

IoT Based Mini Weather Station

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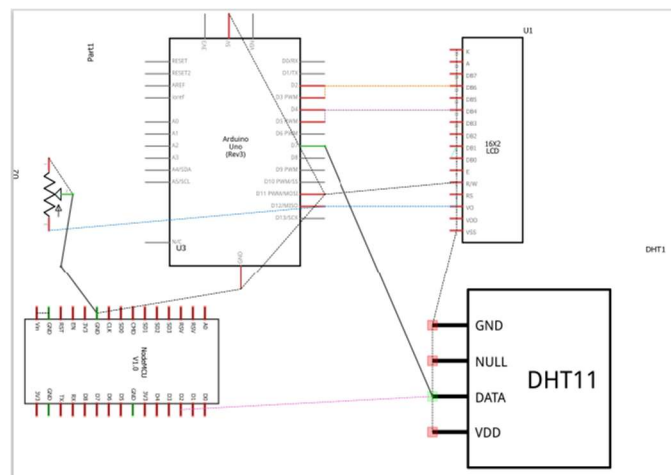
1. Aim: The aim of building a mini weather station using Arduino and ESP8266 is to create a low-cost, customizable, and compact device that can measure and report various weather-related parameters. Such a project can be both educational and practical, allowing you to collect and analyze weather data for personal use or even contribute to a larger weather monitoring network.

2. Introduction: Welcome to the Arduino and ESP8266 project! We've combined the power of these microcontrollers with a DHT sensor to create a compact, real-time weather station. This mini web server-based station allows you to monitor temperature and humidity from anywhere, providing valuable weather insights at your fingertips.

3. Implementation: Implementing this project involves connecting a DHT sensor to an Arduino and ESP8266, coding them to collect weather data, and creating a web server. The ESP8266 transmits data to the server, which displays real-time temperature and humidity information on a web page, accessible from any device with an internet connection.

In a real-world scenario, this mini weather station can be placed in your garden, on your rooftop, or in any location where you want to monitor temperature and humidity. It provides a convenient way to access this data remotely, helping you make informed decisions based on real-time weather conditions or simply satisfy your curiosity about local weather.

3.1 Schematic Circuit :



3.2 Equipment Used:

1. Arduino UNO
2. NodeMCU ESP8266
3. DHT11 Sensor
4. 16*2 I2C LCD Display
5. Potentiometer
6. Jumper Wires
7. Resistor 2K ohm and 220 ohms

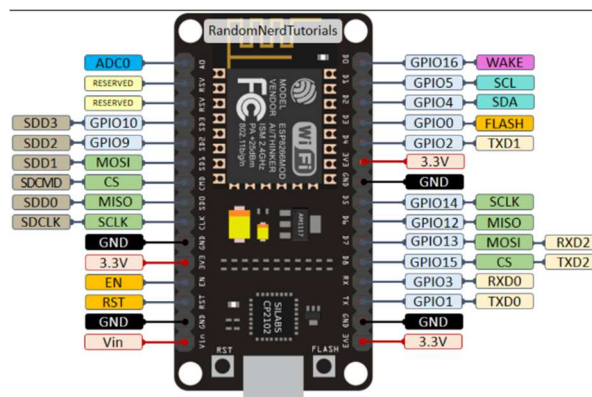
3.4 Power Supply:

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most applied to electrical energy supplies, less often to mechanical ones, and rarely to others. This power supply section is required to convert AC signal to DC signal and to reduce the amplitude of the signal. The available voltage signal from the main is 230V/50Hz which is an AC voltage, but the required is DC voltage with the amplitude of +5V and +12V for varies applications.

3.5 NODEMCU ESP8266:

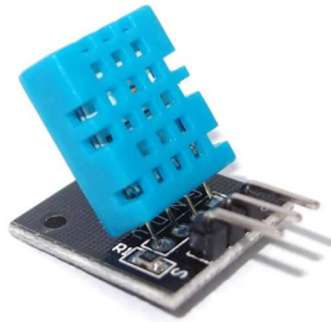
The NodeMCU (Node Microcontroller Unit) is an opensource software and hardware development environment that is built around a very inexpensive System-on-a-Chip (SoC) called the ESP8266. And you must program it in low-level machine instructions that can be interpreted by the chip hardware. The ESP-8266 may be a low-cost Wi-Fi microchip with full TCP/IP Transfer control protocol/ Internet protocol). It makes web connectivity possible for the IOT panel. ESP8266 offers a whole and self-contained W-Fi.

