

Internet of Things:

- **Introduction to IoT**

- IOT basics concepts
- What is Internet of Things?
- Why IOT is important?
- Architecture of IOT
- How is IoT changing the world
- & Impact of IOT
- Applications and industry verticals
- IoT: Characteristics, Enabling Technologies, Technical Scope
- Raspberry Pi
- Raspberry Pi 3 – The “Rocket-In-A-Pocket” Board for IoT
- Board Features – History and Reception
- Hardware Description
- Functional Schematics
- Software and OS Options

Programming Languages:

- **Linux**
 - Introduction to Linux OS
 - Linux Concepts
 - OS Fundamental

- Security of linux environments
- Linux Command line/Shell
- installing Raspbian Stretch Linux
- linux autostart scripts
- Accessing and using manual pages
- Working with the command line and the shell
- Piping and redirection
- Linux Commands

- **Python**
 - Python Basics and programming
 - using python on Raspberry Pi
 - Data types in python
 - using variables in python
 - Casting, string operations
 - use of Python Tuples
 - use of operators in python
 - python looping in linux
 - functions used in python
 - Classes and objects
 - File handling in python

Hardware Platforms:

- Arduino/ Nodemcu
- ESP 8266 wi-fi Module

- Raspberry Pi
 - Raspberry Pi 3 – The Board for IoT
 - Board Features – History and Reception
 - Hardware Description
 - Functional Schematics
- Wireless modules
- Sensor interfacing

Practicals

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- Porting Raspbian Wheezy Linux
- Accessing the command line (terminal and desktop)
- GPIO Interfacing
- GPIO's and Hardware Bus
- Interfacing input Switches
- ADC Interfacing MCP 3008
- Sensor Interfacing : IR sensors, Ultrasonic Sensor
- PIR Sensor, Temperature Sensor, Humidity Sensor
- Configuring & Using Wifi over Raspberry Pi
- Bluetooth Interfacing
- Camera Module Interfacing
- Creating Web server
- Configuring a USB webcam
- Hosting Web Page on Raspberry Pi
- Controlling Motor through Web Server

- Collecting, communicating and leveraging the data from connected devices
- Use of Serial Communication in Raspberry Pi
- Wireless Communication
 - Wi-Fi Communication
 - Use of RF & RFID
 - Zigbee Implementation (IEEE 802.15.4)
 - Use of Bluetooth or Bluetooth Low Energy
 - Message & Mail communication through Rpi
 - GSM Interfacing
 - GPS receivers and real time location tracking
- Thinger IOT platform
- connecting device to thinger
- Creating IOT Dashboard in thinger
- Use of buckets and endpoint in thinger
- Mobile application connectivity for IOT
- MQTT Protocol in IOT
- Introduction to MQTT protocol
- Why we need MQTT
- MQTT Quality of service
- Publish/ subscribe model in MQTT
- MQTT Broker
- HTTP vs MQTT: an insight
- MQTT with Raspberry Pi
- Mosquito MQTT broker on Raspberry

- Testing Publish and Subscribe on broker
- Publish Subscribe on `iot.eclipse`
- Use of Adafruit MQTT
- Building Local Web Server Project
- ESP 8266 development platform
- Uploading data on cloud using WiFi ESP8266 module
- IBM Nodered Tool
- End to End Project implementation on Cloud Platform
- IOT Based Application Project