

## **PRACTICAL 9 : Light, Humidity & Temperature Monitoring**

**Aim** : To measure and display light intensity, humidity and temperature using respective sensors.

### **Overview** :

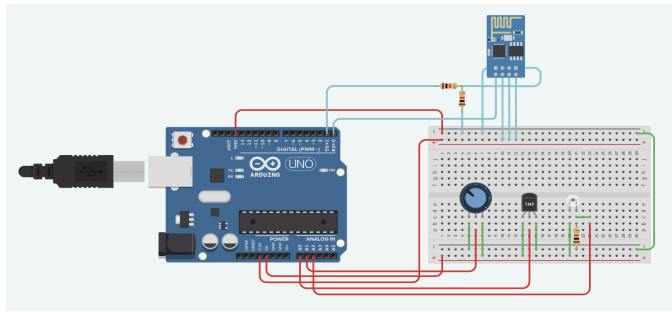
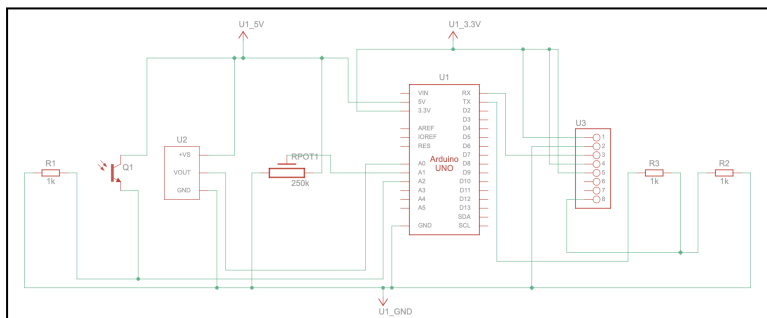
This project integrates multiple sensors to measure light intensity, humidity and temperature. The collected data is displayed on an output device. It introduces multi-sensor interfacing and demonstrates how environmental monitoring can be implemented in IoT applications.

### **Materials Required** :

- Arduino Uno R3
- 250 k $\Omega$  Potentiometer
- Temperature Sensor (TMP36)
- Ambient Light Sensor (Phototransistor)
- 3 x 1 k $\Omega$  Resistor
- Wifi Module (ESP8266)
- Breadboard Small
- Jumper Wires
- Arduino IDE (Installed on your Computer)

### **Circuit Connection and Steps** :

1. **Powering Components** : Connect the **VCC** of all sensors and the ESP8266 to **5V**, except the ESP8266 (**VCC & CH\_PD** → **3.3V**). Ensure all **GND** pins are connected to a common ground.
2. **Sensor Connections** :
  - The **LM35 temperature sensor** outputs data from its **OUT pin to A0** of the Arduino.
  - The **humidity sensor (potentiometer)** has its middle pin connected to **A1** for analog readings.
  - The **LDR (light sensor)** connects one leg to **A2**, the other to **5V**, with a **10k $\Omega$  pull-down resistor to GND** for stability.
3. **ESP8266 Communication** :
  - Connect the **ESP8266 TX to Arduino RX** through a **level shifter** for proper voltage handling.
  - Connect the **ESP8266 RX to Arduino TX** directly.
  - Pull **CH\_PD high** by connecting it to **3.3V** to enable the module.

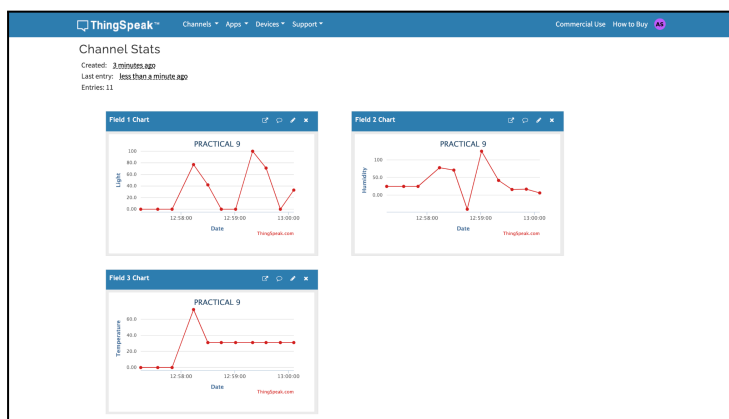
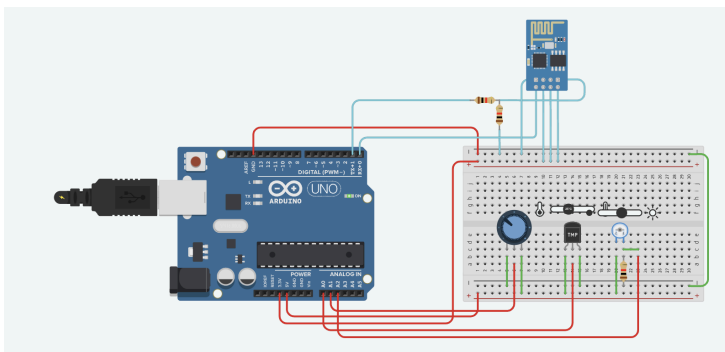
**Circuit Diagram :****Schematic Diagram :****Code :**

```
// WiFi Credentials
String ssid = "Simulator Wifi";
String password = "";
// ThingSpeak API Configuration
String host = "api.thingspeak.com";
const int httpPort = 80;
String apiKey = "YE76IRAW2UVM7LI5";
String endpoint = "/update?api_key=" + apiKey;
// Sensor Pin Configuration
const int tempPin = A0;
const int humidityPin = A1;
const int lightPin = A2;
void setup() {
    Serial.begin(115200);
    Serial.println("AT");
    delay(500);
    // Connect to WiFi
    Serial.println("AT+CWJAP=\"" + ssid + "\",\"" + password + "\"");
    delay(500);
    // Establish TCP Connection
    Serial.println("AT+CIPSTART=\"TCP\",\"" + host + "\", " +
String(httpPort));
    delay(500);
}
void loop() {
```

```
// Read sensor data
float temperature = ((analogRead(tempPin) * 0.0048828125) - 0.5) * 100;
float humidity = map(analogRead(humidityPin), 0, 1023, 0, 100);
float lightIntensity = map(analogRead(lightPin), 0, 471, 0, 100);
// Construct HTTP GET request
String httpRequest = "GET " + endpoint + "&field1=" +
String(lightIntensity) +
                        "&field2=" + String(temperature) + "&field3=" +
String(humidity) +
                        " HTTP/1.1\r\nHOST: " + host + "\r\n";

// Send data to ThingSpeak
Serial.println("AT+CIPSEND=" + String(httpRequest.length()));
delay(500);
Serial.println(httpRequest);
delay(1000);
}
```

## **Results :**



## **Conclusion :**

The multi-sensor project successfully measures light intensity, humidity and temperature, showcasing the integration of multiple sensors with Arduino. It emphasizes real-time environmental data collection, which is crucial for applications in smart agriculture, weather monitoring and automated control systems.