IOT AND CLOUD COMPUTING LAB

By,

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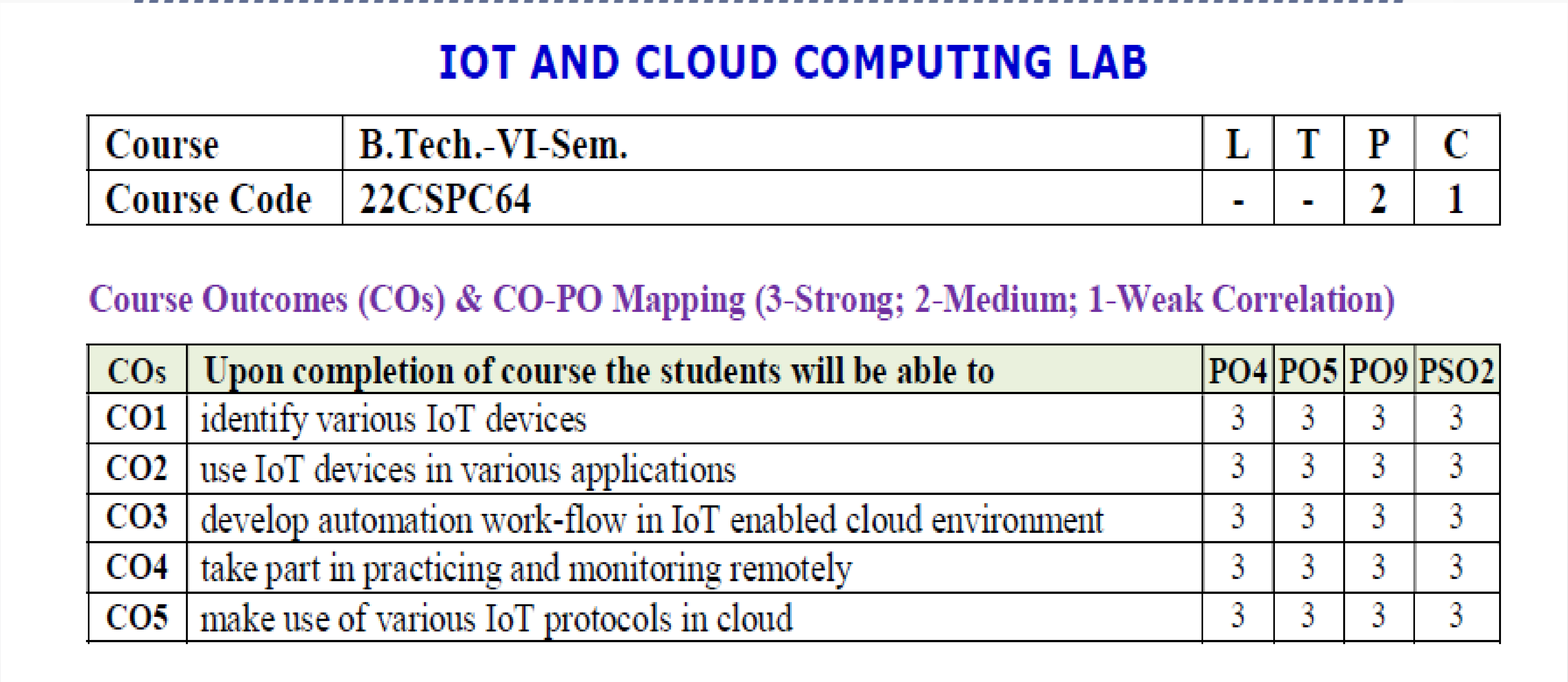
M.E(Computer Science and Engineering)
B.E(Computer Science & Engineering)
Diploma(Computer Science & Engineering)

