Internet of Things

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Pre-Requisites- Nil

Objective

The objective of this course is to enhance students' understanding of the Internet of Things (IoT) architecture, technology & its components and acquire Hands-on skills through various real-life applications of IoT

Learning Outcomes

After completion of this course, the students will be able to demonstrate:

- Architecture & components(H/W, S/W) of internet of things
- I/O devices & sensor interfacing, Communication technologies
- Data integration to cloud and Real life IoT based projects

Contents

1. Introduction to Internet of Things   (9 Hours)
   Definition, Architecture, Design methodology, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Role of Cloud in IoT, Privecy & security issues, QoS parameters, Interoperability & IoT Standards

2. Elements of IoT   (10 Hours)
   Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces. Software Components- Programming API's (using Python/Node.js/Arduino) for Communication Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.

3. Hands-on IoT Applications Development   (16 Hours)
   Interfacing & programming of LED, Switch, Buzzer, OLED, DHT11, LDR with Arduino/Raspberry Pi, Introduction to ThingSpeak cloud platform, Bluetooth interfacing to transfer sensor data between ThingSpeak cloud and Raspberry Pi/Arduino. Sensor data

fusion: Introduction, Type of sensor data fusion technologies, Opportunities & challenges in IoT. Data analytics in IoT.

4. IoT Case Studies   (10 Hours)

    IoT case studies and small projects on Environmental monitoring, Transportation, Agriculture, Healthcare and Home Automation.

LIST OF SUGGESTED BOOKS

1. Vijay Madisetti, Arshdeep Bahga, İnternet of Things, "A Hands on Approach", University Press.
2. Raj Kamal, Internet of Things: Architecture and Design Principles, McGraw Hill Education private limited.
3. Dr. SRN Reddy, Rachit Thukral and Manasi Mishra, "Introduction to Internet of Things: A practical Approach", ETI Labs.
4. Kai Hwang, Min Chen, Big Data Analytics for Cloud, IoT and Cognitive Computing, Wiley.
5. Cuno Pfister, "Getting Started with the Internet of Things", O Reilly Media.
6. Castanedo, Federico. "A review of data fusion techniques." The Scientific World Journal.
7. FURQAN ALAM, et al. "Data Fusion and IoT for Smart Ubiquitous Environments: A Survey." , IEEE Access