Indian Institute Of
Technology, Guwahati

Centre For Career Development

Department of
Electronics and
Electrical

Department
Brochure

About the Institute

Since **1994**, when it was founded as the sixth Indian Institute of Technology, IIT Guwahati has become one of the world's most dynamic universities in technology, innovation, and research. The campus lies on a 285-hectare parcel of land on the northern bank of Brahmaputra 20km from the city centre. The curriculum and courses at IIT Guwahati are constantly changing to meet global needs and allow students to explore their interests.

The Institute offers **B.Tech, B.Des, MA, M.Des, M.Tech, MS(R), MBA, M.Sc, and Ph.D** programmes in 11 Departments, 9 Centres, and 5 Schools in all major engineering, science, and humanities areas. Our students can broaden their studies with a 'Minor' degree, open and interdepartmental electives, audit courses, and inter-disciplinary research.

The institute's state-of-the-art laboratories and **National Centres of Research** have made it a hub for research and technical education.

Apart from world-class research, the faculty prepares students for professional problems by teaching them their fields conceptually. It also helps students participate in worldwide projects, which helps them become pioneers and leaders.

IIT Guwahati has **MoUs (Memoranda of Understanding)** with top international institutes for semester-based student-exchange programmes and summer internships, boosting global integration and broadening our students' perspectives.

In their holidays, students intern in industrial, managerial, and research fields at top international corporations and research labs, contributing greatly. The institute provides excellent extracurricular opportunities to help students develop holistically.

About the Department

The department was established in 1995, alongside the inception of the institute, as the Department of Electronics and Communication Engineering (ECE). From its commencement, the department has focused on delivering high-quality education, training, and research at the undergraduate, postgraduate, and doctoral levels, with a strong emphasis on the design aspects of electronic systems. In 2008, the department introduced a BTech program in Electronics and Electrical Engineering, designed to equip students with a solid foundation in electrical engineering, complemented by a robust background in electronics. In 2011, the department was renamed the Department of Electronics and Electrical Engineering (EEE).

About the Faculty

The major areas of faculty expertise of the department include Biomedical Signal Processing, Communication Systems, Computer Networks, Control Systems, Digital Signal Processing, Image Processing & Computer Vision, Pattern Recognition, Instrumentation, Multimedia Security, Power Electronics, Power Systems, Radar Signal Processing, RF and Microwaves, Microstrip Antennas, Optoelectronic and Optical Communication, Speech Signal Processing, VLSI Systems and MEMS.

About the Students

The Electronics and Electrical Engineering (EEE) department of our institute nurtures a diverse and talented pool of students, well-equipped to excel in the corporate world. Our students possess a unique combination of theoretical knowledge, practical skills, and a passion for innovation. With a comprehensive curriculum that covers a wide range of subjects including power systems, control systems, electronics, and communication, our students are equipped with a strong foundation in electrical engineering principles.

We are pleased to introduce you to the Department of Electronics and Electrical Engineering (EEE) at the esteemed Indian Institute of Technology Guwahati (IITG). It is with great pride that we present our exceptional pool of talent and invite you to explore the vast potential of our students.

At IITG, we are dedicated to cultivating the next generation of leaders and innovators in electrical and electronics engineering. The EEE department is renowned for its academic excellence, pioneering research, and emphasis on practical application. Our students benefit from a robust theoretical foundation coupled with hands-on experience in cutting-edge laboratories.

A large number of faculty members in our department are young and have completed PhD degree or postdoctoral experience in the forefront technologies at highly reputed universities in the world. They are leading experts in their fields, providing inspiration and mentorship that drive students to push the boundaries of knowledge and devise innovative solutions to real-world challenges. Our curriculum is meticulously designed to offer a comprehensive education, preparing students to excel in their careers and be capable of contributing substantially to your organization.

The EEE department at IITG offers a diverse range of specializations. Our students are equipped with advanced tools, software, and equipment, enabling them to undertake groundbreaking research and tackle complex problems. Through academic projects, internships, and industrial collaborations, they consistently demonstrate their ability to apply theoretical knowledge to practical scenarios.

