Internet Of Things

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Short Description:

Welcome to the IoT (Internet of Things) course! In this course, you'll explore the fascinating world of connected devices and learn how to leverage the power of IoT to build innovative solutions. IoT is revolutionizing industries by connecting physical objects to the internet, enabling data-driven insights and automation.

Throughout the course, you'll gain a deep understanding of the core concepts of IoT, including sensors, actuators, wireless communication, data analytics, and cloud computing. You'll learn how to design and implement IoT systems using various hardware platforms and programming languages.

We'll cover topics like IoT architecture, data collection, device connectivity, IoT protocols, and security considerations. You'll also delve into cloud-based IoT platforms, data visualization, and building IoT applications that interact with the physical world.

By the end of this course, you'll be equipped with the knowledge and skills to develop IoT solutions that can monitor, control, and automate devices and processes. Whether you're interested in creating smart home systems, industrial automation, or environmental monitoring solutions, this course will empower you to bring your IoT ideas to life.

Get ready to embark on an exciting journey into the realm of IoT, where technology meets innovation and connectivity transforms the way we live and work!"

Total Duration: 20 Hrs | Modules: 7 | Projects: 3

Related Tags: IOT Applications, IOT Devices, IOT Protocols, IOT Platform, Cloud Computing for IOT, Industrial IOT, Wearable IOT, IOT Networking.

Modules and Description:

Module – 1: Introduction and Installation

Duration: 38 mins

1. Introduction to Internet of Things
2. Introduction to ESP8266

3. IDE Installation

Key Description:

Introduction to Internet of Things: Introduction to Internet of Things (IoT) provides an overview of the concept and impact of connecting physical objects to the internet, exploring its applications in various domains.

Introduction to ESP8266: Introduction to ESP8266 introduces the ESP8266 Wi-Fi module, a popular and affordable platform for IoT projects. This module provides an understanding of its features, programming capabilities, and integration with microcontrollers, enabling wireless communication and connectivity in IoT applications.

IDE Installation: IDE Installation covers the setup and configuration of the Integrated Development Environment (IDE) required for IoT development, such as Arduino IDE or platform-specific IDEs, providing the necessary tools and environment for coding, compiling, and uploading firmware to IoT devices.

Module - 2: Basic Components and Sensor Interface

Duration:

1. ADC, PWM and Deep Sleep
2. Smart Street light using LDR and IR Sensor
3. PIR Sensor interface using Interrupts and Timers
4. DS3231 RTC Module Interface

Key Description:

ADC, PWM, and Deep Sleep: ADC, PWM, and Deep Sleep module focuses on the usage of Analog-to-Digital Conversion (ADC) and Pulse Width Modulation (PWM) techniques in IoT applications, along with exploring power-saving mechanisms like deep sleep mode, optimizing energy consumption for IoT devices.

Smart Street Light using LDR and IR Sensor: Smart Street Light using LDR (Light Dependent Resistor) and IR Sensor module demonstrates the implementation of an intelligent street lighting system that automatically adjusts the light intensity based on ambient light levels and detects the presence of objects using IR sensors, enhancing energy efficiency and safety.

PIR Sensor Interface using Interrupts and Timers: PIR Sensor Interface using Interrupts and Timers module showcases the integration of a Passive Infrared (PIR) sensor with IoT

devices, utilizing interrupts and timers to detect motion and trigger actions, enabling applications like smart security systems or occupancy detection.

DS3231 RTC Module Interface: DS3231 RTC Module Interface explores the integration of the DS3231 Real-Time Clock (RTC) module into IoT projects. This module provides accurate timekeeping capabilities, allowing precise scheduling, data logging, and synchronization of IoT devices.

Module - 3: Cloud Computing

Duration:

1. DHT11 Sensor Interface with Thing Speak Cloud
2. Ultrasonic interface with Thing speak Cloud
3. Monitoring Soil Moisturization using Ask Sensor cloud
4. Event Management System Using RFID Thing speak Cloud
5. Gas Leakage Detection Using Arduino IOT Cloud
6. IOT Based Heartbeat Monitoring System
7. ESP8266 Daily Task – Publish Temperature Readings to Thing Speak

Key Description:

DHT11 Sensor Interface with ThingSpeak Cloud: This project demonstrates the interface between the DHT11 sensor and ThingSpeak Cloud, enabling real-time monitoring and visualization of temperature and humidity data collected by the sensor.

Ultrasonic Interface with ThingSpeak Cloud: By interfacing an ultrasonic sensor with ThingSpeak Cloud, this project allows distance measurement and sends the data to the cloud for remote monitoring and analysis.

Monitoring Soil Moisturization using Ask Sensor Cloud: The project utilizes the Ask Sensor cloud platform to monitor soil moisturization levels, enabling efficient agriculture practices by providing real-time data on soil moisture content.

Event Management System Using RFID ThingSpeak Cloud: Implementing RFID technology with ThingSpeak Cloud, this project enables an event management system where RFID tags are used for attendee identification and data is stored in the cloud for efficient event management.

Gas Leakage Detection Using Arduino IoT Cloud: Using Arduino IoT Cloud, this project detects gas leaks through gas sensors and sends real-time alerts and notifications, ensuring prompt response and safety measures.

IoT-Based Heartbeat Monitoring System: Utilizing IoT technology, this project establishes a heartbeat monitoring system that collects and transmits real-time heartbeat data to a cloud platform for remote monitoring and analysis.