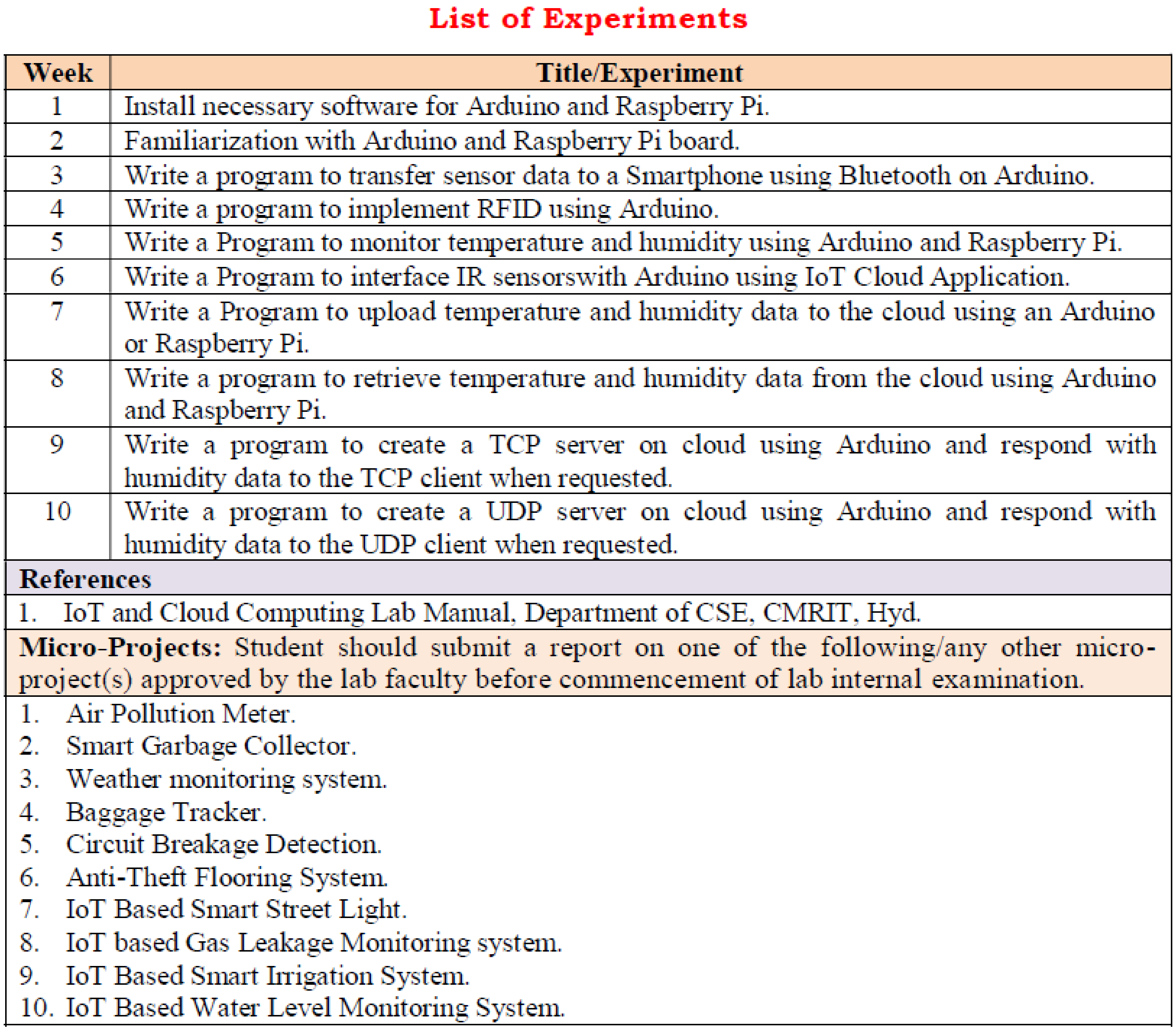


IOT AND CLOUD COMPUTING LAB

Course	B.Tech.-VI-Sem.	L	T	P	C
Course Code	22CSPC64	-	-	2	1

Course Outcomes (COs) & CO-PO Mapping (3-Strong; 2-Medium; 1-Weak Correlation)

COs	Upon completion of course the students will be able to	PO4	PO5	PO9	PSO2
CO1	identify various IoT devices	3	3	3	3
CO2	use IoT devices in various applications	3	3	3	3
CO3	develop automation work-flow in IoT enabled cloud environment	3	3	3	3
CO4	take part in practicing and monitoring remotely	3	3	3	3
CO5	make use of various IoT protocols in cloud	3	3	3	3



