



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

PRINCIPAL OF INTERNET OF THINGS (IoT)								
V Semester: CSE(AI&ML) / CSE(CS)								
CourseCode	Category	Hours/Week			Credits	MaximumMarks		
ACCD08	Elective	L	T	P	C	CIA	SEE	Total
		3	0	0	3	40	60	100
ContactClasses:48	TutorialClasses:Nil	PracticalClasses:Nil			TotalClasses:48			
Prerequisites: There are no prerequisites to take this course								

I. COURSE OVERVIEW:

The course aims to deliver a sound understanding of the design and analysis of Internet of Things through lectures and practice. The lectures provide the foundational knowledge in sensors and actuators, fusion of data from multiple sensors, sensor data calibration and topics in sensor data analytics: pre-processing and extraction of features in time, series sensor data, and classification methods. The students conduct a major piece of coursework working in pairs to develop an IoT application using the Orient speck platform.

II. COURSE OBJECTIVES:

The students will try to learn:

- I The architecture of the Internet of Things (IoT) and its role in a connected world.
- II The use of various hardware components, communication protocols, and sensing technologies to build IoT applications.
- III Real-time IoT applications and their role in creating a smart world.
- VI The challenges and emerging trends in the field of IoT.

III. COURSEOUTCOMES:

After successful completion of the course, students should be able to:

- CO1 The IoT value chain structure (device, data cloud), application areas and technologies involved.
- CO2 The IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, and sensing modules.
- CO3 Market forecast for IoT devices with a focus on sensors.
- CO4 Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi.
- CO5 Evaluate Web server for IoT solutions and advanced Web server for IoT use cases for orchestration.
- CO6 Design RESTful web API. solutions for monitoring, security, and threat mitigation.

IV. COURSECONTENT:

MODULE -I: INTRODUCTION TO INTERNET OF THINGS (10)

Introduction to Internet of Things, definition and characteristics of IoT, physical design of IoT, IoT protocols, IoT communication models, IoT communication APIs, IoT enabled technologies, wireless sensor networks, cloud computing, big data analytics, communication protocols, embedded systems, iot levels and templates; Domain Specific IoTs: Home, city, environment, energy, retail, logistics, agriculture, industry, health and lifestyle.

MODULE -II: IoT and M2M (09)

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT. Basics of IoT System Management with NETCOZF, YANG, NETCONF, YANG, SNMP NETOPEER.

MODULE -III: CONTROLLING HARDWARE AND SENSORS (10)

Controlling Hardware, Connecting LED, buzzer, switching high power devices with transistors, controlling AC power devices with relays, controlling servo motor, speed control of DC motor, unipolar and bipolar stepper motors Sensors.

Light sensor, temperature sensor with thermistor, voltage sensor, ADC and DAC, temperature and humidity sensor DHT11, motion detection sensors, wireless Bluetooth sensors, level sensors, USB Sensors, embedded sensors, distance measurement with ultrasound sensor.

MODULE -IV: INTRODUCTION TO ARDUINO AND RASPBERRY Pi (10)

Introduction to Arduino and Raspberry Pi, Installation, Interfaces (serial, SPI, I2C), Programming – Python program with RaspberryPi with focus on interfacing external gadgets, controlling output, reading input from pins

MODULE -V: CLOUD STORAGE (09)

Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

V. TEXT BOOKS:

1. Arshdeep Bahga and Vijay Madisetti, “Internet of Things: A Hands on Approach”, Universities Press, 1st Edition, 2015.
2. Matt Richardson and Shawn Wallace, “Getting Started with Raspberry Pi”, O'Reilly (SPD), 1st Edition, 2014.
3. Simon Monk, “Raspberry Pi Cookbook-Software and Hardware Problems and Solutions”, O'Reilly (SPD), 2nd Edition, 2016.

VI. REFERENCEBOOKS:

1. Peter Waher, “Learning Internet of Things”, Packt Publishing, 1st Edition, 2015.
2. Peter Friess, “Internet of Things – From Research and Innovation to Market Deployment”, River Publishers, 1st Edition, 2014.
3. N.Ida, “Sensors, Actuators and Their Interfaces”, SciTech Publishers, 2nd Edition 2014.

VII. ELECTRONIC RESOURCES:

1. <http://www.drps.ed.ac.uk/20,21/dpt/cxinfo11150.html>.
2. [https://mrcet.com/downloads/digital_notes/EEE/IoT & Applications Digital Notes.pdf](https://mrcet.com/downloads/digital_notes/EEE/IoT%20&%20Applications%20Digital%20Notes.pdf)
3. [https://www.coursehero.com/file/44580892/ IOT,LECTURE,NOTES,CSE,0doc/](https://www.coursehero.com/file/44580892/IOT,LECTURE,NOTES,CSE,0doc/)
4. https://www.tutorialspoint.com/internet_of_things/internet_of_things_tutorial.pdf
5. <https://lecturenotes.in/subject/370/internet-of-things-iot>

VIII. MATERIAL ONLINE:

1. Course template
2. Tutorial question bank
3. Tech-talk topics
4. Open-ended experiments

5. Definitions and terminology
6. Assignments
7. Model question paper – I
8. Model question paper – II
9. Lecture notes
10. PowerPoint presentation
11. E-Learning Readiness Videos (ELRV)