ESP8266 Daily Task – Publish Temperature Readings to ThingSpeak : This project utilizes the ESP8266 Wi-Fi module to publish daily temperature readings to ThingSpeak Cloud, allowing continuous monitoring and analysis of temperature variations over time.

Module - 4: Communication Protocols
Duration:

1. UART Communication between ESP8266 & Arduino UNO
2. SPI Communication between ESP8266 & Arduino IDE
3. I2C LCD

Key Description:

UART Communication between ESP8266 & Arduino UNO: The UART communication between ESP8266 and Arduino UNO establishes a serial communication link, enabling data exchange between the two microcontrollers, facilitating IoT applications and sensor integration.

SPI Communication between ESP8266 & Arduino IDE: SPI communication between ESP8266 and Arduino IDE utilizes the Serial Peripheral Interface (SPI) protocol to establish fast and reliable communication, enabling data transfer and synchronization between the microcontrollers for various IoT projects.

I2C LCD: The I2C LCD module interfaces an LCD display with Arduino or other microcontrollers using the I2C (Inter-Integrated Circuit) protocol, simplifying the wiring and allowing the display to show text, numbers, or other information in embedded systems.

Module - 5: Webserver

Duration:

1. Build an ESP8266 Webserver
2. ESP8266 Webserver HTTP Authentication (Username and Password Protected)
3. ESP8266 Webserver with BME280 Sensor
4. ESP8266 NodeMCU Webserver with Slider: Control LED brightness using PWM
5. Controlling Outputs using Webserver

6. ESP8266 NodeMCU Webserver using Server-Sent Events (Update Sensor Readings Automatically)
7. ESP8266 NodeMCU Web Serial: Web-based Remote Serial Monitor
8. ESP8266 Publish Sensor Readings to Google Sheets

Key Description:

Build an ESP8266 Webserver: Build an ESP8266 webserver project that allows you to host web pages and serve them to connected clients, enabling control and monitoring of devices and data through a web-based interface.

ESP8266 Webserver HTTP Authentication (Username and Password Protected) : Enhance the security of your ESP8266 webserver by implementing HTTP authentication, requiring a username and password to access and interact with the web-based interface.

ESP8266 Webserver with BME280 Sensor: Integrate the BME280 sensor with an ESP8266 webserver project, enabling real-time monitoring and display of temperature, humidity, and pressure data through a web-based interface.

ESP8266 NodeMCU Webserver with Slider: Control LED brightness using PWM : Create an ESP8266 NodeMCU webserver with a slider interface, allowing users to adjust the brightness of an LED connected to the microcontroller using Pulse Width Modulation (PWM) techniques.

Controlling Outputs using Webserver: Build an ESP8266 webserver that enables control of digital outputs, such as LEDs or relays, through a web-based interface, providing remote switching functionality for connected devices.

ESP8266 NodeMCU Webserver using Server-Sent Events (Update Sensor Readings Automatically): Implement a webserver on ESP8266 NodeMCU using Server-Sent Events (SSE) to establish a persistent connection with the client, allowing automatic and real-time updates of sensor readings on the web interface.

ESP8266 NodeMCU Web Serial : Web-based Remote Serial Monitor : Develop a web-based remote serial monitor using ESP8266 NodeMCU, enabling monitoring and interaction with the serial data output of the microcontroller through a web browser interface.

ESP8266 Publish Sensor Readings to Google Sheets: Publish sensor readings from ESP8266 to Google Sheets, leveraging the power of cloud-based spreadsheets for data logging, analysis, and visualization of sensor data in real-time.

Module - 6: Firebase
Duration:

1. Getting Started With Firebase (Real-time Database)
2. ESP8266 Firebase: Send BME280 Sensor Readings to the Real-time Database

Key Description:

Getting Started with Firebase (Real-time Database) : Get started with Firebase's real-time database service, which allows you to store and sync data in real-time across multiple devices and platforms, providing a powerful and scalable solution for data management in your applications.

ESP8266 Firebase: Send BME280 Sensor Readings to the Real-time Database: Integrate the ESP8266 microcontroller with Firebase's real-time database, enabling the sending and storing of BME280 sensor readings in real-time, providing a seamless and reliable data stream for monitoring and analysis.

Module – 7: Protocols
Duration:

1. Sending Email Using SMTP

Key Description:

Sending Email Using SMTP: Learn how to send emails programmatically using the Simple Mail Transfer Protocol (SMTP), enabling automated email communication, notifications, and alerts in your applications, providing a reliable and efficient method of delivering messages.

Projects:

1. NodeMCU send messages to WhatsApp using WhataBOT API
2. Control ESP8266 Outputs using Telegram
3. ESP8266 NodeMCU Door Status Monitor with Telegram Notifications

Key Description:

NodeMCU send messages to WhatsApp using WhataBOT API: Utilize the WhataBOT API to integrate NodeMCU with WhatsApp, allowing automated sending of messages, notifications, and alerts via WhatsApp from your IoT projects, providing seamless communication.

Control ESP8266 Outputs using Telegram: Control and monitor ESP8266 outputs, such as LEDs or relays, using the Telegram messaging platform, enabling remote control and status updates of connected devices through a user-friendly and secure interface.

ESP8266 NodeMCU Door Status Monitor with Telegram Notifications: Implement a door status monitor using ESP8266 NodeMCU, and receive real-time notifications and alerts through Telegram whenever the door status changes, providing enhanced security and monitoring capabilities.