List of Experiments

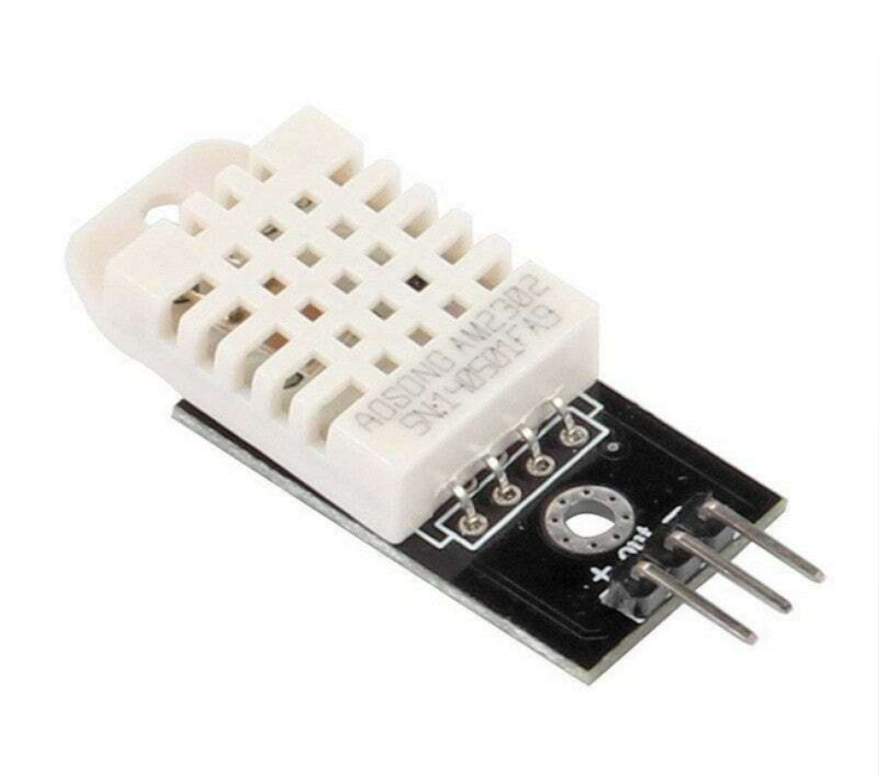
Week	Title/Experiment
1	Install necessary software for Arduino and Raspberry Pi.
2	Familiarization with Arduino and Raspberry Pi board.
3	Write a program to transfer sensor data to a Smartphone using Bluetooth on Arduino.
4	Write a program to implement RFID using Arduino.
5	Write a Program to monitor temperature and humidity using Arduino and Raspberry Pi.
6	Write a Program to interface IR sensorswith Arduino using IoT Cloud Application.
7	Write a Program to upload temperature and humidity data to the cloud using an Arduino or Raspberry Pi.
8	Write a program to retrieve temperature and humidity data from the cloud using Arduino and Raspberry Pi.
9	Write a program to create a TCP server on cloud using Arduino and respond with humidity data to the TCP client when requested.
10	Write a program to create a UDP server on cloud using Arduino and respond with humidity data to the UDP client when requested.

References

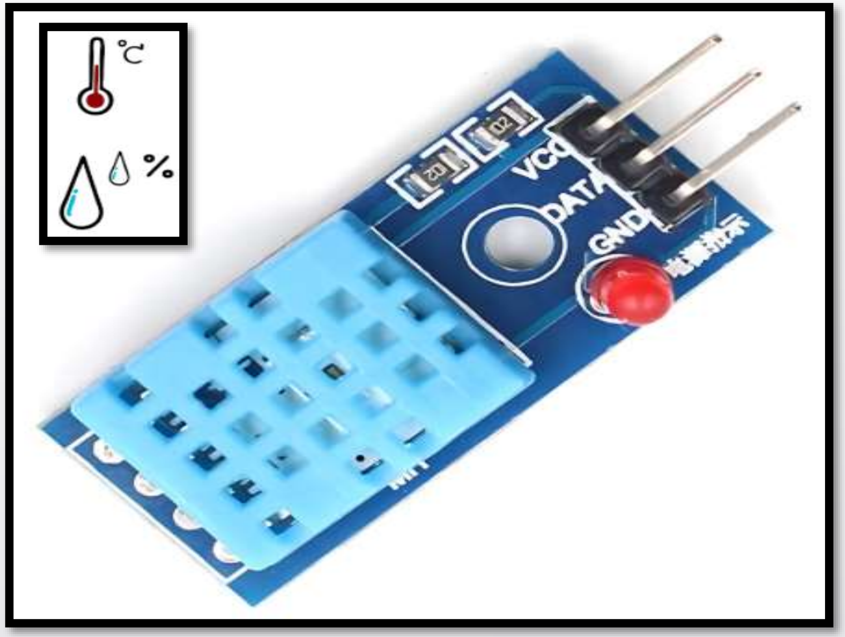
1. IoT and Cloud Computing Lab Manual, Department of CSE, CMRIT, Hyd.

