Showcasing the latest developments in electric vehicles, renewable energy integration, smart grids, and control systems.
- **Panel Discussion:** A high-impact dialogue titled **"Engineering the Future: A Joint Vision for Academia and Industry"** featuring leaders from industry and academia.

The symposium is designed to facilitate meaningful exchanges between academicians, researchers, and industry professionals. It aims to bridge the knowledge-to-practice gap by encouraging partnerships that drive innovation, foster entrepreneurship, and open avenues for career growth. By emphasizing the practical application of advanced concepts, this event seeks to prepare students and researchers for future challenges and opportunities in evolving domains like **electric mobility, smart automation, and intelligent systems**.

### Who Should Attend:

We warmly invite academicians, industry professionals, researchers, and students to participate actively in this symposium. It offers a unique opportunity to:

- Interact with experts shaping **next-generation technologies**.
- Gain insights into **state-of-the-art research** and **industrial trends**.
- Explore **collaborative opportunities** for **impactful innovation**.

Join us at **AI-NxtGen-EE 2024** to be a part of this transformative journey towards academic excellence and industrial innovation, driving sustainable growth and progress in electrical engineering.



## **ABOUT THE INSTITUTE**

IEST, Shibpur owes its origin to the erstwhile Bengal Engineering College, the history of which goes back to the nineteenth century. Considering the year of establishment, it is the 3<sup>rd</sup> engineering college in India but considering the year of graduation it is the 2<sup>nd</sup> oldest engineering college in India. In 1880, the college was shifted to its present campus at Shibpur, Howrah, and was christened the 'Government College, Howrah,' in the premises of Bishop's College. In 1921, the name of the college space was changed to 'Bengal Engineering College' (popularly known as B. E. College). The college celebrated its gala centenary function inaugurated by Dr. B. C. Roy on the 25th of December 1956 and Pandit Jawaharlal Nehru graced its concluding session on 14th January 1957. In recognition of its service to the nation for 143 years of its existence with its well-organized infrastructure, the college was elevated to the status of a "Deemed University" in 1992 by the Ministry of Human Resource Development, Government of India on the recommendation of a UGC Expert Committee. In 2004, B.E. College (Deemed University) was converted into a full-fledged university by an act in the West Bengal Assembly and renamed as Bengal Engineering and Science University, Shibpur. In March 2014, Bengal Engineering and Science University, Shibpur was taken over by the Government of India and it was converted into an Institute of National Importance through an act of parliament and was renamed as Indian Institute of Engineering Science and Technology, Shibpur. It is the only IEST in the country and has 16 departments and 8 schools. It has over 250 faculty members and a student strength of over 4000.

## **ABOUT THE DEPARTMENT**

The Department of Electrical Engineering is one of the oldest in this 'ancient-new' Institute. Started in 1912, undergraduate degree course was introduced in this department from 1935-36 and postgraduate course from 1955. In the 1950s and 60s, the department had a sisterhood (exchange) program with the University of Wisconsin, USA. The first Ph.D. was produced by this department in 1959. From 1989, the Ministry of Human Resource Development declared this department as one of the QIP Centres for Post Graduate Studies and Research.

The sanctioned faculty strength of the department is 30 with a support staff strength of (about) 12. The faculty and other staff members of the department are committed to imparting excellent education at par with national / international seats of learning. An extraordinary pool of talents exists in fields as diverse as Control Systems and Instrumentation, Power Electronics, Machines and Drives, and Power and Energy Systems. The department has been included in the 'National Mission on Power Electronics Technology' (NaMPET), a project launched by DIT, MCIT, Govt. of India. The department was chosen to carry out research under the SAP-DRS scheme of UGC in the area of smart control and instrumentation systems. The department has also executed the DST-FIST project. It has also received its share of about Rs.1.2 crores under the TEQIP scheme. The alumni of this department hold top positions in various national and international organizations.

## OUR SPEAKERS



**Dr. Deepak  
Mishra,  
ISRO**

Title: **Next generation High throughput satellites**

Highlights of the talk:

- Evolution of High Throughput Satellites.
- Requirements of High Throughput Satellites.
- Current trends and challenges of current throughput Satellites worldwide.
- Architecture of advanced High Throughput Satellites.
- Interference mitigation technique for High Throughput Satellite.
- Future trends of High Throughput Satellites.
- Role of academia in the development of the HTS satellite in the Indian scenario.



