IoT -Curriculum

1.Introduction to the domain

- Introduction to the course
- Brief Introduction to IoT
- IoT Architecture
- Embedded System
- Controller & Processor
- Creating an account on Tinkercad

2.Arduino

- Basics of Arduino
- LED
- Led Blinking Assignment 1
- Blinking Assignment Solution

3.Serial Communication

- Introduction to Serial Communication
- For Loop
- User Input
- Controlling with User Input
- Pushbutton LED

4.Pulse Width Modulation - PWM

- Introduction to PWM
- GPIO
- LED Forward Voltage
- Potentiometer
- String Input Assignment solution
- Potentiometer Mapping Assignment Solution

5.RBG (Red, Blue, GREEN)

- Concept of RBG
- Understanding Breadboard
- Sensor Basic & Ultrasonic Sensor
- Ultrasonic Sensor working
- Temperature Sensor
- PIR Sensor

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6.Robotics

- Introduction to Robotics
- DC Motor & L293D
- Command to Motor
- Motor
- Servo Motor

7.Remote Control Robot

- Introduction of Remote Control Robot
- Obstacle Avoidance Robot
- Speed Control of Motor

8.Introduction to IoT

- Basics of IoT
- Component of IoT
- Selection of IoT Board
- Case study on IoT Product

9.ThingSpeak

- Introduction to ThingSpeak
- ThingSpeak HTTP

10.Arduino IDE

- Introduction to Arduino IDE
- LED Blinking
- IR Sensor
- Ultrasonic Sensor
- Air Quality Sensor
- Soil Moisture Sensor
- DHT11 Sensor Serial Monitor
- DHT11 Sensor ThingSpeak

11.MIT App Inventor

- Introduction to MIT App
- Basic App
- Speech to Text App
- IoT App

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12.Smart Home Automation

- Introduction to Smart Home Automation
- Adafruit Dashboard
- IFTTT Applet
- Relay Application

13.Message Queuing Telemetry Transport (MQTT)

- MQTT Basics
- Mosquitto Process
- Mosquitto Authentication
- Adafruit MQTT

14.Python Programming

- Introduction to Python
- Basis of Python Programming
- Python Programming
- Pycharm Installation

15.Socket Programming

- Introduction to Socket Programming
- Server Client Implementation
- Socket Chat Room
- UART & I2C & SPI

16.Exersice

Covid-19 Dashboard

- **Real-Time Data Monitoring:** The COVID-19 dashboard leverages IoT devices to collect and display real-time data on infection rates, vaccinations, and recovery statistics, providing up-to-date information for users.
- **Interactive Visualizations:** Utilizing graphs, charts, and maps, the dashboard presents data in an accessible format, enabling users to track trends and identify hotspots at a glance.
- **Remote Sensor Integration:** IoT sensors gather data from various sources, such as health facilities and public spaces, ensuring comprehensive coverage and accurate reporting of COVID-19 metrics.
- **Alerts and Notifications:** The dashboard can send alerts for significant changes in data, such as spikes in cases or vaccination milestones, helping stakeholders make informed decisions and respond swiftly to the evolving situation.

IoT -Curriculum

CAPSTONE PROJECTS

1 **IoT-Based Smart Factory System**

- Implement automated control for machines and processes in a factory setting.
- Use IoT to control and monitor factory systems from anywhere.
- Learn to improve productivity by minimizing manual interventions.
- Implement the concept of IIOT/Industrial 4.0 using control system

2 **IoT-Based Weather Data System Using ESP32**

- Interface weather sensors with ESP32 for temperature, humidity, and pressure data.
- Transmit weather data over Wi-Fi using MQTT protocols.
- Display and analyze live weather data on cloud platforms or dashboards.
- Gain experience in coding ESP32 for IoT applications.

3 **IoT-Based Health Monitoring System Using ESP32**

- Develops a health monitoring system that uses an ESP32 microcontroller, DHT22 sensor, LCD display, and Blynk IoT platform.
- Illustrate the wiring and connections between the ESP32 and health sensors, ensuring clarity in signal paths and power supply arrangements for accurate data acquisition.
- Monitors and displays body temperature and heart rate.
- Include details on how the ESP32 communicates with a cloud platform or mobile application for data transmission, specifying protocols like MQTT or HTTP for real-time health monitoring.

LIVE PROJECT

1 **Obstacle Avoidance Robot Using Ultrasonic Sensor**

- Learn to detect objects using ultrasonic sensors.
- Illustrate the placement of the ultrasonic sensor on the robot, specifying angles and distances from the chassis to optimize obstacle detection and improve accuracy.
- Include a flowchart that outlines the decision-making process of the robot, detailing how it interprets distance readings from the ultrasonic sensor to navigate and avoid obstacles in its path.
- Draft the wiring connections between the ultrasonic sensor, microcontroller (such as Arduino or Raspberry Pi), and the motors, ensuring proper power supply and signal pathways for effective operation.
- Apply concepts of robotics to create real-world problem-solving robots.