We emphasize the importance of collaboration and teamwork, encouraging students to engage in interdisciplinary projects, participate in national and international competitions, and involve themselves in co-curricular and extracurricular activities. These experiences enhance their communication, leadership, and problem-solving skills, making them valuable assets to any team or organization.

In addition, the strong industry connections of the EEE department ensure that our graduates are well-prepared to make an immediate impact in the corporate world. Our Training and Placement Cell collaborates closely with leading companies to provide internships, industrial visits, and placement opportunities that align with organizational needs.

We invite you to explore the profiles of our talented students, each possessing a unique blend of technical expertise and leadership qualities. We are confident that you will find exceptional candidates capable of contributing to the growth and success of your organization.

Our alumni have pursued excellence and achieved remarkable success across the fields, many holding prominent positions in academia and industry, and some of them have founded successful enterprises.

We look forward to the opportunity to collaborate with you and showcase the exceptional talent of IIT Guwahati.

Head of Department
Prof. Harshal B. Nemade

As a Faculty Placement Representative of the EEE Department, I, on behalf of the department, am thrilled to invite your esteemed organization to participate in our upcoming campus placement drive for this placement season. IIT Guwahati has always been a beacon of excellence, nurturing some of the brightest minds in the country. As a premier institution, we take pride in nurturing a pool of talented and industry-ready graduates from diverse fields equipped with the skills, knowledge, and professionalism that your organization seeks.

Our students have consistently demonstrated excellence in academics, research, and co-curricular activities. They are trained in the latest industry practices and technologies, such as quantum computing, the Internet of Things, blockchain, robotics, renewable energy, nanoelectronics, generative AI, federated learning, virtual reality, and many more. These are just the tip of the iceberg, and their breadth and versatility of skills will ensure they can contribute effectively to your organization's growth and success from day one.

Here at IIT Guwahati, they undergo rigorous training for overall development, which includes Time management, Teamwork, Active listening, Confidence, Integrity, Critical Thinking, Relationship building, Adaptability and many more.

We believe that this collaboration can lead to a mutually beneficial relationship, providing your company with highly skilled professionals while offering our students the chance to start their careers with an industry leader.

We look forward to the possibility of your esteemed organization's participation. Please feel free to contact us for any further information or to schedule your participation.

