EXP.No.5: INTERFACING DHT11 SENSOR WITH ESP8266 TO MEASURE TEMPERATURE

OBJECTIVES:

1. To interface a DHT11 sensor with the ESP8266 NodeMCU board.
2. To measure temperature using the DHT11 sensor.
3. To display the temperature readings on the Blynk IoT app.

Materials Required:

- ESP8266 NodeMCU board
- DHT11 sensor module
- Breadboard
- Jumper wires
- USB cable
- Computer with Arduino IDE installed •
- Blynk app installed on a smartphone or tablet

Theory:

The DHT11 sensor is a basic, low-cost digital temperature sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air and spits out a digital signal on the data pin. It is quite simple to use but requires careful timing to grab data.

The ESP8266 NodeMCU board is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability, designed to provide access to Wi-Fi networks or to act as an access point.

Blynk is a platform with iOS and Android apps to control Arduino, Raspberry Pi, and the likes over the Internet. It's a digital dashboard where you can build a graphic interface for your project by simply dragging and dropping widgets.

Circuit Diagram:

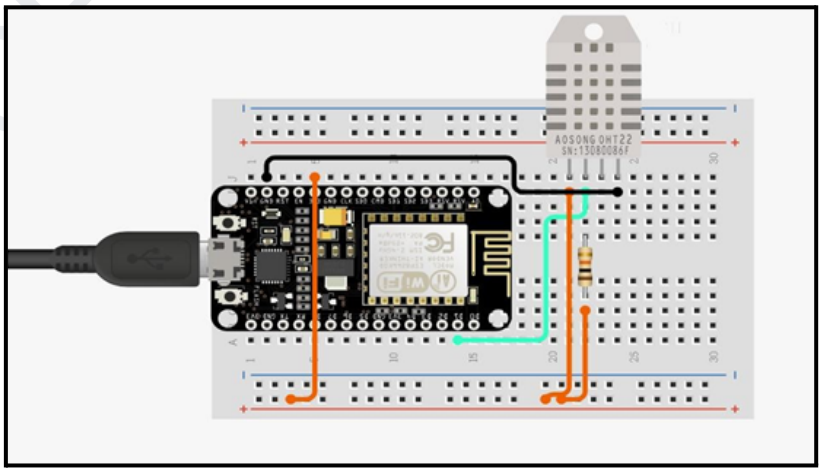


Fig.5.1 Diagram showing the connections between the ESP8266 NodeMCU and the DHT11 sensor

DHT11 Pin Configuration:

- VCC: 3.3V

- GND: GND
- Data: D4 (GPIO2 on ESP8266)

Procedure:

1. **Hardware Setup:**
   - Connect the V_{CC} pin of the DHT11 sensor to the 3.3V pin on the ESP8266.

