

One Week Faculty Development Program (Hybrid Mode)

On

The Recent Trends in AI Applications for Microwave Engineering: Active and Passive Component Design, Imaging, and Beyond

7 – 11 July 2025

Jointly Organized by
Electronics and ICT Academy

National Institute of Technology Patna, Patna
<https://nitp-ict.ct.ws>

&

Netaji Subhash Engineering College, Kolkata
<https://www.nsec.ac.in/>

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About NSEC

Netaji Subhash Engineering College (NSEC), Kolkata, established in 1998, is a premier self-financing institution dedicated to delivering quality education in engineering and management. The college holds NAAC accreditation and has earned NBA accreditation for four of its B.Tech. programs, underscoring its strong academic reputation. The institute offers a range of resources including experienced and skilled faculty, advanced computing facilities. It also features an Institute Innovation Council and a Business Incubator Centre to promote entrepreneurship and research. With a strong emphasis on innovation, industry collaboration, and academic excellence, NSEC equips its students for successful and future-ready careers.

About ECE Department, NSEC

The Department of Electronics and Communication Engineering (ECE) began its journey with the establishment of the institute in 1998, offering a B.Tech. program approved by AICTE, with a current intake capacity of 120 students. In 2005, the department expanded its academic offerings by introducing an M.Tech. program in Communication Engineering. Nationally recognized for its academic excellence, the department has earned NBA accreditation five times and successfully completed TEQIP Phase-I.

About NIT Patna

The National Institute of Technology (NIT) Patna is one of India's most historic technical institutions, tracing its roots back to 1886, when it began as a pleaders' survey training school. Over time, it evolved into the Bihar College of Engineering Patna in 1924, making it the 6th oldest engineering institute in the country. On 28th January 2004, the college was rechristened as NIT Patna, becoming the 18th National Institute of Technology under the Ministry of Education, Government of India. NIT Patna has been a pioneer in technical education for well over a century, offering undergraduate, postgraduate, and PhD programs in engineering, technology, science, and humanities.

About ECE Department, NIT Patna

The department of ECE is one of the established and largest departments in the institute. It was established in the year 1978 with an intake of 10 students only. The Department offers B.Tech. program in "Electronics & Communication Engineering" with 161 intake capacity and M.Tech. program in "Next Generation Wireless Technologies" with an intake of 22 and "Microelectronics and VLSI System Design" with 12 intake capacity. Department introduces dual degree program in "Microelectronics and VLSI System Design" in the year 2022 onwards with 22 intake capacity. The department also offers Ph.D. programs (full/part-time research programs) in ECE since 2012 to conduct research in various areas like VLSI, communication, signal processing, antenna design, microwave engineering, etc.

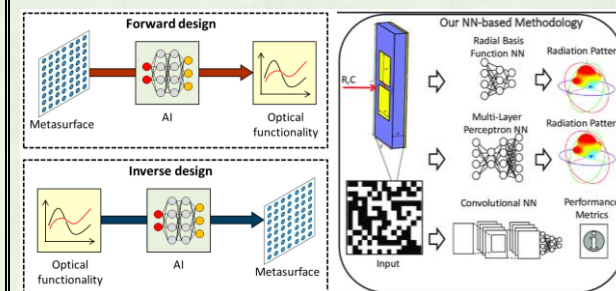
Electronics and ICT Academy

The Ministry of Electronics and Information Technology, Government of India has instituted seven Electronics and Information & Communications Technology (ICT) Academies of which, the academy of NIT Patna is one. The Academy at NIT Patna aims to design and organize basic as well as specialized training programs in niche areas of electronics and ICT for the development of the required knowledge base, skills, and tools to equip the teaching community with better knowledge and understanding.

About Theme

The Faculty Development Program (FDP) titled "The Recent Trends in AI Applications for Microwave Engineering: Active and Passive Component Design, Imaging, and Beyond" is designed to address both the theoretical and practical aspects of applying artificial intelligence and machine learning (AI/ML) and evolutionary optimization, viz. GA, PSO, in the broad domain of microwave engineering. The topics to be discussed have application in the domains like i) Automated design of RF/Microwave/THz parasitic and active components, ii) automated design and optimization of antenna, absorber, reconfigurable intelligent surface (RIS), etc. iii) computational electromagnetics, iv) non-destructive-testing (NDT), etc.