Department Placement Representative, Faculty

Dr. Anirban Dasgupta
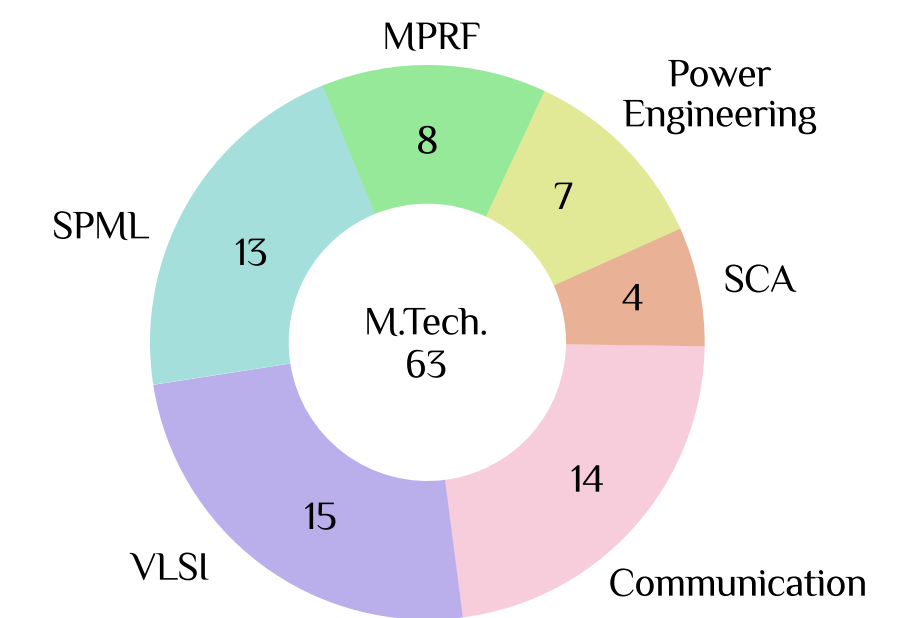
Programmes Offered

Bachelor of Technology

The institute offers two BTech programs: Electronics and Communication Engineering (ECE) and Electronics and Electrical Engineering (EEE). The ECE program focuses on building a strong foundation in theoretical, practical, and design aspects, covering electronic circuits, devices, signal processing, and communication. The EEE program, launched in 2008, aims to develop engineers with a deep understanding of electrical engineering, complemented by a strong background in electronics.

B.Tech. 182 — EEE - 66, ECE - 116
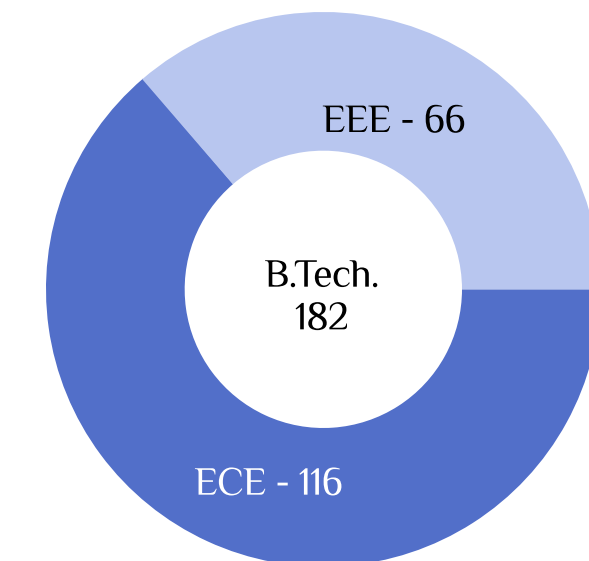
Masters of Technology

In 2010, the department has started two new MTech programmes with specializations in Communication Engineering and Power & Control. In 2015, the department had started one new MTech programme with specialization in RF & Photonics. The department now offers MTech in following specializations: 1) Signal Processing and Machine Learning, 2) VLSI & Nanoelectronics, 3) Power Engineering, 4) Systems, Control & Automation, 5) Communications Engineering, 6) Microelectronics, 7) Photonics & RF Engineering.

M.Tech. 63 — MPRF 8, Power Engineering 7, SCA 4, Communication 14, VLSI 15, SPML 13

Dual [MS (Eng) + PhD]

The department of Electronics and Electrical Engineering has started the Dual [MS(Eng) + PhD] degree program from July 2015. The program has been started to expand the scope of research focus offered in the PhD program covering all the major areas of faculty expertise that include Signal Processing, Communication Systems, Computer Networks, Control Systems, Biomedical Signal Processing, Image Processing & Computer Vision, Instrumentation, Multimedia Security, Power Electronics, Power Systems, RF and Microwaves, Speech and Handwriting Processing, VLSI Systems and MEMS.

PhD Program

The PhD program focuses on enhancing creative thinking, mathematical modeling, and problem-solving skills by engaging students in unsolved research issues in their areas of interest. Students pursue research under the guidance of one or more faculty members, working in various fields such as Biomedical Signal Processing, Communication Systems, Computer Networks, Control Systems, Digital Signal Processing, Image Processing, Pattern Recognition, Instrumentation, Multimedia Security, Power Electronics, Power Systems, Radar Signal Processing, RF and Microwaves, Microstrip Antennas, Optoelectronic Communication, Speech Signal Processing, VLSI Systems, and MEMS.