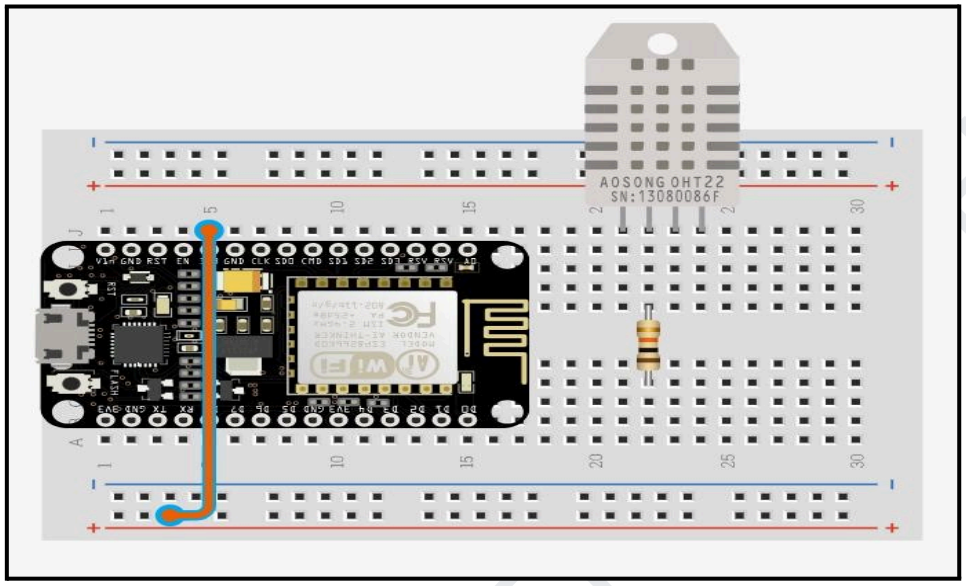


Fig.5.2 Connection of V_{CC} pin of the DHT11 sensor to the 3.3V pin on the ESP8266.

   - Connect the Data pin of the DHT11 sensor to the D4 pin (GPIO2) on the ESP8266 using jumper wires.

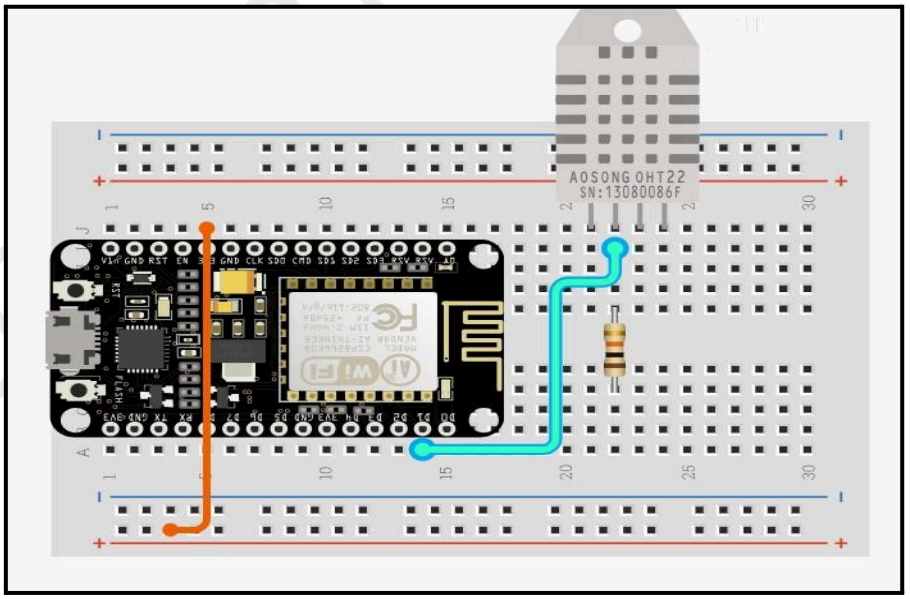


Fig.5.3 Connection of Data pin of the DHT11 sensor to D4 pin on the ESP8266.

   - Connect the GND pin of the DHT11 sensor to a GND pin on the ESP8266.