- 2.4 GHz Wi-Fi (802.11 b/g/n, supporting WPA/WPA2).
- General-purpose input/output (16 GPIO).
- Inter-Integrated Circuit (I²C) serial communication protocol.
- Analog-to-digital conversion (10-bit ADC).
- Serial Peripheral Interface (SPI) serial communication protocol.



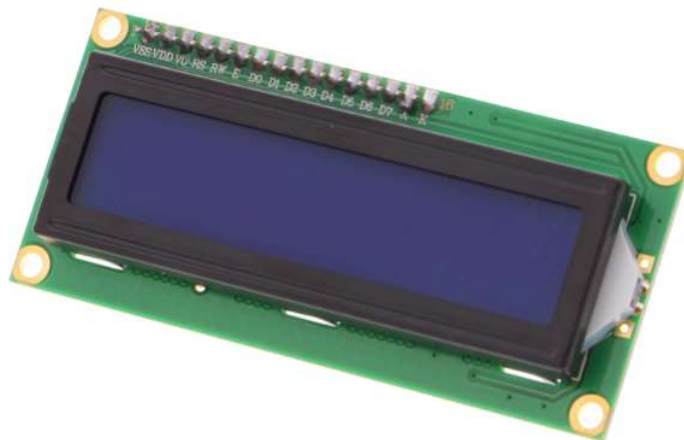
3.6 DHT Sensor

The DHT11 sensor is a low-cost, digital temperature and humidity sensor widely used in DIY projects and IoT applications. Its compact design and simple interface make it ideal for monitoring environmental conditions. With a sensing range of 0-50°C for temperature and 20-80% for humidity, the DHT11 offers reliable data for weather stations, home automation, and more, making it a popular choice among electronics enthusiasts.



3.7 I2C Display

The I2C 16x2 LCD display is a popular component in electronics projects. Its compact design combines a 16-character, 2-line display with an I2C interface, allowing easy integration with microcontrollers like Arduino. It simplifies data output by displaying text and numerical values, making it suitable for various applications, including instrumentation, IoT devices, and embedded systems, where space is limited, and data visibility is crucial.

