



INDUSTRIAL INTERNET OF THINGS (IIOT)

(BASIC & ADVANCE)

1. Module 01: Introduction to IoT

- Introduction to Internet of Things
- M2M towards IoT -the global context
- Scope of IoT - Smart home, Smart Grid Applications
- Skills required to switch career to IoT
- Industries working on IoT
- IoT Products by Indian Companies
- IoT Hardware Requirements
- Analysis of Arduino Uno, Arduino Yun, Raspberry Pi, Beaglebone Black, Intel Edison & Galileo

2. Module 02: Hardware Layer – NodeMCU/Arduino

- Industrial Internet of Things
- Getting started with Arduino Uno R3
- Basics of AVR MCU - RAM, Flash Memory and timers
- Arduino – Open source Hardware Platform
- Pin Configuration and functionalities
- Getting started with Arduino
- IDE LED Interfacing with NodeMCU
- Introduction to Serial Communication
- PC Controlled Communication
- Introduction to basic sensors

3. Module 03: Hardware Layer – Sensor Interfacing

- Sensor 1: Working & Interfacing of IR Proximity Sensor
- Sensor 2: DHT11 Interfacing, working principle
- Measuring temperature & Humidity using DHT11
- Analyzing sensor data on Serial Monitor & Serial Plotter
- Selecting a sensor for your use case
- Commercial/Industrial/Military/Medical/Food grade sensors
- Automatic Street Light Management for Smart Cities
- Understanding Wastage of Electrical Energy due to street lights mismanagement
- Traffic Light Management Automation System



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4. Module 04: API Building & Integration

- Introduction to HTML
- Introduction to JavaScript
- Document object model integration
- Making fetch calls
- Introduction to Firebase Database
- Making an API for Firebase
- Sending data to firebase database
- CRUD operation with Firebase

5. Module 04: Network Layer – Wireless Communication Protocols & Bluetooth

- IPv4 Vs IPv6
- Introduction to 6LowPAN
- IoT Physical Layer Protocols
 - Bluetooth
 - Wi-Fi
 - LORAWAN
 - NFC
- Getting started with HC05 – Bluetooth Module
- Connecting HC05 with Arduino
- Sensor Data Analytics using readily available Bluetooth Terminal Android Apps
- Android Controlled Device Automation with Arduino
- Working with Relay & Interfacing with Arduino
- Controlling AC Appliances with from PC – SMART Home Applications

6. Module 05: Network Layer – Wi-Fi

- Using Voice Recognition Technique
- Sending voice to text from android app via Bluetooth to Arduino
- Voice controlled Device Automation Wifi & Lifi
- Getting Started with ESP8266-01
- Configuration, Pin Layout and Applications
- Testing AT Commands with ESP8266
- Connecting to a network
- HTTP Request Format
- Making HTTP Local Webserver using ESP8266



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7. Module 06: ESP8266 & Thingspeak

- Using ESP8266 as a HTTP Client
- Uploading live sensor data on thingspeak cloud using ESP8266 & GET Request
- Making a Local Webserver
- using Arduino Using Arduino as a TCP data server
- Accessing UI in a local network
- Analyzing HTTP callbacks in webserver
- Projects and Tasks
- Introduction to Transport Layer Protocols

8. Module 07: Python Programming

- Getting started with Python
- Variables, and Data Structure
- List, tuples and dictionary
- Functions in python
- Control Structure
- Object Oriented Programming
- Using Packages
- Os, time and datetime
- File Handling in Python
- Miscellaneous Functions in python

9. Module 08: Raspberry Pi

- Getting Started with Raspberry Pi
- Installing OS in Rpi
- Command line and GUI Interface
- Raspbian OS Introduction & Tools
- Interfacing GPIOs with LEDs
- Interfacing sensors
- Serial Communication
- Getting started with MQTT on Raspberry Pi
- Controlling LED using Android MQTT Client
- Getting sensor data using Android MQTT Client
- Using Raspberry pi as HTTP Client to send live sensor data to thingspeak
- Installing Mosquitto on Raspberry pi
- Making pi a local MQTT broker
- Testing Publish and subscribe model on RPi
- Publishing data from PC, Android to RPi over a local network



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- Controlling Pi GPIOs using iot.eclipse.org MQTT broker

10. Module 09: AWS IoT

- Introduction to AWS IoT
 - Create a Device in the Thing Registry
 - Secure Communication between a Device and AWS IoT
 - Verify MQTT Subscribe and Publish
 - Configure and Test Rules
 - Use the Device Registry and Device Shadows
- Device Registry
 - Identity in AWS IoT
 - Authorization
- Rules
 - Granting AWS IoT the Required Access
 - Creating an AWS IoT Rule
 - Troubleshooting a Rule
 - AWS IoT rule action
- Topics
 - Device Shadows
 - Device Shadows Data Flow
 - RESTful API
 - MQTT Pub/Sub Messages
 - Error Messages
- AWS IoT SDKs
 - Device SDK
 - Miscellaneous & Troubleshooting
 - Diagnosing Connectivity Issues
 - Diagnosing Rules Issues
- Integrating AWS IoT with AWS SNS to trigger email, SMS
- Integrating DynamoDB with AWS IoT
- Case Studies on IoT based projects & implementations
- Discussion about current Challenges in IoT



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11. Module 10: Industrial IoT

- Industrial Internet of Things
- Smart Factory Concept
- Automation to Digitalization
- Platforms for Smart Industry
- Case Studies on Smart Industries
- Getting started with IBM Watson IoT
- Connecting Raspberry Pi to send telemetry data on IBM Watson IoT
- Creating visualization dashboard using IBM Watson IoT
- Creating triggers
- Working with IIoT Use cases.



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