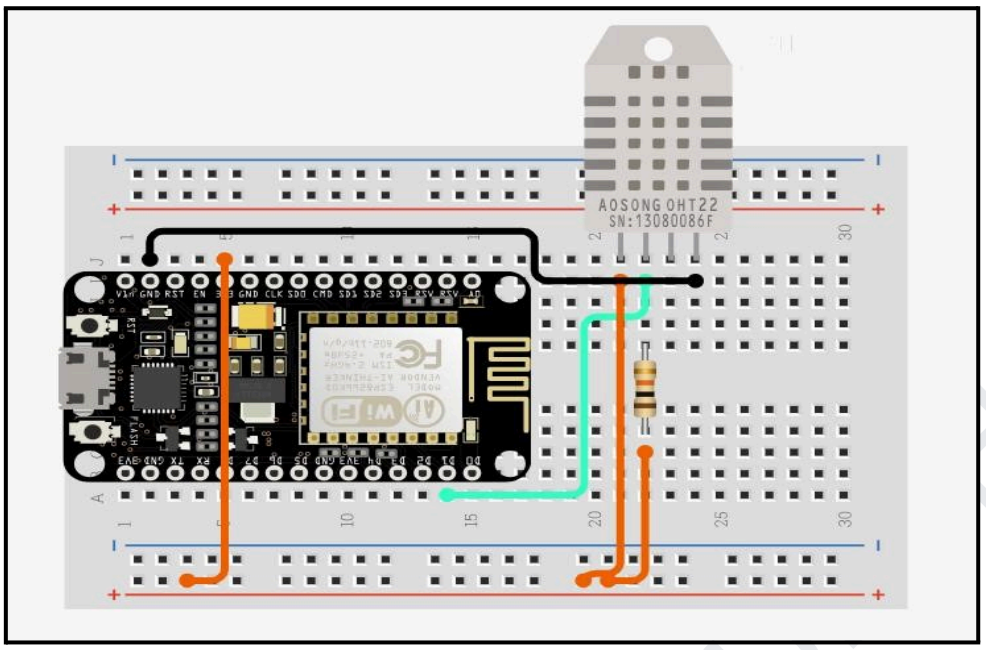


Fig.5.4 Connection of GND pin of the DHT11 sensor to GND pin on the ESP8266.

2. **Software Setup:**
   - Open the Arduino IDE on your computer.
   - Install the necessary libraries: DHT sensor library and Adafruit Unified Sensor library.
   - Install the Blynk library by navigating to Sketch > Include Library > Manage Libraries and searching for “Blynk”.
3. **Blynk App Setup:**
   - Open the Blynk app on your smartphone/tablet.
   - Create a new project and note the Auth Token.
   - Add two Value Display widgets and set them to Virtual Pin V5 and V6, respectively.
4. **Programming:**
   - Connect the ESP8266 to your computer using a USB cable.
   - In the Arduino IDE, write the following code:

```
#define BLYNK_TEMPLATE_ID "TMPL3YWb39NeI"
#define BLYNK_TEMPLATE_NAME "temperature"
#define BLYNK_AUTH_TOKEN "ooBq1QQNSMwrHQHcJlO24IPXLsahubtF"
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
#include <DHT.h>
 char ssid[] = "bhavan";
char pass[] = "88888888";
#define DHTPIN D4
```

```
#define DHTTYPE DHT11
DHT dht (DHTPIN, DHTTYPE);
void setup()
 {
Serial.begin(9600);
Blynk.begin(BLYNK_AUTH_TOKEN, ssid, pass);
dht.begin();
}
void loop() {
Blynk.run();
float t = dht.readTemperature();
Blynk.virtualWrite(V0, t);
delay(2000);
}
```

- Replace "YourAuthToken", "YourNetworkName", and "YourPassword" with the actual values.
- Upload the code to the ESP8266.

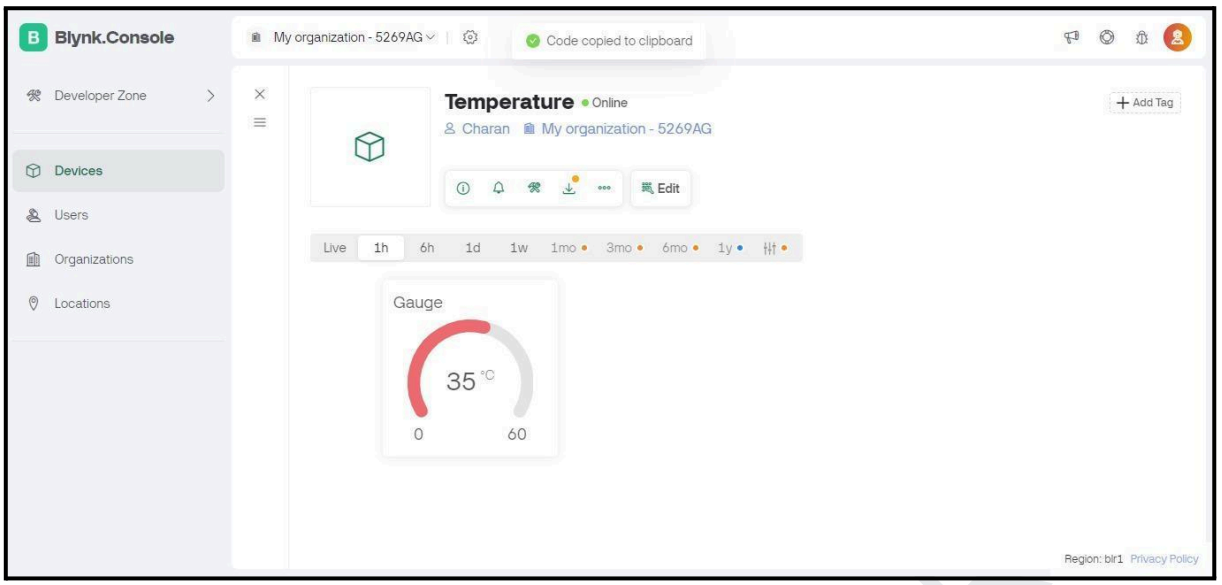
5. **Running the Experiment:**
   - Open the Serial Monitor in the Arduino IDE to observe the temperature readings.
   - Open the Blynk app to view the live temperature data on the Value Display widgets.

