

# **COURSE: Fundamentals of Internet of Things**

## **OVERVIEW:**

Internet of Things (IoT) is a network of devices that can sense, accumulate and transfer data over the internet without any human intervention. Through this course you will learn about:

- Programming a micro-controller using NodeMCU based on Arduino platform
- Programming the device with online simulator
- Control devices using digital and analog outputs
- Usage of sensors for your projects, i.e. temperature, humidity, light sensor and so forth.
- Building projects using digital and analog inputs
- Setup of an access point and a web server from a NodeMCU micro-controller.

## **HIGHLIGHTS:**

- Programming steps are explained with real time industrial applications.
- The course is delivered through online simulators & demonstrations.

**DURATION:** 16 hours

## **TARGET AUDIENCE:**

- Beginners and enthusiasts interested in learning applications of IoT.
- Students pursuing any engineering degrees.
- Professionals looking to kickstart their skills in IoT.
- Hobbyists and makers interested in exploring the potential of IoT.

## **PRE-REQUISITES:**

- Interest to learn & explore

## **COURSE CONTENT:**

### **Module 1: Introduction**

- a. Understanding IoT Fundamentals.
- b. Evolution of IoT

### **Module 2: IDE installation**

- a. Arduino IDE features
- b. USB to serial communication
- c. Driver software installation
- d. Board package installation

### **Module 3:Online simulator**

- a. Introduction
- b. Account creation & basic tools
- c. Advantage of simulator

### **Module 4:NodeMCU board**

- a. Design & architecture
- b. Development workflow
- c. Programming language

### **Module 5: Basic sketch programming -Digital output**

- a. Digital output – Interfacing LED,Alarm,etc
- b. Purpose of serial monitor & serial plotter
- c. Controlling output via serial monitor

**Module 6: Digital input**

- a. Monitoring input from digital sensors
- b. Use of pullup resistors

**Module 7: Analog input & output**

- a. Read analog input from sensor
- b. Light Intensity control with analog input

**Module 8: PWM**

- a. Generate analog signal with PWM
- b. PWM controlled light

**Module 9: Sensor interfacing**

- a. Analog sensors
- b. Digital sensors

**Module 10: Communication**

- a. Serial
- b. I2C

**Module 11: Wireless communication**

- a. access point & webserver

**Module 12: IoT connectivity**

- a. MQTT
- b. Publish & subscribe using MCU

**OUTCOMES:**

At The End of the Course the Learner Will

- Write programs to control hardware
- Learn to simulate the projects in virtual environment
- Build IoT projects using NodeMCU based on Arduino platform
- Connect IoTs to cloud services to store data