21IOT03	IOT ARCHITECTURES AND PROTOCOLS	L	T	P	C
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Course Objectives

- To impart knowledge on the infrastructure, sensor technologies and networking technologies of Internet of Things (IoT).
- To analyze, design and develop IoT solutions.
- To explore the entrepreneurial aspect of the Internet of Things
- To apply the concept of Internet of Things in the real world scenarios.

UNIT I	IOT FUNDAMENTALS	9 Hours

Definition & Characteristics of IoT - Challenges and Issues - Physical Design of IoT, Logical Design of IoT - IoT Functional Blocks, Security.

UNIT II	IOT REFERENCE ARCHITECTURE, SOFTWARE DESIGN	9 Hours

Control Units – Communication modules – Bluetooth – Zigbee – Wifi – GPS- IOT Protocols (IPv6, 6LoWPAN, RPL, CoAP etc..), MQTT, Wired Communication, Power Sources

UNIT III	TECHNOLOGIES BEHIND IOT	9 Hours

Four pillars of IOT paradigm, - RFID, Wireless Sensor Networks, SCADA (Supervisory Control and Data Acquisition), M2M - IOT Enabling Technologies - BigData Analytics, Cloud Computing, Embedded Systems.

UNIT IV	PROGRAMMING THE MICROCONTROLLER FOR IOT	9 Hours

Working principles of sensors – IOT deployment for Raspberry Pi /Arduino/Equivalent platform – Reading from Sensors, Communication: Connecting microcontroller with mobile devices – communication through Bluetooth, wifi and USB - Contiki OS- Cooja Simulator, Resource management in IoT: Clustering, Clustering for Scalability, Clustering for routing, Clustering Protocols for IOT

UNIT V	FROM THE INTERNET OF THINGS TO THE WEB OF THINGS	9 Hours

The Future Web of Things – Set up cloud environment –Cloud access from sensors– Data Analytics for IOT- Rest Architectures- The web of Things, Resource Identification and Identifier-Richardson Maturity Model, Applications of IoT: Business models for IoT, Green energy buildings and infrastructure, Smart farming, Smart retailing and Smart fleet management

Course Outcomes:

- Identify the main components of Internet of Things
- Program the sensors and controller as part of IoT
- Assess different Internet of Things technologies and their applications.
- To learn basic circuits, sensors and interfacing, data conversion process and shield libraries to interface with the real world
- To understand various challenges in designing IoT devices
- Demonstrate and build the project successfully by hardware/sensor requirements, coding, emulating and testing.

Text books:

1. Simone Cirani, Gianluigi Ferrari, Marco Picone, Luca Veltri. Internet of Things: Architectures, Protocols and Standards, 1st edition, Wiley Publications, 2019.
2. Bahga, Arshdeep, and Vijay Madisetti. Internet of Things: A hands-on approach, 1st edition, University press, 2014.

Reference Books:

1. Vermesan, Ovidiu, and Peter Friess, eds. Internet of things-from research and innovation to market deployment, 1st edition, Aalborg: River publishers, 2014.
2. Tsiatsis, Vlasios, Tsiatsis, Vlasios, Stamatis Karnouskos, Jan Holler, David Boyle, and Catherine Mulligan, Internet of Things: technologies and applications for a new age of intelligence, 2nd edition, Academic Press, 2018.