Observations:

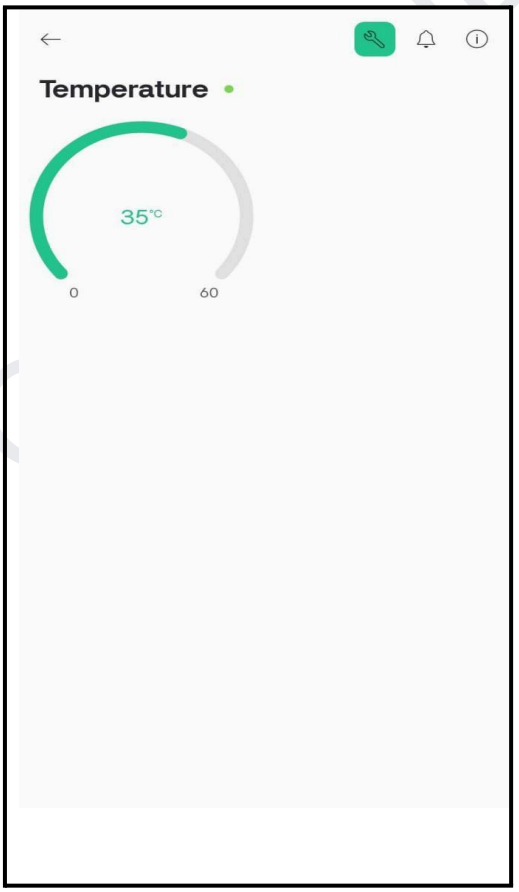
Record the temperature readings displayed on the Blynk app at different intervals.

S.No	Time(HH:MM)	Temperature (℃)

Observations in Blynk website:



Observations in Blynk IoT app:



Result:

The temperature readings were successfully measured using the DHT11 sensor and displayed on the Blynk app.

Conclusion:

This experiment demonstrates how to interface the DHT11 sensor with the ESP8266 board and use the Blynk IoT platform to remotely monitor temperature. The successful implementation confirms the practicality of using ESP8266 and Blynk for IoT applications.

Appendix:

A. Symbols, Units, and Abbreviations:

- °C: Degree Celsius (Temperature)
- VCC: Voltage Common Collector
- GND: Ground
- GPIO: General Purpose Input/Output

B. Tools Required:

- ESP8266 NodeMCU board
- DHT11 sensor module
- Breadboard
- Jumper wires
- USB cable
- Computer with Arduino IDE installed
- Blynk app installed on a smartphone or tablet

C. Additional Resources:

- ESP8266 Documentation
- Arduino IDE Installation Guide
- Blynk Documentation
- DHT11 Sensor Guide

D. Reference link with QR code:

https://www.youtube.com/watch?v=LxSaasRmcjw

This format provides a clear and comprehensive guide for conducting the experiment, ensuring students can follow along and achieve the desired outcomes.