

STANDARD IoT COURSE CONTENT

Introduction:

Concepts & Definitions – Identification, localization. Wireless protocols, data storage and security. Collecting, Communicating, coordinating and leveraging the data from connected devices, understand how to develop and implement IoT technologies, solutions, and applications. Machine Learning, Distributed Computing, and Artificial intelligence.

Introduction to IoT:

- What is iot?
- Why iot?
- Why do we need iot?
- History of iot.

IoT Architecture:

- How IoT Works?
- High Level Data Flow in IoT Technical Architecture.

The Arduino platform:

- The Arduino Open-Microcontroller Platform.
- Arduino Basics.
- Arduino Board Layout & Architecture.
- Introduction to various Functions.
- Reading from Sensors (real world data).
- Programming fundamentals (C language).
- Arduino Programming & Interface of Sensor.
- Interfacing sensors with Arduino.
- Programming with Arduino.

IOT Gateways:

- Introduction to IoT Gateways.
- What is gateway? Why it's needed?

Three Stages of IOT:

- How to fetch The real World data or Unique Identity Data
- How to store these in a Gateway Buffer or How to hold Data
- How to pass the data on to the network for Controlling via APP.

Introduction to Raspberry Pi:

- Features of Raspberry Pi.
- Interfacing with Sensors.
- Python Programming.

IoT Communication Protocols:

- Wired Communication Protocols: UART, SPI, and I2C.
- Wireless Communication Protocols: Bluetooth, WI-Fi, Overview of Zigbee, and other IoT communication technologies and protocols (Coverage area, frequency range and power usage).
- Networking Protocols: OSI reference Model, TCP/IP, Ethernet.
- Application Protocols: HTTP, MQTT, TCP/IP protocol.

Cloud level transport layer:

- MQTT
- CoAp

IOT Cloud Layer:

- Cloud and Cloud Storage
- Cloud Characteristics
- IoT Cloud Platforms
- Concept & Architecture of Cloud
- Role of Cloud Computing in IoT
- Tools, API and Platform for integration of IoT devices with cloud
- IoT cloud platform and integration with Gateway (Thingspeak, AWS IoT)

Developing Board:

- Raspberry pi 3
- Arduino Mega (ATmega2560) with usb Cable
- ESP8266 NodeMcu

Electronic Components:

- Sensors – PIR, DHT11, Ultrasonic Sensor, IR Proximity Sensor.
- Switches – Push Button.
- Breadboard.
- LEDs.
- Connecting leads.

Communication Modules:

- Wi-Fi – ESP8266.
- Bluetooth – HC05.

IOT Projects:

Project 1: Arduino Voice Recognition via Bluetooth HC-05.

Industry: Home applications

Problem Statement: Controlling the Home applications using Voice Commands. This Project has been done using Bluetooth communication Protocols.

Project2: LED Control with IoT in a logistics Company

Industry: Logistics

Problem Statement: A logistics Company wants to use IoT-enabled Led light to monitor the movement of goods within its warehouse.

Highlights:

- Configuration of Raspberry Pi
- Python Coding for lighting the LED
- Connect Raspberry Pi board with Python code.

Project 3: Control LED light using Arduino mega 2560.

Industry: Garbage monitoring system.

Problem Statement: This project IOT Garbage Monitoring system is a very innovative system which will help to keep the cities clean. This system monitors the garbage bins and informs about the level of garbage collected in the garbage bins via a web page. For this the system uses ultrasonic sensors placed over the bins to detect the garbage level and compare it with the garbage bins depth. The system makes use of Arduinio Mega microcontroller, Wi-Fi modem for sending data and a buzzer.

Highlights:

- Configuration of Arduinio Mega 2560.
- C Coding for ultrasonic sensor
- Connect Arduinio Mega board with C language code.