Micro-Projects: Student should submit a report on one of the following/any other micro-project(s) approved by the lab faculty before commencement of lab internal examination.

1. Air Pollution Meter.
2. Smart Garbage Collector.
3. Weather monitoring system.
4. Baggage Tracker.
5. Circuit Breakage Detection.
6. Anti-Theft Flooring System.
7. IoT Based Smart Street Light.
8. IoT based Gas Leakage Monitoring system.
9. IoT Based Smart Irrigation System.
10. IoT Based Water Level Monitoring System.



DHT22 Temperature and Humidity Sensor



DHT11 Temperature and Humidity Sensor

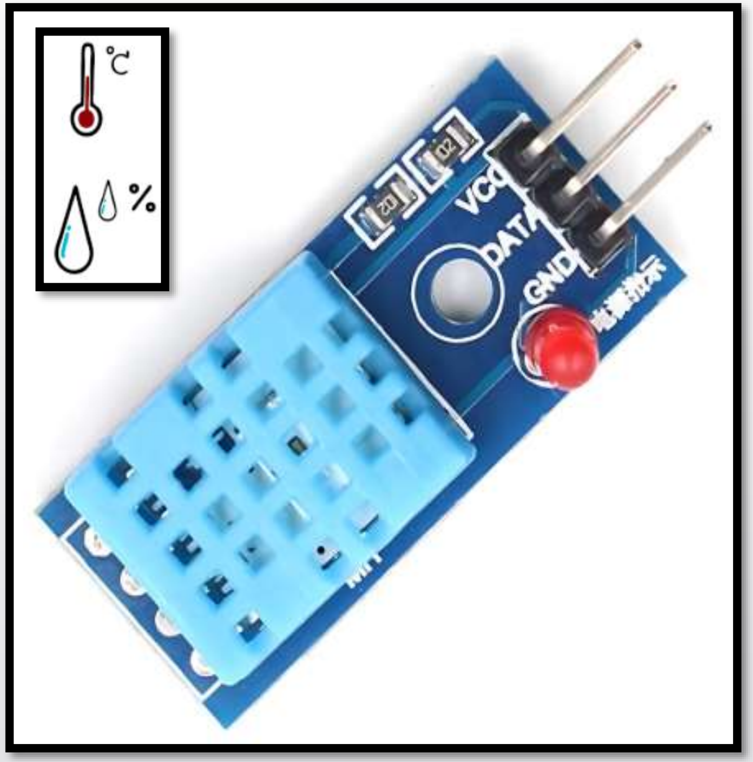
The **DHT11** is a digital temperature and humidity sensor that provides calibrated output via a single-wire communication protocol.

❖ It is commonly used in

✓ weather monitoring systems,

✓ home automation, and

✓ IoT applications.



DHT11 Temperature and Humidity Sensor

1. Weather Monitoring Systems

□ Used in DIY and professional weather stations to measure temperature and humidity levels.