**Prof. Shubhendu  
Bhasin,  
IIT Delhi**

Title: **Control of Quadrotor: Theory to Practice**

Highlights of the talk:

- **Quadrotor modelling**
- Design of **advanced controls**
- **Start Up** for Quadrotors



**Dr. Abhilash Patel,  
IIT Kanpur**

Title: **Control and Dynamics in Microscale**

Highlights of the talk:

- Use of **microrobotics** in **healthcare**, particularly for **drug delivery applications**
- How **control theory** can be applied in **genetic engineering**



**Dr. Arun Dayal  
Uday, IIT (ISM)  
Dhanbad**

Title: **COBOTS: The Future of Smart Automation**

Highlights of the talk:

- **Cobots Overview:** Lightweight, sensor-equipped robots enabling safe, cost-effective collaboration with humans in industries like automotive, pharma, and electronics.
- **Market Potential:** Projected to reach \$11.02 billion by 2030, driven by SME adoption.
- **Industrial Impact:** Ideal for non-repetitive, low-payload tasks, transforming small-batch production and multi-product assembly lines.



**Dr. Dwaipayan  
Mukherjee, IIT  
Bombay**

**Title: Problems at the intersection of control theory and algebraic graph theory**

Highlights of the talk:

- **Core Focus:** Analyze performance and stability of multi-agent systems using tools from control theory.
- Discussion of **four distinct problems**: stability of the signum-based consensus problem, H-2 performance under Taylor's model for opinion dynamics, bearing and elevation angle based formation control, and applications of the consensus protocol to the salvo guidance problem
- Challenges and future trends.



**Dr. Shyam Kamal,  
IIT (BHU) Varanasi**

**Title: A Transition from PID to Sliding mode control**

Highlights of the talk:

- Mathematical Model & Physical Interpretation of PID control
- Why PID? How to tune PID using Newtown's law
- Limitations of PID
- Sliding Mode Control & Physical Interpretation of Sliding mode



**Dr. Chayan  
Bhawal, IIT  
Guwahati**

**Title: Maximizing quadrotor flight: Tuning for energy-optimal performance**

Highlights of the talk:

- **Quadrotors**, vital in industries like delivery and surveillance, face energy limits, with half spent supporting their weight
- **Energy optimization** is key to extending their flight range.
- This talk explores tuning controllers for **efficient, energy-optimal paths**.



**Dr. Dipankar  
Debnath, IIT  
Kharagpur**

**Title: Integrated Motor Control Unit and Vehicle Control Unit for Low-Speed Electric Vehicles**

Highlights of the talk:

- Indigenous design and development of **motor cum vehicle controller, BLDC motor**, more informative display for e3W and similar light duty **EVs**
- **Motor controller integrated with vehicle supervisory controller**: Category first, Indian Patent granted Technology
- Custom more informative display unit
- 1.2kW BLDC motor for Indian conditions: IP67 and AIS041 certified (iCAT)
- Overall package: 2-5% more efficient than off-the shelf solution





**Dr. Atreyee Kundu**  
IIT Kharagpur

Title: **A tale of Matrix Commutators and Stability of Switched Systems**

Highlights of the talk:

- **Switched systems'** stability may differ from their subsystems, enabling divergence or stabilization through switching.
- **Stability analysis** focuses on matrix commutators and constrained switching strategies.
- Applications include **networked control systems**.



**Dr. Ankit Ravindra Deshmukh, IIT Bhubaneshwar**

Title: **Continuous-time periodic controllers**

Highlights of the talk:

- **Limitations of LTI Controllers:** Unable to relocate loop-zeros, impacting robustness, especially for RHP zeros and certain unstable plants.
- **Periodic Controllers:** Offer loop-zero placement and address robustness challenges of LTI controllers.
- **Decentralized Control:** Stabilize plants with unstable decentralized fixed modes using periodic control.
- **Centralized Impact:** Decentralized periodic control exhibits centralized action for strongly connected plants.



**Dr. Jagannath Samantaray, MathWorks**

Title: **Applied Control Systems in Automotive Engineering**

Highlights of the talk:

- **Core Focus:** Explore control systems for safety and performance in automotive technologies like ABS and power converters.
- **Hands-On Tools:** Learn controller design, simulation, and validation using MATLAB and Simulink.
- **Practical Insights:** Gain understanding of dynamic modeling, tuning, and real-world automotive challenges.
- **Student Benefits:** Bridge theory and practical skills for control system applications in automotive engineering.



**Mr. Chandan Kumar**  
Chief Manager,  
Operational  
Technology,  
ERLDC, Grid-India

Title: **New Challenges in RE Integration and Solutions**

Highlights of the talk:

- Rapid renewable energy integration challenges traditional grids.
- Issues include reduced inertia, UFLS, RoCoF, and grid compliance.
- Solutions and mitigation strategies will be discussed.



