

Centre for Machine Learning and Intelligence

Generic Elective

Fundamentals of Artificial Intelligence and Internet of Things
(Applicable for the UG Students admitted from 2023 – 2024 onwards)

Semester: 1,3,4,6

Subject Code : 23BAIGE3

Course Objectives:

Hrs of Instruction/Week: 5+1

No of Credits: 6

1. To know about the basics of Internet of Things.
2. To know about the basics of Artificial Intelligence.
3. To become familiar with AI integrated IoT applications.

Unit 1: Introduction to IoT

- 15Hrs

Fundamentals of IoT: Introduction - Definitions & Characteristics of IoT - Features of IoT - Types of IoT - IoT Architectures - Physical & Logical Design of IoT – IoT Enabling Technologies - History of IoT - Applications of IoT - (About Things in IoT)* - The Identifiers in IoT - About the Internet in IoT - IoT frameworks – IoT Communication models.

Unit 2: IoT Design Methodology

- 15 Hrs

Purpose & Requirements Specification - Process Specification - Domain Model Specification - Information Model Specification - Service Specifications- IoT Level Specification - Functional View Specification - Operational View Specification - Device & Component Integration - Application Development – (Case Study: Home Automation)*

Unit 3: AI, ML & DL

- 15Hrs

Principles of Artificial Intelligence - AI with Search Techniques and Games - Using Trees for Predictive Analysis - Deep Learning with Neural Networks - An Introduction to Machine Learning - Supervised Learning - Unsupervised Learning - Real World Machine Learning - Introduction to Deep Learning - Neural Networks Basics - Artificial Neural Networks - Back Propagation - (Convolution Neural Networks in Various Research Domains)* - Deep Learning Applications in Image Processing - Vision – NLP

Unit 4: Domain Specific IoTs

- 15 Hrs

Home Automation – Smart Lighting – Smart Appliances – Intrusion Detection – Smoke/Gas Detectors - Smart Cities – Smart Parking – Smart Roads – Structural Health Monitoring – Surveillance – Emergency Response – Environment – Weather Monitoring – Air Pollution Monitoring – Noise Pollution Monitoring – Forest Fire Detection – River Flood Detection – Energy – Smart Grids – Renewable Energy System – Prognostics – Retail – Inventory Management – Smart Payments – Smart Vending Machine – Logistics – Route Generation & Scheduling – Fleet Tracking – Shipment Monitoring – Remote Vehicle Diagnostics –

Agriculture – Smart Irrigation – Green House Control – Industry – Machine Diagnosis & Prognosis – Indoor Air Quality Monitoring – Health & Lifestyle – (Health & Fitness Monitoring)* – Wearable Electronics

Unit 5: AI and IoT Application

- 15 Hrs

Benefits of AI enabled IoT – Robots for Manufacturing Industries – Self Driving Cars – Retail Analytics – Smart Thermostat Solution – Face Detectors – Body Sensors – Traffic Management – (Smart Home)* – Wearables - Security Devices

***Indicates Self-Study Component
Total Hours: 75**

Reference Books:

1. *Arshdeep Bahga, Vijay Madisetti (2014), Internet of Things: A Hands-On Approach, VPT Publishers.*
2. *Dimitrios Serpanos, Marilyn Wolf (2018), Internet-of-Things (IoT) Systems - Architectures, Algorithms, Methodologies, Springer.*
3. *Wolfgang Ertel (2017), Introduction to Artificial intelligence (2017), Second Edition, Springer.*

Reference Website Link:

1. <https://www.analyticssteps.com/blogs/ai-iot-benefits-and-applications>
2. <https://www.clariontech.com/blog/ai-and-iot-blended-what-it-is-and-why-it-matters>
3. <https://dzone.com/articles/the-role-of-artificial-intelligence-in-iot>
4. <https://addevice.medium.com/using-ai-for-iot-applications-benefits-tech-aspects-4th-industrial-revolution-d1fc87a723d>

Course Outcome:

- CO1: Get knowledge on the Internet of Things.
- CO2: Knowledge on IoT design methodology.
- CO3: Get knowledge on Artificial Intelligence, Machine Learning & Deep Learning.
- CO4: Get familiar with IoT Applications.
- CO5: Get familiar with AI Embedded IoT Applications and its benefits.