IOT WITH ARDUINO ESP8266 & NODEMCU

INTERNET OF THINGS(IOT)

Introduction to IoT
- What is IoT?
- IOT basics concepts
- Architecture of IOT
- IOT in home automation
- Applications and industry verticals

Introduction to Embedded System
- Introduction to Embedded System
- Applications & Scope of Embedded System in various industries

Introduction to Arduino
- Introduction to Arduino
- Arduino Board Description
- What is a Microcontroller
- Difference between Microcontroller and Microprocessor
- Microcontroller architecture and Interfacing
- Basics of Electronics.
- Sensors and Actuators.
- The Arduino Uno

Introduction to Arduino IDE
- What is ARDUINO IDE and Language?
- Fundamentals of C programming
- What is Open Source Microcontroller Platform?
- "Hello World" Example

Decision Making and using Logic
- Fundamentals of C programming
- "If" Statements
- "While" Loops
- For Loops
- "Switch" Cases
- Using Maths
- Creating Functions

Using inputs and outputs
- Overview
- Program Structure
- Using Variables
- Building Your First Circuit Using a Breadboard
- Digital Input & Digital Output
- Analog Input & Analog Output
- Serial Input & Serial Output
- Displaying Information Using the Serial Port

Sensors Interfacing

- What is Sensor & Actuator?
- Sensor Feature.
- Types of sensors
- Interfacing Sensors with GPIO of Arduino.
- Reading from Sensors

Interfacing of I/O devices

- Interfacing of LED with Arduino
- Interfacing of switch with Arduino
- Interfacing of Buzzer with Arduino
- Interfacing of LCD display with Arduino

Libraries, Serial Data and Hardware

- Overview
- Using and Including Libraries
- Using ADC
- USART / UART Protocol
- Using SPI
- Using I2C
- Interrupts
- Arduino Shields

Introduction to ESP8266 and NodeMCU

- Introduction about NodeMCU
- Pinouts
- NODE MCU firmware
- Connecting to Local Wi-Fi
- Getting Static IP
- Introduction to Attention Commands for internet access

Sensors Interfacing

- What is Sensor & Actuator?
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Implementation of IOT

- Accessing the DHT data over WIFI on Webpage and mobile (local Wi-Fi).
- Remotely controlling LEDs through Android app (local Wi-Fi).
- Create a local server using Node MCU

Cloud computing and IOT

- Introduction to Cloud Computing
- Cloud platform introduction
- Creating Channel for live data feed
- Program Node MCU to read and update sensor data over cloud
- Continuously monitor sensor reading through internet
- Remotely Temp. Monitor using NodeMCU.
- Remote controlling of appliances over cloud.

Cybersecurity and privacy in the IOT

- Case Studies on IoT based projects & implentations.
- Discussion about current Challenges in IoT.

Project 1: - Esp8266 WIFI controlled Home automation using Localhost Web Server

Project 2: - A cloud-based temperature monitoring system using Arduino and Node MCU

Project 3: - Control Electronic Devices from anywhere across the world using Internet & Mobile App.

Project 4: - Voice Controlled Mini Home Automation using Android Smartphone.

Project 5: -Creating Android App using MIT App Inventor & Controlling Devices Connected toController.

Project 6: - Sending Email from Nodemcu

Project 7: - Sending Sensor data to Cloud Server using Nodemcu.

Project 8: - Plotting Data on Plotly using Nodemcu.

Project 9: - Remotely Temp. Monitor using Nodemcu

Project 10: - Remotely controlled traffic light system

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