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/*
 * ESP8266 Hydroponic Automation Sensor Module
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 * Description: This code is part of a hydroponic automation project and is designed for the ESP8266 microcontroller.
 * It gathers environmental data using sensors, including temperature, humidity, light intensity, and water level.
 * The collected data is transmitted to the ThingSpeak cloud platform for real-time monitoring and analysis.
 * Date: January 28, 2024
 */

#include <WiFiManager.h> // Library for simplified WiFi connection handling
#include <ESP8266WiFi.h> // ESP8266 WiFi library
#include <DHT.h> // DHT sensor library for interfacing with DHT11 sensor
#include "ThingSpeak.h" // Library for seamless communication with ThingSpeak IoT platform

WiFiClient client; // WiFi client for ThingSpeak communication

unsigned long myChannelNumber = 2384399; // Channel number on ThingSpeak cloud
const char *myWriteAPIKey = "ELW2NF5Q83OGB39G"; // Write API key for ThingSpeak
const char *myCounterReadAPIKey = "3D8NH4JCI0EDYMIU"; // Read API key for ThingSpeak

DHT dht; // Initialize DHT sensor
const int DHTPIN = D5; // Pin for DHT sensor

void setup() {
    pinMode(LED_BUILTIN, OUTPUT); // Set built-in LED pin as output

    Serial.begin(115200); // Initialize serial communication for debugging
    WiFiManager wm; // Create WiFiManager instance for easy WiFi connection handling
    bool res;
    res = wm.autoConnect("ASAA"); // Attempt to connect to WiFi using saved credentials
    if(!res) {
        Serial.println("Failed to connect");
        digitalWrite(LED_BUILTIN, HIGH); // Turn on built-in LED to indicate connection failure
        delay(1000);
        digitalWrite(LED_BUILTIN, LOW); // Turn off built-in LED
        delay(1000);
        digitalWrite(LED_BUILTIN, HIGH); // Turn on built-in LED
        ESP.restart(); // Restart the ESP8266
    }
    else {
        ThingSpeak.begin(client); // Initialize ThingSpeak communication
        digitalWrite(LED_BUILTIN, LOW); // Turn off built-in LED to indicate successful connection
        Serial.println("Connected to WiFi");
        dht.setup(DHTPIN); // Initialize DHT sensor
    }
}

void loop() {
    digitalWrite(LED_BUILTIN, LOW); // Turn off built-in LED

    // Read DHT sensor data
    float temperature = dht.getTemperature(); // Read temperature from DHT sensor
    float humidity = dht.getHumidity(); // Read humidity from DHT sensor
}

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// Read LDR analog input
int ldrValue = analogRead(A0);                                // Read analog input from LDR

// Read water level (0 or 1) from ThingSpeak
int waterLevel = digitalRead(D0);

// Send data to ThingSpeak
ThingSpeak.writeField(myChannelNumber, 1, temperature, myWriteAPIKey);
ThingSpeak.writeField(myChannelNumber, 2, humidity, myWriteAPIKey);
ThingSpeak.writeField(myChannelNumber, 3, ldrValue, myWriteAPIKey);
ThingSpeak.writeField(myChannelNumber, 4, waterLevel, myWriteAPIKey);
}

// Send temperature data to ThingSpeak
// Send humidity data to ThingSpeak
// Send LDR value to ThingSpeak
// Send water level data to ThingSpeak
```