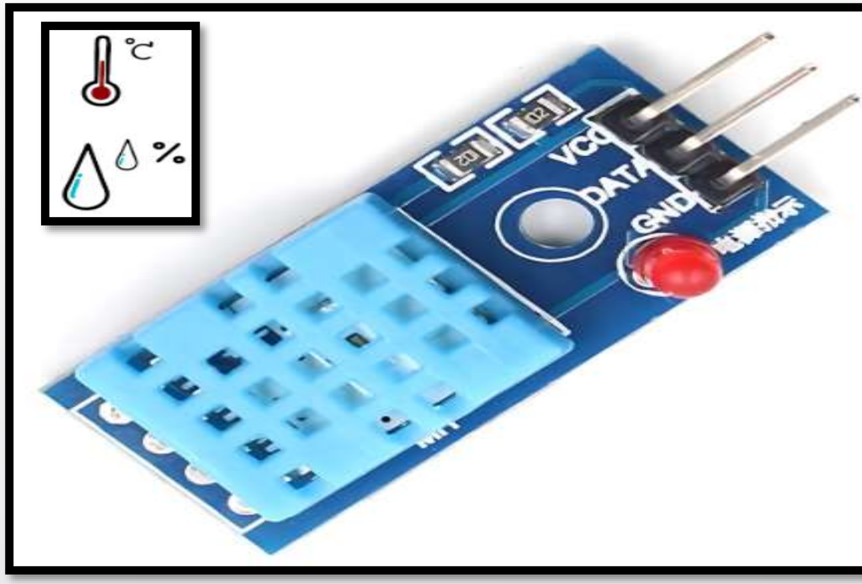
2. Home Automation & Smart Homes

🏠 Integrated into IoT-based smart home systems for automatic climate control, triggering fans, air purifiers, or dehumidifiers.

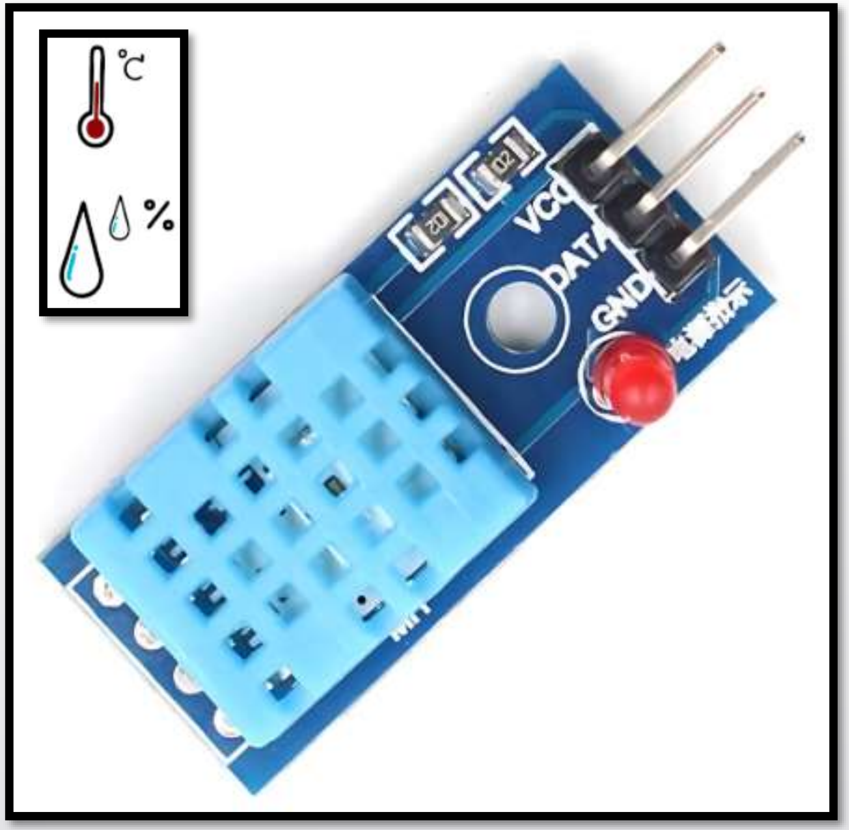
3. Greenhouse Monitoring
🌱 Helps maintain optimal temperature and humidity levels for plant growth in agricultural environments.

4. Industrial Environmental Monitoring
🏭 Used in factories and warehouses to monitor environmental conditions that affect machinery and stored goods.

5. HVAC (Heating, Ventilation, and Air Conditioning) Systems
❄□ Helps in climate control systems by providing real-time temperature and humidity data for automated adjustments.



