

# Raspberry PI and Arduino-IOT

Master the programming and design of popular open source hardware, build innovative projects. Easily realize your ideas and concepts.

## What you will learn:

- Expert-level knowledge of IoT technology and tools.
- You'll learn microcontrollers like Raspberry PI, Arduino, sensors, interfaces, build IoT devices and programming languages. The course introduces you to advance concepts and design methodologies to design IoT systems.
- Application Protocols – HTTP, Web sockets, MQTT, CoAP, Understanding of cloud infrastructure, services, APIs, and architectures of commercial and industrial cloud platforms.
- Complete Hands-on experience with Hardware Kit provided by the company.
- Implement real-life projects in IOT like weather monitoring, Smart parking, vehicle tracking.
- Work on real-life industry projects on the Internet of things.

## Curriculum:

### Module 1:

#### *Introduction to Arduino*

#### **Introduction to Embedded Systems**

- Understanding an embedded system.
- Study of market profile.

#### **Review of Basic Concepts**

- Overview of basic electronics and digital electronics.
- Microcontroller vs. Microprocessor
- Common features of Microcontroller.
- Comparison between different types of microcontrollers.

#### **Introduction to Arduino**

- Pin configuration and architecture.
- Device and platform features.
- Concept of a digital and analog ports.

## **Module 2:**

### **Optocouplers**

- Using an Optocoupler
- Isolating control and logic circuit

### **Interfacing DC motors to Arduino**

- H-Bridge Circuit
- Making of power supply and a basic robotic car

### **Relays**

- Type of relays.
- Working of a magnetic relay.
- Controlling Electrical appliances with electromagnetic relays.

### **Interfacing a 8 bit LCD to Arduino**

- Fixed one line static message display.
- Running message display.
- Using the LCD Library of Arduino.

### **Interfacing a Matrix Keypad to Arduino**

- Working of a matrix keypad
- Using the keypad library to interface with Arduino.

### **Serial Communication**

#### **PWM**

#### **Analog inputs and ADC**

#### **Interfacing Servo motors to Arduino**

#### **Interfacing Stepper Motors to Arduino**

#### **Interfacing of a bluetooth Module**

## **Module 3: Raspberry pi**

- Introduction to Raspberry Pi
- Projects in Raspberry Pi
- Raspberry Pi Hardware
- Linux Fundamentals
- Various Distributions available on Raspberry Pi
- Getting distributions for Raspberry Pi on a SD card and booting Pi.

- Getting the Essential Software's
- Getting started with python and python first code
- Raspberry Pi GPIO's.

## **Module 4: Raspberry Pi and Python**

- Python 3 Basics
- Python 3 Advanced Concepts
- Setting Up and using Raspberry Pi
- Scientific Python Ecosystem
- Basics of NumPy and Matplotlib
- Image Processing
- Basics of Machine Learning and Data Science
- Hardware and GPIO of Raspberry Pi
- LED project with Raspberry Pi GPIO

## **Module 5: Interfaces with Raspberry Pi**

- LED interfacing
- Communication program
- LCD interface program
- Analog to Digital conversion(I2C)
- Sensors interfacing
- GSM interfacing
- Camera
- IOT
- Video Streaming

## **Projects on Raspberry Pi**

- IOT-Raspberry Pi based air quality monitoring project.
- IOT- Raspberry Pi based home automation project.
- IOT based industrial automation.
- Raspberry pi based cat feeder using IOT.
- Raspberry Pi based IOT gateway.

## **Real time projects using Arduino and Raspberry Pi**

- PROJECT WORK
- Line Follower Robot.
- Bomb diffusion robot.
- Fire fighting Robot
- RF based robot.
- GSM controlled car with stereo and head lights.
- LED Display board.
- Anti collision robot.
- RF controlled robot.
- RFID based attendance system.
- RFID based home security system
- Intelligent home locking system.
- Intelligent water level management system.
- Home automation using RFID.
- Real time clock based home automation.