Course Offered

Core courses

BTech

- Digital Communication
- Embedded Systems
- Digital Signal Processing
- Principles of Communication
- Electromagnetic Theory
- Analog Circuit
- Control System
- Measurement and Instrumentation
- Semiconductor Device
- Circuit Theory
- Digital Circuit
- Signals and Systems
- Electrical Machines
- Power Electronics
- Electrical Power System
- Advanced electrical engineering lab
- Microelctronics Lab

MTech

- Digital IC Design
- Analog IC Design
- Semiconductor Device Modelling
- VLSI DSP
- VLSI System Design
- IC technology
- Communication System theory
- Information Theory
- Probability and Stochastic Processes
- Wireless Communication
- Data Communication Networks
- Detection and Estimation Theory
- Power Electronics Converter
- Modern Power System
- Insulation and High Voltage Engineering

Electives

- Optimization Techniques
- Medical Imaging
- Stochastic Analysis of Wireless Networks
- Biometrics
- Speech Signal Processing and Coding
- Fundamentals of VLSI CAD
- Micro sensors and Nano sensors
- Circuits for Sensor Signal Processing
- Optical Measurement Techniques and Applications
- Digital Control
- Modeling and Simulation of Dynamic Systems
- Introduction of Distributed Control Systems
- Smart Power Grids for a Sustainable Future
- Modeling and Control of Power Electronic Converters
- Blockchain Science & Technology

Labs

- Digital Circuits Laboratory
- Analog Circuits Laboratory
- Instrumentation Laboratory
- Control and Robotics Lab
- Communication and DSP Laboratory
- Electrical Machines Lab
- Wireless Communications Design Lab
- Machine Learning Laboratory
- Digital Signal Processors Lab
- Digital IC design Laboratory
- Analog VLSI Laboratory
- Photonic and Microelectronics Lab
- RF Laboratory
- Applied Control and RF Laboratory
- Power Electronics and Engineering Laboratory

The Department of Electronics and Electrical Engineering (EEE) is dedicated to providing comprehensive education and training at the undergraduate, postgraduate, and research levels, focusing on both electronics & communication engineering and electronics & electrical engineering. A key priority of the department is to emphasize the **design aspects of electronic systems**, ensuring that students not only build solid theoretical and analytical foundations but also develop a **comprehensive design perspective** and **practical aptitude**. This **design-oriented approach** prepares students to meet the challenges of modern engineering by equipping them with the ability to innovate and implement complex electronic systems.

Faculty members and students within the department are deeply involved in research across a wide range of EEE-related areas. The department hosts a substantial number of **MTech, PhD**, and **Dual Degree (MS+PhD)** students who are actively engaged in cutting-edge research projects. These projects often involve collaboration with government agencies and well-known private organizations, reflecting the department's commitment to advancing technology and addressing real-world challenges.

The research activities within the department are diverse and can be broadly categorized into the following key areas:

- Communication Engineering
- Signal Processing and Machine Learning
- Systems, Control and Automation
- VLSI & Nanoelectronics
- Power Engineering
- Microelectronics, Photonics and RF Engineering

The department's commitment to excellence in research and education ensures that its graduates are well-prepared to contribute to the advancement of technology and innovation in the field of electronics and electrical engineering.

Research Groups

Research Areas

- Analog & RF IC design
- VLSI CAD & System Design
- Digital Circuits and Systems
- High Performance Computing
- DSP Architectures
- Hardware Security
- Nano Sensors
- Spintronics
- MEMS, SAW Devices
- Flexible/Wearable Electronics
- III – V Compound Semiconductor
- Neuromorphic Computing
- Photovoltaics
- Memory Technology
- New and Quantum Materials
- Organic Electronics
- Embedded System Design
- Hardware Realization of ML Algorithms

