

# **EMBEDDED SYSTEM&IOT**

**Duration- 6 Weeks**

## **RECAP of EMBEDDED C**

- Datatypes
- Array
- Conditional Statements
- Functions / Callback function
- Structures
- Pointers
- Storage classes

## **EMBEDDED SYSTEM**

- Basic Concepts
- Sensors/Actuators
- Microcontroller units and Architecture (Arduino)
- Interfaces (serial port, SPI, I2C, UART)
- ADC, Timers, RTC, Interrupts, Polling, DMA
- Memory architecture and handling (stack, heap, cache)
- Application driven Selection of Microcontrollers

## **SIGNAL AND ACQUISITION**

- Analog and Digital
- Industrial Terminology

## **INTRODUCTION TO IOT**

- What is IoT
- IoT application in different domains
- Trends in IoT Market
- Smart things
- Gateways
- Middleware Edge vs Cloud functional partitioning

## **IOT ARCHITECTURE**

- Architecture.Tech Stack.
- Hardware Development Platforms
- Software Development Platforms
- Communication Protocols
- Power Requirements in IoT
- Cloud, its components and IoT
- Data Streaming and IoT
- Data Store and IoT
- Analytics & Visualization and IoT
- IoT Security

## **NODEMCU (ESP8266)**

- Install IDE Software
- Introduction to NODEMCU(Esp8266)
- Pinout of NODEMCU
- Programming Of NODEMCU
- Weather monitoring solution
- Automatic street lights

## **IOT PROTOCOLS**

- HTTP/REST
- MQTT
- COAP
- AMQP
- WEBSOCKETS
- 6LoWPAN

## **NODE-RED**

- Installation of Nodejs,
- Installation of Node-Red,
- Building your first flows
- Basic nodes and flows
- A tour of the core nodes
- The Node-RED programming model
- Dashboards and UI techniques
- Local broker installation,
- Connection between local broker and Node-RED

## **CLOUD COMPUTING**

- Cloud Computing
- Benefits of Cloud
- Deployment Models
- AWS-IOT Core/ SageMaker
- Greengrass
- Google IOT Cloud
- Thingspeak
- IBM Bluemix
- AWS
- AZURE
- Google Firebase
- SQL and NoSQL Data bases
- Integration with MySQL

- MongoDB
- IoT Cloud Platform: Device Management

## **EDGE AI**

- Standards and best practices
- Types of analytics and machine learning
- Supervised/ Un-supervised learning
- Python for IoT analytics
- Computer vision for image data
- Anomaly detection
- Edge Impulse/ TinyML

## **INDUSTRY4.0**

- Introduction to Industry 4.0
- Road to Industry 4.0
- Role of data, information, knowledge and collaboration in future organizations.
- Related Disciplines, System, Technologies for enabling Industry 4.0
- IoT Deployment with legacy systems PLC/SCADA/OPC-UA