



## IOT Edge and Gateway

Duration– 15days

### Objectives

- Understanding the concept of IOT
- To gain an understanding of Internet of things using python features and their uses in developing applications.
- Understand the internals of Internet of things by connecting node devices to gat way and gateway devices to cloud and by collecting things data.
- Analyzing the data and act upon the data from the cloud.
- Exposure to technologies used in building an IOT solution

### Takeaway

- Explore Raspberry-pi with Python scripts
- Discover how to work with Internet of things
- Interfacing sensors with Raspberry-pi
- Analyze the data and work with cloud
- Use Raspberry pi as a server to control the things
- Master the fundamentals of IOT by building project

### Pre-requisites

- Basic programming and Hardware knowledge
- Basic knowledge of Python
- Basic knowledge of Microcontrollers
- Basic knowledge of Linux

### Hardware and Software tools

- RaspberryPi3+micro-USBCable
- Internet connectivity and Ethernet cable
- USB keyboard and mouse
- Monitor, HDMI to Serial converter
- Windows 7(or higher) system to download andportRaspberryPIOSonRaspberryPi3

#### Day1:

##### Introduction to Python

- Using Python Interpreter
- Python script file
- Print Message to Standard Output
- Variables and data types
- Reading Input from console
- Type Conversion
- Arithmetic Operators and Conditions

- List Slicing
- Joining two lists
- Repeating sequence
- Nested List
- Built-in List Methods and Functions

#### Day4

- Searching elements in List
- Sorting elements of List
- Shallow and Deep copy
- List Comprehensions
- Conditionals on Comprehensions
- Tuples and its functions
- Inserting and Deleting Elements from List

#### Day2:

##### Control Flow

- Relational Operators
- if...else statement
- Logical operators
- While Loops
- Break and continue statement
- Loops with else statement
- Pass statement
- Python for loop
- Range Function

#### Day3:

##### Lists and Tuples

- Creating List
- Accessing elements from List

## Day5:

### Set and dictionary

- Creating a Set
- Adding and removing elements from set.
- Python set operations
- Creating a Dictionary
- Accessing elements of Dictionary
- Adding elements to Dictionary
- Deleting elements from a dictionary
- List as values of Dictionary
- Nested Dictionary.



## Day6 :

### Functions

- Defining Functions in Python
- Function Argument
- Single Parameter Functions
- Function Returning single Values
- Functions with multiple parameter
- Function that return Multiple Values
- Functions with Default arguments
- Named arguments
- Scope and Life time of Variables
- Global specifier

## Day7 :

- Functional programming tools: map(), reduce() and filter()
- Lambda: short Anonymous functions
- Creating and importing modules
- Programming Examples & Assignments
- Recursion

## Day8 :

### Introduction to IOT

- What is IOT?
- Why do we need IOT?
- How does IOT work?
- IOT Architecture- Components of IOT
- How Does an IoT Gateway Device Work?

### RASPBERRYPI

Introduction to Raspberry Pi 3 model B Raspbian OS:

- Setting up Raspbian OS on SD card
- Raspberry Pi hardware setup
- Basic Raspbian OS commands

## Day9:

### Raspberry pi GPIO programming.

Working with GPIO

- Flashing an LED
- Interfacing LCD
- Developing LCD package in python

## Day10:

### Interfacing Sensor to RPi

- Interfacing DHT11 sensor to Rpi
- Interfacing LDR Sensor to RPi

## Day11:

- Interfacing ultrasonic distance Sensor
- Interfacing PIR Sensor
- LCD Interfacing with sensors

## Day12:

### Cloud Computing

- Connecting to cloud
- Creating Thing speak account
- REST API
- Using Thing Speak API to upload data to cloud
- Connecting using MQTT

## Day13:

### Setting RPi as a server

- Setting RPi as a http server
- Installing the packages to setup server
- Hosting the server
- Creating the Web pag

## Day14:

### Mail transfer through SMTP

- Introduction to SMTP
- Configuring smtp configuration file (ssmtp.conf)
- Sending messages through email

## Day15:

### Mini Projects:

- Home Automation
- Smart Agriculture Farming
- Remote Health monitoring

**Note: Coverage of the topics and Projects mentioned will be strictly based on the student's learning ability and time.**

There will be assignments on every peripheral and enough hands on will be given with strong programming knowledge.

### Mini Project Titles of SKILL DEVELOPMENT PROGRAM

Sl. No	Project title
1.	Automated irrigation system
2.	Automated attendance system RFID
3.	Smart card connect
4.	Smart irrigation system
5.	Wifi controlled car
6.	Alcohol detector
7.	Water irrigation using soil moisture sensor
8.	LED distance indicator
9.	Solar power monitoring system using ThingSpeak
10.	Passcode security system & notifying
11.	Home automation
12.	Water Dispenser
13.	Temperature based fan speed controller
14.	Wifi controlled AC Appliances using web server
15.	Smoke alarm system
16.	Toll gate
17.	Soil moisture detection on o led
18.	Smart dust bin
19.	Temperature controlled fan
20.	Fire sensor system
21.	Temperature monitor using ThingSpeak
22.	Fire detector and mam alert
23.	Sprinkler actuator