VLSI and Nanoelectronics

Signal Processing and Machine Learning
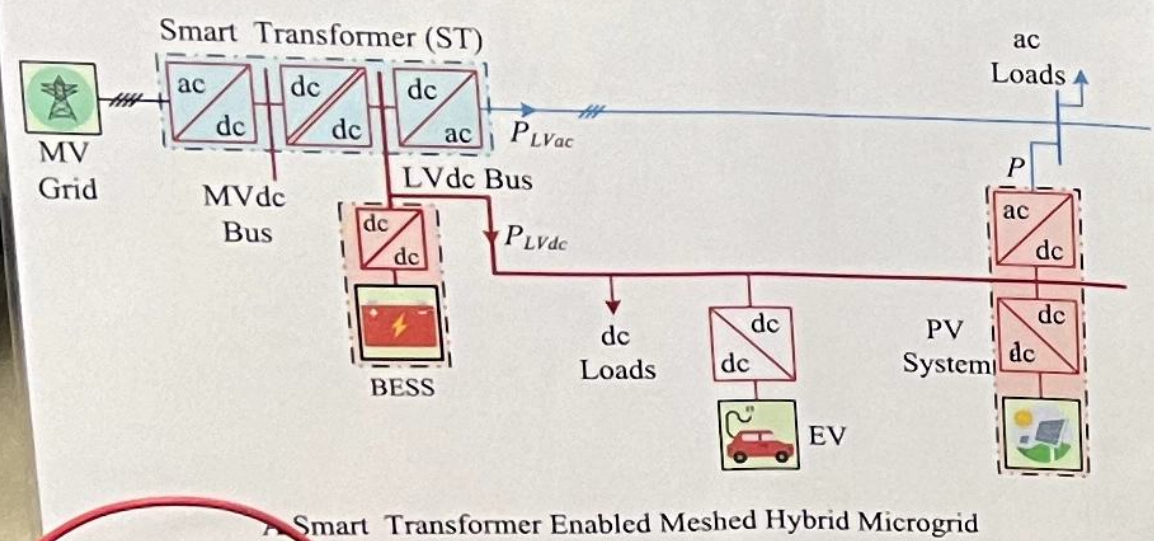
Research Areas

- Data Sciences
- Biomedical Signal and Medical Image Processing
- Speech and Handwriting Processing
- Image and Video Processing
- Computer Vision
- Pattern Recognition
- Multimedia Analytics
- Biometrics and Counter-Spoofing
- Security and Privacy
- Vision and Language
- Natural Language Processing
- Deep Learning
- Federated Learning
- Privacy Preserving Analysis for Secure Computation
- Secure Key Distribution and Management in Wireless Sensor Networks
- DSP Architectures
- Hardware Security
- Nano Sensors
- Smart City

Power Engineering

A Smart Transformer Enabled Meshed Hybrid Microgrid

Research Areas

- Power Systems
- Power Electronics and Application in Power Systems
- Power Quality
- Microgrid and Renewable Energy Resources
- Power Distribution System Planning
- Custom Power Devices
- Electrical Machines
- Control of Electrical Drives
- Smartgrid and Electric Vehicles
- High Voltage Engineering and Applied Electromagnetics
- Condition Monitoring of Power Apparatuses
- High Voltage and Pulse Power
- High Power Density Motor Design
- Inductive Charging for EVs
- Vector Control of Motors
- Power System Monitoring and Control
- Power System Cyber-Security
- Decentralized Control for the Smartgrid
- Battery Management System
- Wireless EV Charging

Research Areas

- Wireless Communications and its Waveform Design
- Wireless Energy Transfer
- Information Theory and Coding
- Communication and Computer Networks
- Computational Photography
- Data Compression and Cryptography
- Quantum Error Correction and Communication
- 5G / 6G Communications
- Vehicular Communications
- AI/ML Application in Communications
- Adversarial Machine Learning
- Cognitive Radio
- Cell-free Massive MIMO Systems
- Ultra-dense Networks (UDN)
- Edge Computing Enabled Networks
- Orthogonal Time Frequency Space (OTFS) Modulation
- Intelligent Reflecting Surfaces
- Spectrum Sharing Techniques
- Adaptive and Statistical Signal Processing
- Low Complexity Multiple Antenna Diversity Techniques
- Cooperative Communication, Multi-hop Relaying Systems

