T. Y. B. Tech (E&TC Engineering)

Academic Year – 2021-2022 Semester -VI

[EC3109]: Internet of Things

Teaching Scheme:	Credit	Examination Scheme:
TH: -3Hours/Week	TH:3	In Sem. Evaluation :15 Marks
LAB: -1Hours/Week	LAB:1	Mid Sem. Exam :25 Marks
		End Sem. Exam : 60 Marks
		LAB Evaluation :50 Marks

Course Pre-requisites: Microcontrollers, Embedded system and Real time operating System and computer network.

Course Objective:

To learn the terminology, technology and its applications of IoT and to understand IoT Architecture and framework. Create a basic understanding of the communication protocols in IoT communications. To build a small low-cost embedded system using Arduino / Raspberry Pi. Familiarize the student with application program interfaces for IoT. To apply the concept of Internet of Things in the real-world scenario.

Course Outcome:

After successful completion of the course, students will able to:

CO1: Recognize fundamental concepts of Internet of Things
CO2: Identify sensors for different IoT applications
CO3: Apply basic protocols and understand higher layer Protocols in IoT
CO4: Demonstrate the interface of sensor data to cloud platforms
CO5: Develop simple applications using Arduino and Raspberry Pi.

Course Contents

UNIT-I	Overview of IOT	06 Hours

Internet of Things: Need, Definition and characteristics, Architecture: client-server architecture, P2P, M2M, Physical and Logical design, Frameworks, IOT levels, IOT vs M2M, Different software and hardware platforms for development, Challenges.

UNIT-II	Wireless Sensor Networks	07 Hours

Introduction to Wireless Sensor Network, Classification, Architecture of WSN. WSN Vs. IOT, Types of Sensors, Signal Conditioning, Interfacing, Smart Sensors. Selection of sensors for Practical Applications, Architecture of Mote, Wireless Sensor Network Protocols, Routing, localization, Tracking

UNIT-III	Wireless Technologies and IP based protocols supporting IoT	07 Hours

IEEE 802.15.4, Zigbee, Wireless HART, ZWave, Bluetooth Low Energy, RFID, RFID Protocols.
Zigbee & IoT Network Layer Protocols-IPv4, IPv6, 6LoWPAN, RPL, REST, AMPQ, CoAP, MQTT,

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comparison of Bluetooth and BLE, CoAP and MQTT.

UNIT-IV	Data Handling& Analytics	07 Hours

Bigdata, Types of data, Characteristics of Big data, Data handling Technologies, Introduction to Hadoop and cloud computing, Role of Cloud Computing in IoT, Introduction to data Analytics, Types of Data analytics.

UNIT-V	Embedded Suite for IoT	07 Hours

Introduction to Arduino and Raspberry Pi, Architecture of Arduino and Raspberry Pi, interfacing with sensors and actuators, Stepper motor, DHT 11, etc, Arduino IDE – Programming, APIs, Raspberry Pi Interfaces, Programming, APIs / Packages, Web services, controlling embedded system-based devices using Arduino and Raspberry Pi, Case study

UNIT-VI	Applications of IoT	08 Hours

Home automation, smart cities, Various Real time applications of IOT- Connecting IOT to cloud – Cloud Storage for IOT, Data Analytics for IOT – Software & Management Tools for IOT. Industrial IOT.

Lab Contents

Guidelines for Assessment

- Total marks assigned are 50.
- Continuous assessment will be carried out based on attendance, lab performance, and timely submission of lab file.
- Final practical examination for specific practical and oral examination will be conducted.

List of Laboratory Assignments/Experiments

1	Interfacing sensors to Arduino board (any two sensors).
2	PIR, Ultrasonic sensor, IR Sensor, Flame Sensor interface with Microcontroller (ATMEGA)
3	InterfacingAndroid Phone with Arduino andControl any two actuators using Bluetooth.
4	Demonstrate the cloud interface with Arduino, Upload data from Environmental Sensors to Cloud Server.
5	Access the data pushed from sensor to cloud andapply any data analytics or visualization services.
6	Interfacing of LED with Raspberry Pi
7	Interfacing of Raspberry Pi with DHT11
8	Interfacing of Raspberry Pi to demonstrate the Traffic Signal Control
9	Twitter alert using HTTP protocol with Raspberry Pi
10	Case Study: MQTT protocol
11	Case Study: Different cloud platforms and development boards

Text Books:

T1. ArshdeepBahga, Vijay Madisetti, Internet of Things: A Hands-On Approach, Universities Press, 2015. ISBN: 978-8173719547

T2. Olivier Hersent, David Boswarthick, and Omar Elloumi, ―The Internet of Things: Key

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Applications and Protocols‖, Wiley Publications

Reference Books:

R1. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", (CRC Press)

R2. HakimaChaouchi, ― The Internet of Things Connecting Objects to the Web‖ ISBN: 978-1- 84821-140-7, Wiley Publications

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