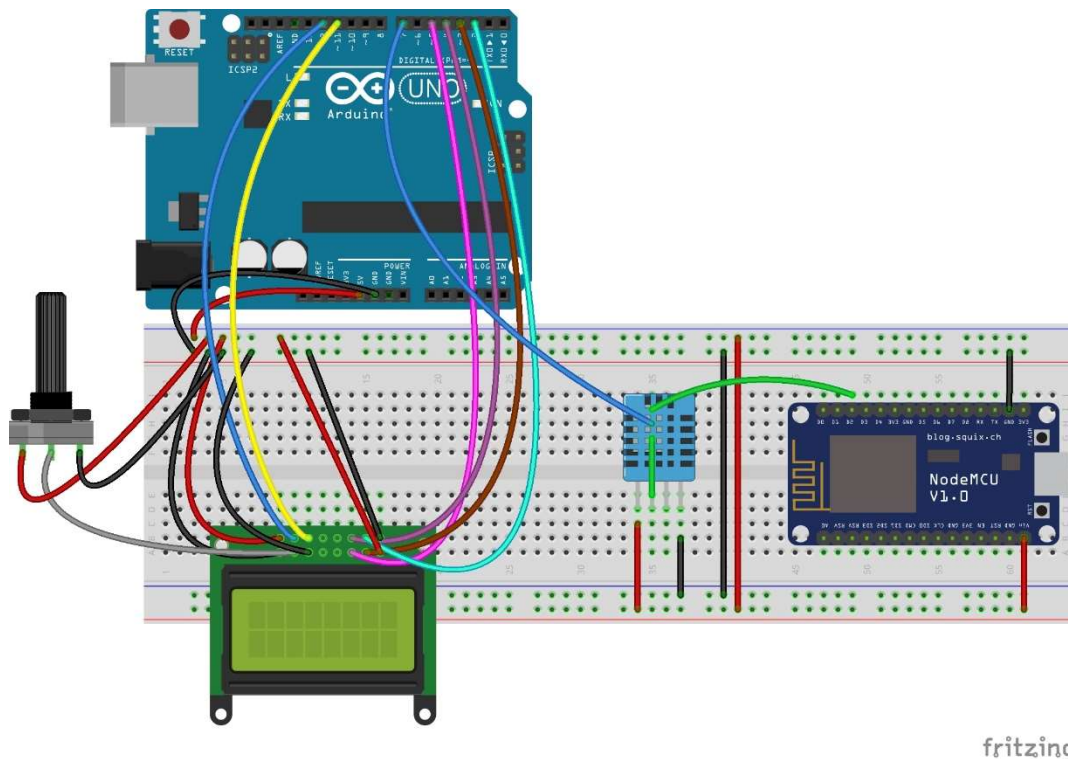


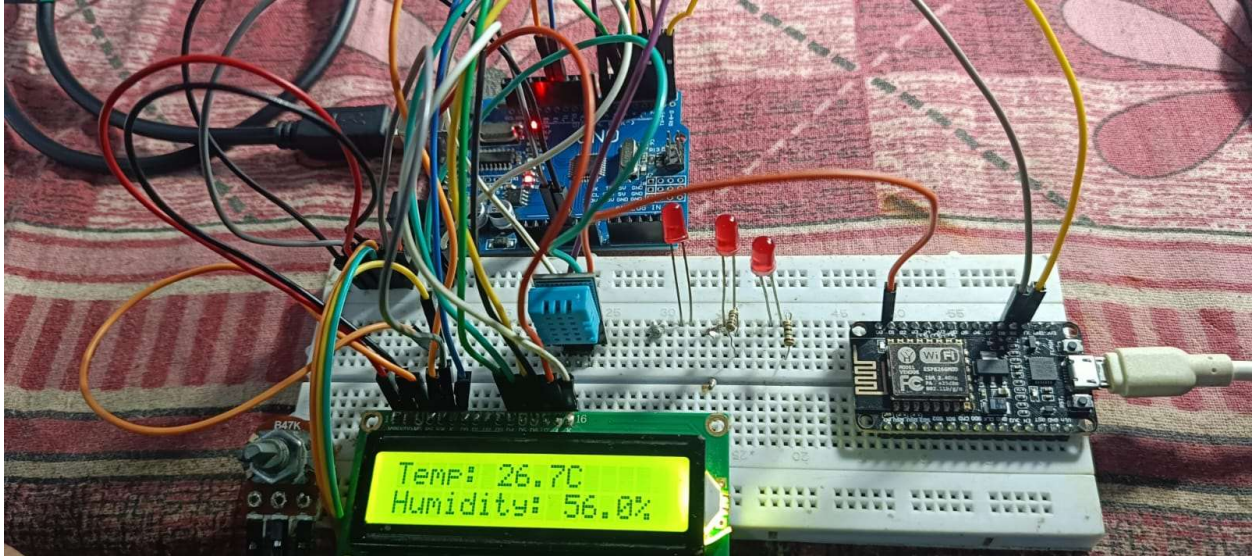
3.8 Potentiometer

A potentiometer, often referred to as a "pot," is a variable resistor used in electronics. It has three terminals, allowing it to adjust and control electrical resistance within a circuit. By rotating the knob or wiper, the resistance value changes, making potentiometers valuable for tasks like volume control in audio equipment, brightness adjustment in displays, and sensor calibration. They provide precise and manual control over electrical parameters, enhancing user interaction in electronic devices.



4. Circuit Diagram





 Temperature **26.70** °C

 Humidity **57.00** %

5. Coding :

5.1 Interfacing Arduino I2c display and DHT :

```
#include <DHT.h>
#include <LiquidCrystal.h>
#define DHTPIN 7
#define DHTTYPE DHT11

DHT dht(DHTPIN, DHTTYPE);

LiquidCrystal lcd(12, 11, 5, 4, 3, 2);

void setup() {
  dht.begin();
  lcd.begin(16, 2);
}

void loop() {
  float temperatureC = dht.readTemperature();
  float humidity = dht.readHumidity();
  lcd.setCursor(0, 0);
  lcd.print("Temp: ");
  lcd.print(temperatureC, 1);
  lcd.print("C");
  lcd.setCursor(0, 1);
  lcd.print("Humidity: ");
  lcd.print(humidity, 1);
  lcd.print("%");
  delay(2000);
}
```

5.2 Interfacing ESP8266 AND DHT11 With custom web server :

Refer to file readhumid.ino for the esp8266 server file config



endeavour