DHT11 Temperature and Humidity Sensor



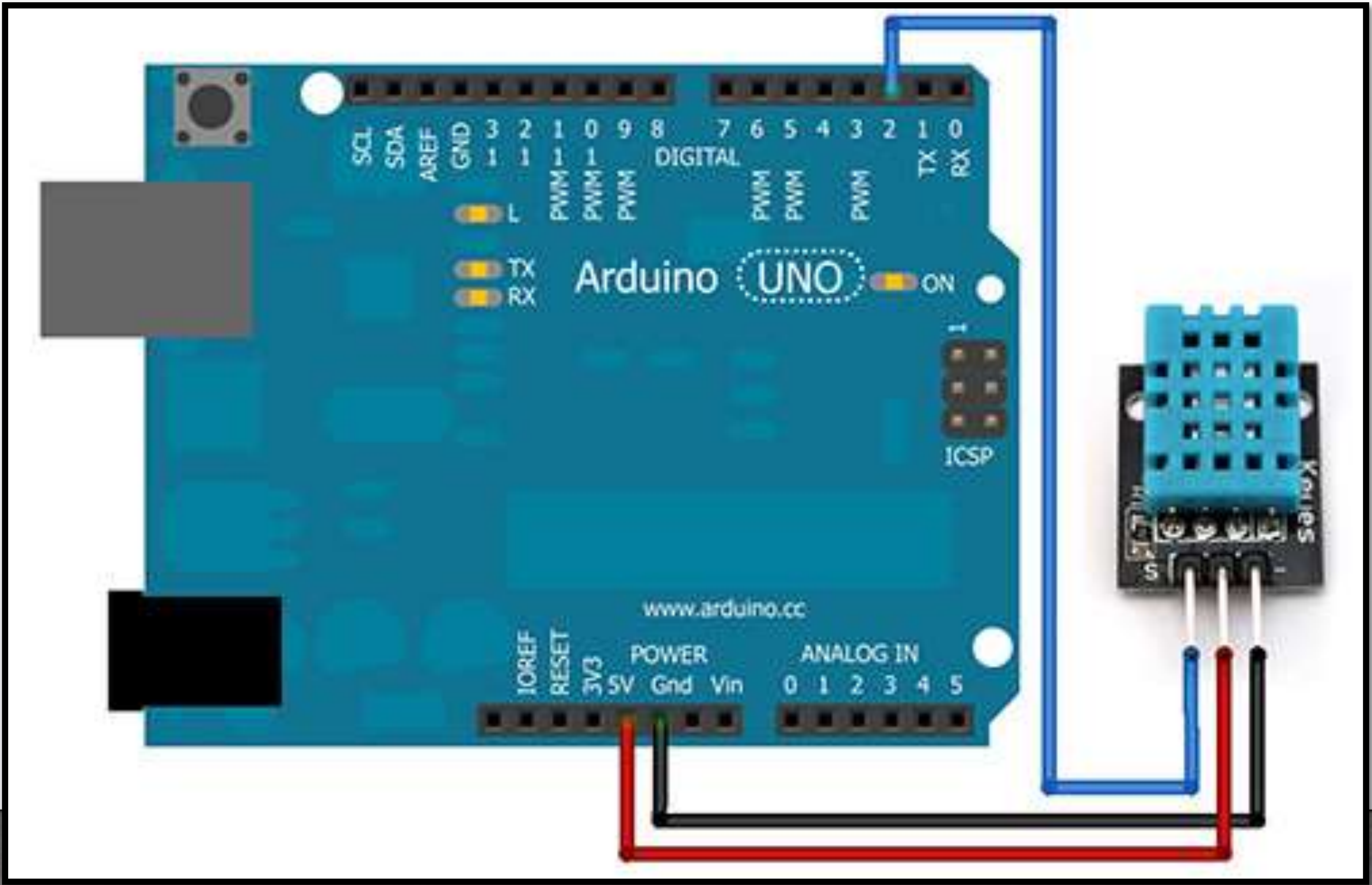
DHT11 Temperature and Humidity Sensor

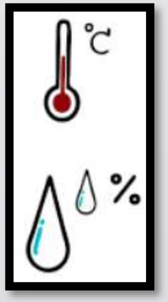
Specifications:

- **Temperature Range:** 0°C to 50°C (±2°C accuracy)
- **Humidity Range:** 20% to 90% RH (±5% accuracy)
- **Operating Voltage:** 3.3V - 5V
- **Output Signal:** Digital (single-wire)
- **Sampling Rate:** 1 Hz (one reading per second)
- **Response Time:** ~2 seconds
- **Dimensions:** 15mm x 12mm x 5mm

