One Week Online
# Faculty Development Program
On
## Empowering Smart Healthcare with Deep Learning: From Data to Diagnosis
Under the banner of
**Electronics and ICT academy**
at
**National Institute of Technology Patna**

**09th June to 13th June 2025**

**Coordinators**
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## Jointly Organized by
Electronics and ICT Academy, National Institute of Technology Patna and Maulana Abul Kalam Azad University of Technology, West Bengal
https://nitp-ict.ct.ws

**Chief Guest:**
Hon'ble Vice Chancellor, MAKAUT, WB.

## Supported by
Ministry of Electronics and Information Technology (MeitY), Govt. of India.

## 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 (UG), postgraduate (PG), and PhD programs in engineering, technology, science, and humanities. Located on the south bank of the holy river Ganges, near the iconic Gandhi Ghat in Patna, the institute stands as a symbol of both academic excellence and cultural significance. With a mission to set high standards in education and research, NIT Patna is actively involved in research and development (R&D), pushing the boundaries of innovation across various fields. It holds a distinguished reputation for its long record of academic excellence and is dedicated to preparing students for the challenges of the global economy.

## ABOUT MAKAUT,WB
Maulana Abul Kalam Azad University of Technology, West Bengal (MAKAUT, WB) is the nodal State Government University which provides affiliation to more than 200 Colleges spread throughout the state offering courses in Engineering & Technology, Pharmacy, Architecture, Management, Applied Sciences and various professional courses. The University is recognized under Section 2(F) and 12(B) of the UGC Act. The courses offered by the University are approved by AICTE and UGC. University offers UG, PG and PhD programs in various emerging areas, CSE, IT, Biotechnology UG courses are NBA accreditated. The University is NAAC accredited and has NIRF ranking 51-100 (2024, State University ranking). The University has its main campus sprawling over 40 acres at Haringhata, Nadia. The university always encourages application of ICT in all domains. In recent past, we have successfully organized AICTE funded ATAL FDPs in ICT mode.

## 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 THE THEME
The proposed Faculty Development Programme (FDP) on "Empowering Smart Healthcare with Deep Learning: From Data to Diagnosis" is an advanced training initiative aimed at empowering faculty members with state-of-the-art knowledge and tools in the emerging domains of smart healthcare systems. It will lead to advancements in teaching, research, and healthcare practices, ultimately contributing to the development of intelligent solutions that can address critical challenges in healthcare.
Brief Content to be covered via Proposed FDP:
Introduction to machine learning and deep learning, Neural networks, activation functions, loss functions, Popular deep learning frameworks, Significance of deep learning in healthcare, Healthcare 4.0 / Healthcare 5.0, Internet of Healthcare Things(IoHT),Sensor Networks for IoHT, Challenges in medical data collection, preprocessing, and privacy, Techniques for cleaning noisy, incomplete, or biased data, Preprocessing medical images and time-series data, Handling medical data using deep learning techniques, Introduction to GANs and their role in medical image generation and data augmentation, Ethical considerations of synthetic data in healthcare, Hands-on implementation of medical data classification and prediction, Evaluation metrics for medical models, Applications in disease diagnosis, cancer detection, and personalized medicine, Role of Deep Learning in telemedicine and remote healthcare, Human activity Recognition Systems, Trends and challenges for the security of Smart Healthcare Systems, Architecture of Smart Healthcare, Applications of Block chain Technologies in Smart Healthcare

## OBJECTIVES OF THE PROGRAM

- To provide a comprehensive understanding of deep learning techniques.
- Explore the usage of CNNs, RNNs, and GANs and their use in medical imaging, diagnostics, and time-series data analysis.
- Provide practical exposure to medical data preprocessing, model building, and evaluation using popular deep learning frameworks.
- Encourage participants to explore real-world use cases and research opportunities in intelligent medical system.
- Discuss the ethical, legal, and social implications of deep learning in healthcare.

## TOPICS TO BE COVERED

Topic 1: Introduction to Deep Learning: Overview of Machine Learning and Deep Learning, Introduction to Key Deep Learning Frameworks, Importance of Deep Learning in Medical Applications

Topic 2: Medical Data Types and Challenges: Overview of Structured and Unstructured Data, Introduction to Imaging Data (X-rays, MRIs, CT scans) and Time-Series Data (EEG, ECG), Challenges in Medical Data Collection, Processing, and Annotation

Topic 3: Convolutional Neural Networks (CNN) for Medical Imaging: CNN Architecture: Convolution, Pooling, Fully Connected Layers, Image Classification and Feature Extraction, Applications in Medical Imaging: X-rays, CT Scans, MRIs

Topic 4: Recurrent Neural Networks (RNN) and Medical Time Series Data: RNNs, Long Short-Term Memory (LSTM), Gated Recurrent Units (GRU),Applications for Time Series Data: ECG, EEG, etc.

Topic 5: Advanced Deep Learning Techniques in Medical Analysis: Generative Adversarial Networks (GANs) in Healthcare, GAN Architecture: Generator, Discriminator, Role of GANs in Image Synthesis and Data Augmentation

Topic 6: Ethical, Legal, and Social Implications of AI in Healthcare: Data Privacy and Security Issues (HIPAA, GDPR), Regulations and Standards Governing AI in Healthcare

Topic 7: Future Trends in Deep Learning for Healthcare: AI for Telemedicine and Remote Patient Monitoring, Robotics, AI in Surgery, and Precision Medicine
Etc..

## RESOURCE PERSONS

**Resource persons from leading industries, IITs, NITs and other eminent institutes**

1. Prof. Rajeev Srivastava, IIT BHU
2. Prof. Ram Bilas Pachori, IIT Indore
3. Prof. Pavitra Mitra, IIT Kharagpur
4. Prof. Sudip Mishra, IIT Kharagpur
5. Prof. Sudipta Mukhopadhyay, IIT Kharagpur
6. Prof. Anup Singh, IIT Delhi
7. Prof. Neeraj Sharma, IIT BHU
8. Dr. Debanga Raj Neog, IIT Guwahati
9. Dr. Dipanwita Thakur, Univ. of Calabria, Italy

And many others..........................................

## FDP INCLUDES

05-days training will be conducted by experts from academia and industries with experience ranging from several years to several decades in delivering sessions in India and abroad. The training hour is 08 hours each day. The mode of training is Instructor-led live online.

- **40 Hours of Instructor-led live online Hands-on learning & Interactive Query Sessions.**
- 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:** Online
- **Timings:** Mon-Fri (09.00 AM- 06.00 PM)

## WHO CAN PARTICIPATE

Faculty members, Research scholars of recognized Universities from India and Abroad, Research scholars, Students, and Industry personals. However, priority will be given to the faculty members.

**Selection will be done on first-cum-first-serve basis.**

## REGISTRATION FEE

**For Indian Nationals:** Rs. 500/- (Faculty/ Research Scholar/Student), Rs. 500/- (Industry)
**For Foreigners:** 60 US Dollars (Faculty/Research scholar/student), 60 US Dollars (Industry)

## REGISTRATION PROCESS

1. Registration fee should be paid through online mode, the account details for this purpose is

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

2. Registration form link:

    https://forms.gle/KWVha3MptNNjxARy5



**Scan the above QR code for payment using UPI apps.**

3. The brochure of the program may be downloaded from the website https://makautwb.ac.in//
4. **Registration deadline: 31 May 2025 11:59 PM (IST)**
5. A PDF file of the online filled registration form with proof of registration fee paid should be sent by email to **seemanti@nitp.ac.in / ritesh@nitp.ac.in**

## ADDRESS FOR CORRESPONDENCE

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