**Dr. Bhabani Shankar Dey**  
IISc Bangalore

Title: **Human Robot Collaboration: Mastering Interactions**

Highlights of the talk:

- **Impedance Control**: A Philosophical Overview
- Applications in the today's context
- Controller Design using Impedance Control
- Towards **Safety and Stability in Human Robot Collaboration (HRC)**



**Dr. Anirban Nag**  
IIST Shibpur

Title: **Control strategies for robotics: trends and open research areas**

Highlights of the talk:

- **Dynamic modelling** of robots and challenges
- **Controllability** criteria in **parallel manipulators**
- **Computed torque control** - theoretical and practical considerations



**Mr. Shubhra Jyoti Moitra**  
Senior Application Engineer-  
MATLAB, Elmax Systems  
and Solutions

Title: **Design and simulation of Electrical engineering systems (Electric Vehicle application)**

Highlights of the talk:

- Introduction to **electric vehicle** and its different components
- **Simulation** of **vehicle dynamics** and **power train**
- Selection of **EV motors** and simulation of their control systems
- A brief on **EV battery modelling** and **Battery Management System**



**Mr. T R Balaji**  
Manager - Emerging  
Technology, Edutech India  
Pvt. Ltd.

Title: **Bridging Academic Excellence and Industry Readiness: Insights from E-Mobility, Autonomous Solutions, and Robotics**

Highlights of the talk:

- **E-Mobility**: Training in powertrains, battery management, and vehicle systems meets industry EV demands.
- **Autonomous Solutions**: Skills in ADAS, machine learning, and sensors drive readiness for self-driving tech.- Milestone and Achievement.
- **Control & Robotics**: Practical robotics and AI skills prepare students for automation in key industries.





**Dr. Rajeeb Dey**  
**NIT Silchar**

Title: **Cyber Physical Systems: Control System Perspective**

Highlights of the talk:

- **Cyber Physical Systems:** An introduction
- Control systems in cyber physical system applications



**Mr. Sagar Indalkar,**  
**Nayak Power Systems**

Title: **Introduction to PSCAD EMT simulation and recent trends in power system simulation**

Highlights of the talk:

- Hands-on with PSCAD**



**Mr. Rakesh Pachisia**  
**Technical Sales – Engineer,**  
**Dspace**

Title: **ElectroMobility @ dSPACE**

Highlights of the talk:

- Solutions for **RCP & HIL**
- **EMobility** Solutions from dSPACE
- EDrive **Demonstration**



**Mr Prantik Sinha**  
**Co-Founded Agastya**  
**Invention Private Limited**

Title: **Seeds of Innovation: How a College Project Grew into Agastya Invention**

Highlights of the talk:

- The Genesis of Idea
- Challenges and Learning
- Milestone and Achievement.
- Future Vision and Impact



**Mr Sandip Borral**  
**Founder & CEO at Calnestor**

Title: **Developing AI Solutions for India's Unique Challenges**

Highlights of the talk:

- Democratizing AI:** Making AI Accessible and Affordable for India
- AI and the Future of Work in India: Preparing the Workforce for the **AI Revolution**

## OUR KEYNOTE SPEAKERS



**Prof Siddhartha  
Mukhopadhyay IIT  
Kharagpur**



**Mr. Gautam Ray  
President (Corporate)  
RPSG Group**

## OUR PANELISTS



**Mr. Abhijit Maitra  
Director, Armatrixes  
Applications**



**Mr. Sanjay Kar  
Chowdhury,  
Dy. General  
Manager(HR), CESC**



**Dr. Mita Tarafder  
Former Chief Scientist, CSIR-  
NML, Jamshedpur**



**Prof. Pratik Dutta  
Dean R&C, IEST  
Shibpur**



**Prof. Shubhendu Bhasin  
Professor, Electrical  
Engineering, IIT Delhi**



**Dr. Suvarun Dalapati,  
Assistant Professor, Electrical  
Engineering, IEST Shibpur**

## REGISTRATION DETAILS

### Registration Fees

The registration fees (incl. of GST) payable, per delegate, for the five days, is as follows:

Faculty/ Scientists/ equivalent	1500/-
Research Scholars	1180/-
Students of other institutes	600/-
Students of IEST	300/-

The Registration Fee will cover the **Symposium-kit, Participation Certificate, Tea/coffee and Lunch** on all the days.

Participants are requested to make their own arrangements for accommodation if necessary.

