



Course No : ESIC01	IoT for Beginners
Course No : ESIC02	IoT from the Ground Up Using Arduino
Course No : ESIC03	Powering IoT Using the Raspberry Pi
Course No : ESIC04	Powering IoT Using the ESP
Course No : ESIC05	Powering IoT Using the Orange Pi
Course No : ESIC06	Introduction to IoT Analytics

ESIC03 Powering IoT Using the Raspberry Pi

Course Content

Introduction to IoT

- 1.1 What is IoT?
- 1.2 Why do we need IoT?
- 1.3 Definition of IoT
- 1.4 History of IoT
- 1.5 Applications
- 1.6 Market Study

Introduction to IoT, definition, small history, applications of IoT and current market study.

IoT requirements

- 2.1 Interoperability
- 2.2 Scalability
- 2.3 Routing and Forwarding
- 2.4 Security

Practical challenges or requirements to make IoT possible.

IoT Architecture

- 3.1 Physical Layer
- 3.2 Communication Layer
- 3.3 Cloud Platform Layer
- 3.4 Application Layer

IoT Architecture and detail explanation of each layer and its role.

Physical Layer/Hardware

- 4.1 Sensors
- 4.2 End Nodes
- 4.3 Gateways

IoT Communication Protocols

- 5.1 Wi-Fi
- 5.2 BLE
- 5.3 Zigbee
- 5.4 Z-Wave
- 5.5 Ethernet
- 5.6 RFID

High level technical details and usage of each communication technology.

IoT Data Protocols

6.1 MQTT

6.2 MQTT-SN

6.3 CoAP

6.4 Node

High level explanation of each Data protocol and its application.

IoT Gateway

7.1 Getting started with basics

- Introduction to Raspberry Pi, different Models, etc.
- Hardware Description & Interfacing Components.
- OS – Basics and Introduction (Application Level – Kernel – Device Drivers – Hardware).

7.2 Setting up the Pi for the First Boot

- Flashing & preparing the SD card for the Raspberry Pi.
- Hardware Interfacing of PI.
- Installation & Booting in Debian Linux (Raspbian).
- Booting Raspberry Pi and explaining the GUI, basic interface.
- Connecting to the Internet using Wi-Fi.

7.3 Playing with the Linux OS, Commands & Programming on Raspberry

- Brief Introduction to Embedded Linux, Shell and Linux Commands.
- Logging in to Raspberry Pi- Linux LX- Terminal.
- Exploring Important Linux Commands and Checking the Output.
- Concept of Super User & File System hierarchy.
- Installing and Uninstalling software's.
- Programming on Raspberry Pi (Introduction to Python).
- Changing Configuration Menu & Enabling SSH (secure connection).
- Remote Login via SSH.

7.4 Accessing GPIO using Python Library and Interfacing Electronics and IoT Protocols

- Introduction to GPIO.
- Enabling the Raspberry Pi GPIO Pins.
- Testing the Sample Programs in Python.
- Programs in Python (Basic Syntax, Test Programs).
- Interfacing of HARDWARE : LED, Switches, Sensors, LCD Display.
- Importing Libraries, creating delays, etc.
- Practical's on the above topics in Python.
- Running programs at boot up.

7.5 Controlling via Android App

- Controlling GPIO via Android App,.

Node-red On Gateway

8.1 Getting started with basics.

- Introduction to Node-red.

8.2 Setting up the Pi for the Node-red.

- Installation & Booting in Raspberry pi.

8.3 Accessing GPIO using Node-red and Interfacing Electronics and IoT Protocols.

IoT Security

9.1 Need for security.

9.2 Threats of IoT devices.

9.3 Mitigations How secure are IoT devices? Security threats and mitigations of IoT.

Project Session

Live Project.