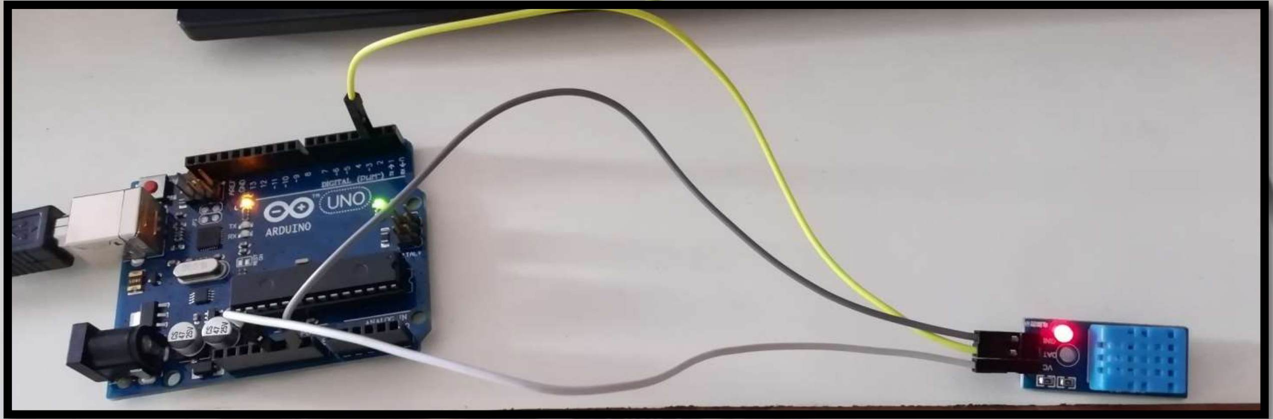
Pinout:

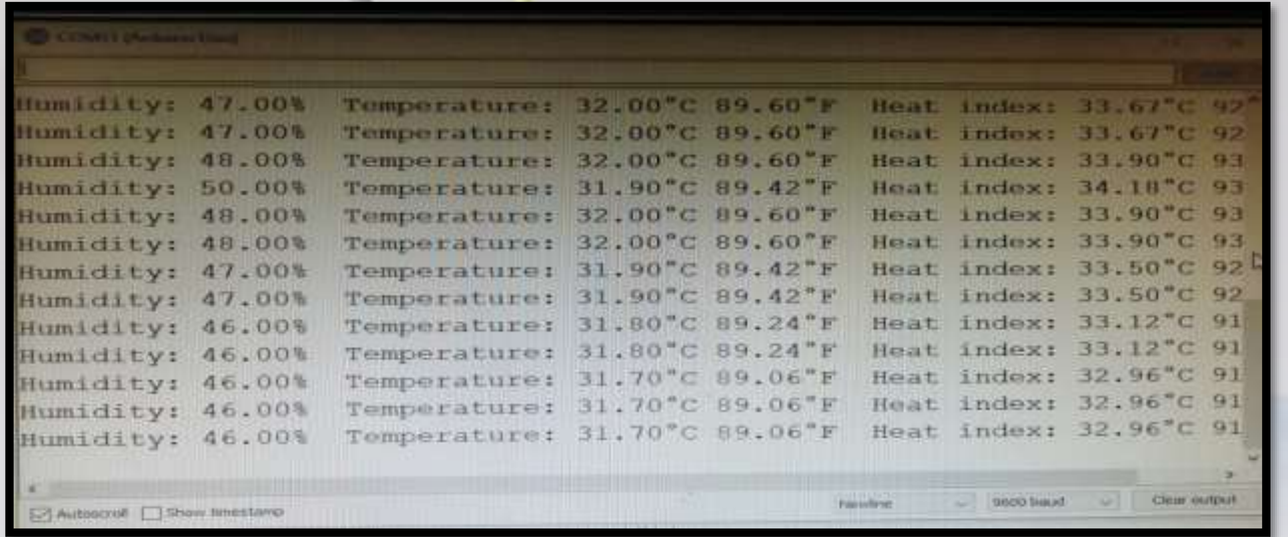
1. **VCC** - Power supply (3.3V or 5V)
2. **Data** - Digital output (connect to a pull-up resistor, typically 4.7kΩ)
3. **GND** - Ground