### Mode of Payment:

#### 1. By bank transfer/ NEFT as per following details:

**A/c Name : CONTINUING EDUCATION CENTRE BESUS**  
**A/c No. : 1532010011963**  
**Bank : PUNJAB NATIONAL BANK**  
**Branch : BESUS BRANCH**  
**IFSC Code : PUNB0153220 (Fifth character is zero)**

#### 2. By scanning the QR code

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After the payment, please fill the **Google Form.**  
<https://forms.gle/BhSidnHjGHaf6qyC7>

In case of difficulties or queries, contact [mousumi@ee.iests.ac.in](mailto:mousumi@ee.iests.ac.in) or [anirudh@ee.iests.ac.in](mailto:anirudh@ee.iests.ac.in)



# SCHEDULE

Day 1 03.12.2024	09:00 AM – 11:00 AM	Registration
	11:15 AM – 12:15 PM	Inaugural session
	12:30 PM – 1:30 PM	Keynote addresses
	01:30 PM – 02:15 PM	Lunch
	02:30 PM – 03:30 PM	A transition from PID to Sliding Mode Control Dr. Shyam Kamal (IIT (BHU) Varanasi)
	03:30 PM – 04:30 PM	Cyber Physical Systems Dr. Rajeeb Dey (NIT Silchar)
	04:30 PM – 05:30 PM	ElectroMobility @ dSPACE Mr. Rakesh Pachisia(dSPACE)
Day 2 04.12.2024	11:00 AM – 11:45 PM	Control strategies for robotics: trends and open research areas Dr. Anirban Nag (IEST Shibpur)
	11:50 AM – 12:35 PM	Human Robot Collaboration: Mastering Interactions Dr. Bhabani Shankar Dey (IISc Bangalore)
	12:40 PM – 01:25 PM	Next generation High throughput satellite Dr. Deepak Mishra (ISRO)
	01:30 PM – 02:25 PM	Lunch
	02:30 PM – 03:30 PM	Control and Dynamics in Microscale Dr. Abhilash Patel (IIT Kanpur)
	03:30 PM – 04:30 PM	Seeds of Innovation: How a College Project Grew into Agastya Invention Mr. Prantik Sinha
	04:30 PM – 05:30 PM	Developing AI Solutions for India's Unique Challenges Mr. Sandip Boral
Day 3 05.12.2024	10:00 AM – 11:00 AM	Maximizing quadrotor flight: Tuning for energy-optimal performance Dr. Chayan Bhawal (IIT Guwahati)
	11:00 AM – 01:30 PM	Design and simulation of Electrical engineering systems (Electric Vehicle application) Mathworks (Demonstration) Mr. Shubhra Jyoti Moitra (Elmax)
	01:30 PM – 02:15 PM	Lunch
	02:30 PM – 03:30 PM	Applied Control Systems in Automotive Engineering Dr. Jagannath Samantaray (Mathworks)
	03:30 PM – 05:00 PM	Bridging Academic Excellence and Industry Readiness: Insights from E-Mobility, Autonomous Solutions, and Robotics Mr. T R Balaji (EduTech)

<b>Day 4</b> 06.12.2024	09:30 AM – 10:30 AM	<b>Problems at the intersection of control theory and algebraic graph theory</b> <b>Dr. Dwaipayan Mukherjee (IIT Bombay)</b>
	10:30 AM – 01:30 PM	<b>Introduction to PSCAD EMT simulation and recent trends in power system simulation</b> <b>Mr. Sagar Indalkar (PSCAD)</b>
	01:30 PM – 02:15 PM	<b>Lunch</b>
	02:30 PM – 04:00 PM	<b>COBOTS: The Future of Smart Automation</b> <b>Dr. Arun Dayal Udai (IIT (ISM) Dhanbad)</b>
	04:00 PM – 05:00 PM	<b>Continuous-time periodic controllers</b> <b>Dr. Ankit Ravindra Deshmukh (IIT Bhubaneshwar)</b>
	05:00 PM – 06:00 PM	<b>Integrated Motor Control Unit and Vehicle Control Unit for Low-Speed Electric Vehicles</b> <b>Dr. Dipankar Debnath (IIT KGP)</b>
<b>Day 5</b> 07.12.2024	10:30 AM – 11:30 AM	<b>A tale of Matrix Commutators and Stability of Switched Systems</b> <b>Dr. Atreyee Kundu (IIT KGP)</b>
	11:30 AM – 12:30 PM	<b>New Challenges in RE Integration and Solutions</b> <b>Mr. Chandan Kumar (POSOCO)</b>
	12:30 PM – 01:30 PM	<b>Control of Quadrotor: Theory to Practice</b> <b>Prof. Shubhendu Bhasin (IIT Delhi)</b>
	01:30 PM – 02:15 PM	<b>Lunch</b>
	02:30 PM – 04:00 PM	<b>Panel Discussion on</b> <b>Engineering the Future: A Joint Vision for Academia and Industry</b>
	04:00 PM – 04:30 PM	<b>Valedictory</b>

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## SPONSORS



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Industry to drive Next-Gen Electrical Engineering  
Innovation

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**Dr. Anirudh Nath**



**Prof. Aparajita  
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**Dr. Roshni Maiti**



**Dr. Sukanya Parui**



**Dr. Suvarun  
Dalapati**



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Qasim**



# Student Activities