Communication Engineering

Research Areas

- Microelectronics
- Optics Metrology
- Optoelectronics
- Photonics Integrated Circuits
- Optical Communication, Networks and Sensors
- Optical Instrumentation
- Optical Signal Processing
- Distributed Acoustic Sensors
- RF, Microwave and Photonics
- Plasmonics and Metamaterials
- Smart Electrotuneable Plasmonic Metasystems
- Reconfigurable Metasurfaces
- THz Devices
- Silicon Photonics
- Computational Electromagnetics
- Digital holography
- Millimeter-Wave Communication
- Vacuum Electronics
- Advanced Photovoltaics and LEDs using Metamaterials

Microelectronics, Photonics and RF

System Control & Automation

Research Areas

- Systems Theory
- Control Theory and Applications
- Artificial Intelligence based Control
- Identification and Control of Nonlinear Systems
- Control of Nonlinear Uncertain Systems
- Relay based Identification and Autotuning
- Adaptive, Optimal and Robust Control
- Robotics and Automation
- Cryptography
- Cooperative Control of multi-agent systems
- Model Predictive Control
- Reinforcement Learning
- Vibration Control of Flexible Structures
- Modelling and Control of Mechatronic and Robotic Systems
- Group-Coordinated Control of UAVs, UGVs and AUVs
- Connected Vehicle Platooning
- Passivity-based Control and Dissipativity
- Negative-imaginary Systems Theory
- Robust Control of Missiles, Spacecraft and Rockets
- Smart and Microgrid Control using a Multi-agent Framework
- Controller Design for Energy Management System in EVs

Sponsored Projects

Projects	Domain	Sponsors
Design and development of a digital holographic microscopic imaging system for detection and recognition of underwater microorganisms and particles	MPRF	IIT Guwahati Technology Innovation and Development Foundation (NM ICPS Underwater Exploration)
Development of signal and channel plasmonic metamaterials based optical components for applications in space models, circuits, and antennas for next generation wireless systems with emphasis on vehicular communications	Communication Engineering	MeiTy
Design and development of a robotic vision system for underwater trash detection using subsea inpainting and textual artifact analysis	SPML	TIH - TIDF, IITG
Phase and bandgap engineering of III-Oxides in quest of interfacial 2DEG	VLSI & Nanoelectronics	STAR MoE
Development of non-edible green vegetable oil as a potential liquid dielectric for nanofilled natural ester impregnated surface modified pressboards for suppressing partial discharges in transformer	Power Engineering	SERB, DST, New Delhi
Contraction analysis and resilient control design for nonlinear cyber-physical systems under denial-of-service	SCA	SERB
Plasmonic metamaterials based optical components for applications in space	MPRF	ISRO
AI enabled advanced aquaponics ecosystem for the self-reliance of SC community in central and lower Assam	SPML	Science for Equity Empowerment and Development Division (DST-SEED)

Sponsored Projects

Projects	Domain	Sponsors
Design and Development of a Motion Planning and Control Scheme for an AUV swarm with Application to Underwater Surveillance	SCA	TIH - TIDF, IITG
Design and Analysis of OTFS-based Multi-user Terahertz Communication for 6G and Beyond	Communication Engineering	SERB
Exploration of flexible power distribution systems enabled by the smart transformer	Power Engineering	Research Group Linkage Programme supported by Alexander von Humboldt Foundation
Design and development of real-time semantic segmentation networks and the corresponding FPGA-ASIC based hardware accelerators for possible deployment in commercial prototype for autonomous driving	VLSI & Nanoelectronics	SERB, DST
Sign language translator for identification of health conditions of the deaf and dumb population for medical attention	SPML	SERB, DST
Improving the existing linear state estimator's bad data detection capability using the prediction of the system states, and developing a low-frequency mode estimator using ring-down and ambient data	Power Engineering	GRID INDIA
Intelligent Reflecting Surface Enabled Simultaneous Wireless Energy and Information Transfer in Next Generation IoT Networks: System Design, Optimization and Performance Analysis	Communication Engineering	SERB
Prototype Development of a Low-Cost Resistive Humidity Sensor	VLSI & Nanoelectronics	DST

and many more......

