

## JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY

(Deemed University) A-10, Sector 62, Noida, Gautam Buddh Nagar – 201 309 (U.P.) AICTE Approved | UGC Approved | NAAC Accredited | NIRF Ranked

### An Institution Dedicated to Excellence in Higher Education

## Introduces Online Certificate Courses

# IoT System Design using Edge AI and Cloud Computing

Preamble

The course is focused towards designing of IOT based systems, application of different cloud services in internet of things perspective and introduction to edge AI. The course includes building blocks of an IOT system, different communication protocols, hardware development boards such as Node MCU, Raspberry pi, etc., different cloud platforms for IOT and deploying AI models in edge devices. The course also has capstone projects and hands on exercises that are included in the end of each module.

**Target Participants/ Industry:** Professionals working in industry/Job seekers/Current Senior students who wish to upgrade their professional skills.

Duration of the Course: 3 Months

Mode of Operation: Blended mode

Number of Lectures of 1 hour duration: Approx34

Number of Practical Sessions of 1 hours duration: Approx16 (1 Hours)

#### To be covered in each Lecture:

Topics Durat	ion
Introduction to IOT (People Connecting to Things, Things Connecting to Things, Definition of IOT, History of IOT), IOT Components (Sensors & Actuators, Things, Communications, Networks, The Internet, Protocol Stack), Evolution of Connected Devices, IOT Applications, IOT Companies, Baseline Technologies (Machine to Machine (M2M) Communication, Cyber Physical Systems (CPS), Web of Things (WOT)), Address Crunch in IOT.Introduction to IOT Networking, Networking Standards and Technologies (Network Access & Physical Layer, Internet Layer, Transport Layer, The application layer),	-

Topics	Duration
Introduction to Arduino (Different Arduino boards, Arduino Uno board description and its pin configuration, Arduino IDE and program uploading, different functions related to GPIOs and special functions (PWM and Serial communication), Interfacing with Arduino using processing language (LED, Switch, Seven Segment, LCD, DC Motor, Relay, IR, LDR and DHT11 sensor), Interrupts, use of simulator and compiler, basics of HTML, Arduino supported IOT modules (NodeMCU, ESP32) and their configuration, Monitoring of sensor data on cloud and Web based controlling of actuators.	8L
Introduction to python, python IDE, Data types, various programming constructs (loops, if, else etc.), operators, functions, modules, data handling (pandas), file operations, Image operations (PIL-pillow), data plotting in python (Matplotlib), basics of machine learning in python (Scikit) and related case studies.Basic of AI, Introduction to computer vision, Introduction to Edge AI, Basics of TensorFlow.	8L
Introduction to Raspberry pi (Raspberry pi different model comparison, Pin Configuration, Raspberry Pi operating system choices, Set up your Raspberry pi, Raspbian OS, Remote Access using SSH, Remote Access using TightVNC), Interfacing with Raspberry pi using python and use of open source libraries (LED, Switch, LCD, DC Motor, Relay, IR, LDR and DHT11 sensor), IOT Applications (Water management system, Weather monitoring station on cloud, Smart Agriculture System, Pollution Monitoring system, Smart Dustbin management system.	6L
IoT hardware platforms, IoT operating systems, IoT cloud platforms, Cloud computing vs Edge computing, Fog computing in IoT, Introduction to cloud computing, Need of cloud computing, Types of clouds, Cloud computing models (SaaS, PaaS, IaaS), Popular cloud platforms.Introduction to ThingSpeak, IFTTT, Microsoft Azure, Azure IoT hub, Azure IoT central, Analyze IoT Data in ThingSpeak (Traffic Analysis monitoring), Home automation using Google Assistant and IFTTT, Deploying a Neural network Model on the Cloud and Hardware.	6L

### To be covered in each Practical Session

S.No.	Topics	Duration
1	Familiarization with proteus software and various IoT boards	2 Hours
2	IoT based weather monitoring system and sending live sensor data to cloud	2 Hours
3	IoT based smart home using Google Firebase	2 Hours
4	IoT Based Smart Agriculture and Automatic Irrigation System	2 Hours
5	IoT Based Waste Management System	2 Hours
6	IoT Based Camera Interfacing with raspberry pi and send on to the Gmail account	2 Hours
7	Object detection using raspberry pi	2 Hours
8	Generating optimized code for deploying NN model to an edge device	2 Hours

**Pre-requisite, if any:** Knowledge of Digital Electronics, Basic Electronics and at least one microprocessor and microcontroller architecture is desirable.

Schedule of the Classes: (Saturday/ Sunday – 2 hours each day)

Name of the Faculty Coordinators: Dr. Gaurav Verma and Mr. Ritesh Sharma

Name(s) of the Faculty to be involved in conduction of the Course: Dr. Gaurav Verma and Mr. Ritesh Sharma

Minimum Qualifications for participants: Preferably having bachelors degree in any specialization, students pursuing bachelor's degree will also be considered.

Mode of evaluation of the participants after every 7 - 10 Lecture Sessions: Quiz

Mode of evaluation of the participants after 3 – 4 Practical Sessions: Capstone projects

For course related query please mail to: Dr. Gaurav Verma: gaurav.verma@jiit.ac.in

For course registration, please click the link: https://forms.gle/AkVidsjMp5ArfwNj7

www.jiit.ac.in