IoT Practical
20CSP358
BE CSE 6th SEMESTER

Course Objectives:

1. To study hardware and software related to IoT.
2. To understand the functions of Node MCU, Arduino Uno and Raspberry Pi.
3. To grasp knowledge about interfacing using non-wired connection.

Course Outcomes:

1. Analyze the components of IoT system. (BT-4)
2. Testing of model on IoT based Simulation. (BT-5)
3. Illustrate real time application using Node MCU/Arduino Uno/Raspberry Pi. (BT-3)
4. Develop an interface between controller and sensor to capture real time data. (BT-6)
5. Design an application to control actuators using wireless connectivity. (BT-6)

Syllabus

Unit 1

1. Familiarization with Arduino/Raspberry Pi hardware and perform necessary software installation. (CO-1)
2. Identification of different sensors used in IoT applications. (CO-1)
3. Demonstration of Autodesk Tinkercad Simulation Platform. (CO-2)
4. Program to interface the Arduino/Raspberry Pi with LED and blinking application. (CO-3)

Unit 2

5. To measure the distance of an object using an ultrasonic sensor. (CO-3)
6. Interfacing of Arduino/Raspberry Pi with temperature and humidity sensor with real time application. (CO-4)
7. To display data generated by sensor on LCD using Arduino/Raspberry Pi. (CO-4)

Unit 3

8. Interfacing Air Quality Sensor (MQ135) and display data on LCD. (CO-4)
9. Real time application of controlling actuators through Bluetooth application using Arduino. (CO-5)
10. Study the Implementation of Zigbee Protocol using Raspberry Pi/Arduino. (CO-5)

Text Books

Sr No	Title	Author	Volume/Edition	Publishing House	Year
1	Practical Internet of Things for Beginners: IoT Projects with Realsense, Azure, Arduino, and Intel E	Pooja Baraskar	1st	Apress	2020
2	The IoT Hacker's Handbook: A Practical Guide to Hacking the Internet of Things	Aditya Gupta	2021	Apress	2021
3	INTERNET OF THINGS - A HANDS-ON APPROACH	Arsheep Bahga, Vijay Madisetti	1st	Orient Blackswan Private Limited, New Delhi	2015
4	21 IOT Experiments	Yashavant Kanetakr and Shrirang Korde	2018	BPB	2018
5	Visual Inference for IoT Systems: A Practical Approach	Delia Velasco-Montero , Jorge Fernández-Berni , An	2022	Springer	2022

Reference Books

Sr No	Title	Author	Volume/Edition	Publishing House	Year
1	Building Arduino Projects for the Internet of Things: Experiments with Real-World Applications	Adeel Javed	2016	Apress	2016
2	Practical Internet of Things Security: Beat IoT security threats by strengthening your security stra	Brian Russell, Drew Van Duren	2016	Packt Publishing	2016
3	A Practical Guide for IoT Solution Architects: Architecting secure, agile, economical, highly availa	Dr. Mehmet Yildiz	2019	Independently Published (27 July 2019)	2019
4	Programming Arduino with LabVIEW	Marco Schwartz, Oliver Manickum	2015	PACKT	2015
5	New Arduino Communication Projects using MATLAB and Sensors: Simple technical approach	Anbazhagan k, Ambika parameswari k	2019	Kindle Edition	2019

IoT Theory
20CSP357
BE CSE 6th SEMESTER

Course Objectives

1. To study Origins, Drivers and Applications of Internet of Things.
2. To study Internet of Things Communications Models.
3. To learn what issues does the Internet of Things raise.

Course Outcomes

1. Analyze the basic terminologies associated with IOT and use it.
2. Justify the applications of Internet of Things and correlate them.
3. Compare different objects and communication strategies and also able to see the issues raised by communication strategies in IOT.
4. Examine the protocols required for communication and packet size required for each application.
5. Illustrate security issues with IOT like security, privacy, communication standard and some other legal issues.

Contents of the Syllabus

UNIT-I
[15h]
Chapter-1 (Introduction)
What is the Internet of Things, Components of IOT, Applications, Different Definitions, Similar Concepts, Sensing, Actuation, Smart Objects, Smart applications.
Chapter-2 (IOT Applications for Industry)
Value Creation and Challenges. IoT Today, IoT as a Network of Networks, Why Is IoT Important, IoT: Critical for Human Progression, Challenges and Barriers to IoT.

UNIT-II
[15h]
Chapter-3 (Internet of Things Communication Models)
Device – to – Device Communications, Device – to – Cloud Communications, Device – to - Gateway Model, Back - End Data - Sharing Model.
Chapter-4 (Issues Raised by Internet of Things)
Security Issues, The IoT Security Challenge, A Spectrum of Security Considerations, Unique Security Challenges of IoT Devices and Privacy.
Considerations: Internet of Things Privacy Background, Unique Privacy Aspects of Internet of Things, Interoperability.

UNIT-III
[15h]
Chapter-5 (Standard Issues)
IoT Interoperability / Standards Background, Key Considerations and Challenges in IoT Interoperability / Standards, Regulatory, Legal, and Rights Issues: Data Protection and Cross border Data Flows, IoT Data Discrimination, IoT Devices as Aids to Law Enforcement and Public Safety, IoT Device Liability.
Chapter-6 (Proliferation of IOT Devices)
Used in Legal Actions, Regulatory, Legal, and Rights Issues Summary, Emerging Economy and Development Issues: Ensuring IoT Opportunities are Global, Economic and Development Opportunities.
Chapter-7 (Case Study)
Case study on smart homes using Internet of things.

ADVANCED TOPICS (BEYOND SYLLABUS)
Mobile Cloud Services, IOT and Cloud Security, Smart Cloud and IOT

TEXT BOOKS

1. Ovidiu Vermesan, Peter Friess, “Internet of Things-Converging Technologies for Smart Environments & integrated Ecosystem”, River Publications Netherlands.
2. Internet Society, “An overview of Internet of Things”.
3. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things by David Hanes, Gonzalo Salgueiro, Patrick Grossetete, CISO Press.

REFERENCE BOOKS

1. Pfister, Cuno, “Getting started with the Internet of Things: connecting sensors and microcontrollers to the cloud", O'Reilly Media, Inc.”, 2011.
2. Greenfield, Adam,” Everyware: The dawning age of ubiquitous computing”, New Riders, 2010.
3. The Internet of Things, revised and updated edition (The MIT Press Essential Knowledge series) by Samuel Greengard, MIT Press.