Achievements

Name of the Awardee	Name of the Award	Name of Institution / Organisation bestowing the Award	Reason for the award
Dr. Ankush Bag (Faculty)	Excellent R & D Project Proposal	Indian Semiconductor and Packaging Ecosystem Conference	Best Project Proposal
Prof. R. S. Kshetrimayum (Faculty)	Certificate of Appreciation	IEEE Communications Society	Editor of IEEE Communications Society of Letters (2021 - 2023)
Mr. Tanmay Bhowmik (Student)	Best Oral Presentation Award	IISC Bangalore/ Photonics 2023 Conference	Best Oral presentation
Mr. Shiv Kumar (Student)	Best Paper Award	IEEE Electron Device Technology Manufacturing (EDTM) 2024, Bengaluru	Best Paper
Mr. Dibaskar Biswas (Student)	Prime Minister Research Fellowship (PMRF)	Ministry of Education, Government of India	Selected for impactful research proposal having applications in 6G
Ms. Salam Athoibi Devi (Student)	Prime Minister Research Fellowship (PMRF)	MHRD, Government of India	Outstanding academic profile
Mr. Ashish Kumar (Student)	Award of PhD Scholarship	C-DOT Star Program	Outstanding research performance

and many more......

Department Workshops

OpenROAD for Low-Cost ASIC Design and Rapid Innovation

- Workshop was organised to get vital knowledge on VLSI system design along with backend flow through open-source tool OpenROAD.

- Special Guest **Prof. Andrew B. Kahng**, who is currently Distinguished Professor of CSE and ECE, UC San Diego, was also invited for the talk "**OpenROAD: A Foundation for IC Design Innovation and Workforce Development**"

Vision for a Distributed Network of Brain Implants using the Conductive Properties of the Tissue

- Talk delivered by **Baibhab Chatterjee**, who is currently working as an Assistant Professor in the Department of Electrical and Computer Engineering (ECE), University of Florida, and directs the Wireless Intelligence Sensor Electronics (WISE) Lab.

- The talk focused on recent work on **Bi-Phasic Quasistatic Brain Communication** (BP-QBC).

Evolution of RF and Microwave Engineering

- Talk was delivered by **Prof. Ratnajit Bhattacharjee**, who is currently Distinguished Professor of EEE Department, IIT Guwahati and had also served as General Chair for 5th edition of IEEE Applied Electromagnetic Conference, AEMC 2015 and 22nd National Conference on Communications, NCC 2016.

- Talk emphasized on different aspects of the development in the field of RF and Microwave Engineering with the activities which accelerated its growth.
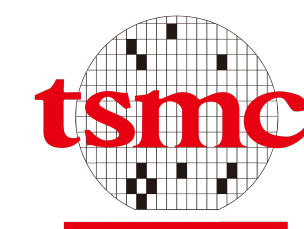
Semiconductor Horizons in Assam: Technological Empowerment through Skilling & Innovation

- Workshop was organised to Development of essential skills for R&D and Commercialisation of Semiconductor technology.

- Special guests, including **Dr. Charan Gurumurthy**, Chief Executive of Tata Semiconductor Assembly and Test Pvt. Ltd., **Prof. Rajeev Ahuja**, **Dr. Lakshmanan S.**, and **Smt. Saumya Gupta**, were invited to speak, along with **Prof. Harshal Bhalchandra Nemade** (HoD, EEE, IIT Guwahati), **Prof. Roy Paily Palathinkal** (IIT Guwahati), and **Dr. Akshai Kumar Alape Seetharam** (Head, Centre for Nanotechnology, IIT Guwahati), to share their insights as experts and leaders in their respective fields.

  and many more......

Past Recruiters

Past Recruiters

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and many more......

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