Sensor Module Code Documentation

Overview

This code is designed for a sensor module that reads data from a DHT11 sensor (temperature and humidity), and two analog signals and sends the data to ThingSpeak cloud. Additionally, it allows users to update WiFi credentials using a web interface when connected to a hotspot.

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Libraries Used

- **WiFi.h:** Provides the ability to connect to Wi-Fi networks.
- **HTTPClient.h:** Enables HTTP communication with servers.
- **WebServer.h:** Facilitates the creation of a local web server for WiFi credentials update.
- **EEPROM.h:** Allows reading and writing to the EEPROM memory.
- **ThingSpeak.h:** Library for interfacing with the ThingSpeak IoT platform.
- **DHT.h:** Library for DHT sensors.

Variables

- **ssid, passphrase:** Default WiFi credentials.
- **esid, epass:** Strings to store EEPROM read WiFi credentials.
- **server:** Web server instance.
- **dht:** DHT sensor instance.
- **potPin, potValue, potPin2, potValue2:** Pins and values for two potentiometers.
- **client:** WiFi client for ThingSpeak communication.
- **myChannelNumber, myWriteAPIKey, myCounterReadAPIKey:** ThingSpeak channel details.
- **statusCode:** HTTP status code for server responses.

Functions

- **testWifi():** Checks WiFi connection status.
- **launchWeb():** Launches the web server for WiFi credentials update.
- **setupAP():** Sets up the WiFi access point for credentials modification.
- **createWebServer():** Defines web server routes and actions.

Setup Function (`void setup()`)

- Initializes serial communication.
- Disconnects from the current WiFi network.
- Initializes EEPROM.
- Initializes pins and peripherals.
- Reads WiFi credentials from EEPROM.
- Begins WiFi and ThingSpeak.
- Sets up a pin for an LED indicator.

Main Loop Function (`loop()`)

1. Checks if WiFi is connected:

- If connected:
    - Collects sensor data (temperature, humidity, potentiometer values).
    - Sends data to ThingSpeak.
- If not connected:
    - Turns off the LED indicator.

2. Checks WiFi connection status and D15 pin:

- If positive, returns.
- If negative, turns off the LED, prints status, and initiates hotspot setup.

3. Waits for WiFi connection.

- Prints dots while waiting.

WiFi Credentials Update Functions

- **testWifi():** Tests and waits for a successful WiFi connection.
- **launchWeb():** Launches the web server, prints local and SoftAP IP addresses.
- **setupAP():** Scans available networks, initializes SoftAP, and launches the web server for WiFi credentials update.
- **createWebServer():** Defines routes for web server actions (scan, setting).

WiFi Credentials Update Web Interface

- **`/`:** Home page displaying WiFi credentials, available networks, and a form for updating credentials.

- `/**scan**`**:** Displays a message to go back.
- `/**setting**`**:** Processes form data to update WiFi credentials in EEPROM.

Conclusion

This code provides a versatile sensor module with the capability to update WiFi credentials through a web interface. It reads sensor data and sends it to ThingSpeak for further analysis and visualization. The inclusion of comments and clear function names enhances readability and maintainability.