The above said domains play a crucial role in development future technologies like 6G communication and Industry 6.0, etc.



Objectives of the Program

The objective of this FDP is to

- Develop the understanding of the fundamentals of linear algebra and statistics, required as the prerequisite for venturing in to the realm of AI/ML
- Provide understanding of AI/ML to microwave engineers.
- Provide hands on training on implementation of ML and evolutionary optimization algorithms in higher level programming languages like Python/MATLAB
- Provide hands on training to automate 3D model creation and simulation of microwave components in fullwave simulators like HFSS/CST/FEKO, etc. using scripting languages like JavaScript, VBScript, Lua, etc.
- Provide hands on training on the MATLAB antenna toolbox
- To inspire the participants to actively pursue research in the AI/ML and its impactful application in the broad domain of microwave engineering

Topics to be Covered

- Introduction to AI/ML
- Introduction to Evolutionary Optimization
- Application of AI/ML in computer aided design (CAD) for the following components or systems
 - Antenna design using AI/ML
 - Absorber and metasurface design
 - Reconfigurable Intelligent Surfaces (RIS) design
 - Design of microwave circuits (RFIC, MMIC, MIC, etc.) like low noise amplifier (LNA), Power Amplifier (PA)
 - Design of microwave components like filter, coupler, beamformer, etc.
- Modeling of wireless propagation channel
- Non-destructive testing (NDT) and microwave imaging
- Application of AI/ML in computational electromagnetics
- Hands-on training on AI/ML algorithms and programming.
- Hands-on training on simulation and optimal design of microwave devices/circuits/antennas, etc. using AI/ML.

Resource Persons (Tentative)

- **Dr. S. Raghavan**, National Institute of Technology, Tiruchirappalli
- **Dr. Amalendu Patnaik**, IIT Roorkee
- **Dr. Soumava Mukherjee**, IIT Jodhpur
- **Dr. Debdeep Sarkar**, IISc Bangalore
- **Dr. Jagannath Malik**, IIT Patna
- **Dr. Koushik Dutta**, Netaji Subhash Engineering College
- **Dr. Debasis Mitra**, IEST, Shibpur
- **Dr. Ravi Panwar**, IIT BHU Varanasi
- **Dr. Ravi Kumar Arya**, Zhongshan Institute of Changchun University of Science and Technology, China
- **Mr. Swapnil Gaul**, Founder and Director, Numergion Technology (OPC) Private Limited

Other experts are from IITs, NITs, and industries.

FDP Includes

- **5-day training (8 hours per day) by renowned experts from India and abroad. 40 Hours of Lecture and Hands-on sessions including Interactive Query Sessions.**
- **2 hours of lectures on Pedagogy**
- Soft copy of study material, Training PPTs, recorded session & Project code
- E-certificates will be given to participants who have **attended more than 70%** of the workshop sessions and complete the **assessment** at the end of the FDP.
- **MODE OF CONDUCTION: Hybrid**
- **Timings: Mon-Fri (09.00 AM- 06.00 PM)**

Who can Participate

Faculty members, Research scholars, PG students from India and Abroad, and Industry personnel. **The selection will be done on first-cum-first-serve basis.**

Registration Fee

Rs. 500/- only (Faculty/Industry/ Research Scholar/ Student) for both online and physical mode participants.

****The registration includes Hostel accommodation and food for physical mode participants**

Registration Process

1. **Registration fee should be paid online in the account given below:**

**Account Name: E AND ICT
ACADEMY**
Account No.: 50380476798
IFSC Code: IDIB000B810
**Bank Name: Indian Bank, NIT
Patna**



2. **Scan the above QR code for payment using UPI apps.**
3. **During the registration process select the institute name as “Netaji Subhash Engineering College, Kolkata”.**
4. Fill out the registration form by clicking on the link given below or scanning the QR code

<https://forms.gle/YxjmzU1Sm2H3wtRWA>



5. **The brochure of the program may be downloaded from the website**
<https://nsec.ac.in/page.php?id=777>
6. **Last date of Registration: 5 July 2025**
7. A PDF file of the online filled registration form with proof of registration fee paid should be sent by email to **supriyo.dhabal@nsec.ac.in**

Address for Communications:

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