SCL
SDA
AREF
GND
13
12
11
10
9
8
DIGITAL
7
6
5
4
3
2
1
0
TX
RX
PWM
L
TX
RX
Arduino
UNO
ON
ICSP
www.arduino.cc
IOREF
RESET
3V3
POWER
5V
Gnd
Vin
ANALOG IN
0
1
2
3
4
5
Keyes
S
-

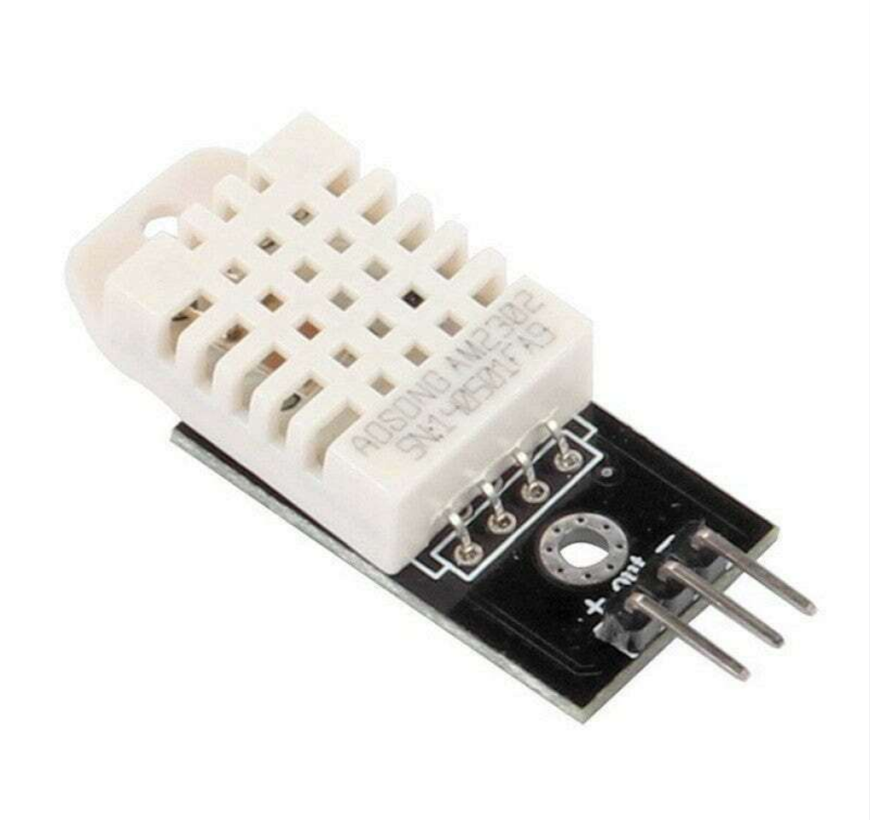

℃
%

OUTPUT:





```
Humidity: 47.00%  Temperature: 32.00°C 89.60°F  Heat index: 33.67°C 92
Humidity: 47.00%  Temperature: 32.00°C 89.60°F  Heat index: 33.67°C 92
Humidity: 48.00%  Temperature: 32.00°C 89.60°F  Heat index: 33.90°C 93
Humidity: 50.00%  Temperature: 31.90°C 89.42°F  Heat index: 34.18°C 93
Humidity: 48.00%  Temperature: 32.00°C 89.60°F  Heat index: 33.90°C 93
Humidity: 48.00%  Temperature: 32.00°C 89.60°F  Heat index: 33.90°C 93
Humidity: 47.00%  Temperature: 31.90°C 89.42°F  Heat index: 33.50°C 92
Humidity: 47.00%  Temperature: 31.90°C 89.42°F  Heat index: 33.50°C 92
Humidity: 46.00%  Temperature: 31.80°C 89.24°F  Heat index: 33.12°C 91
Humidity: 46.00%  Temperature: 31.80°C 89.24°F  Heat index: 33.12°C 91
Humidity: 46.00%  Temperature: 31.70°C 89.06°F  Heat index: 32.96°C 91
Humidity: 46.00%  Temperature: 31.70°C 89.06°F  Heat index: 32.96°C 91
Humidity: 46.00%  Temperature: 31.70°C 89.06°F  Heat index: 32.96°C 91
```



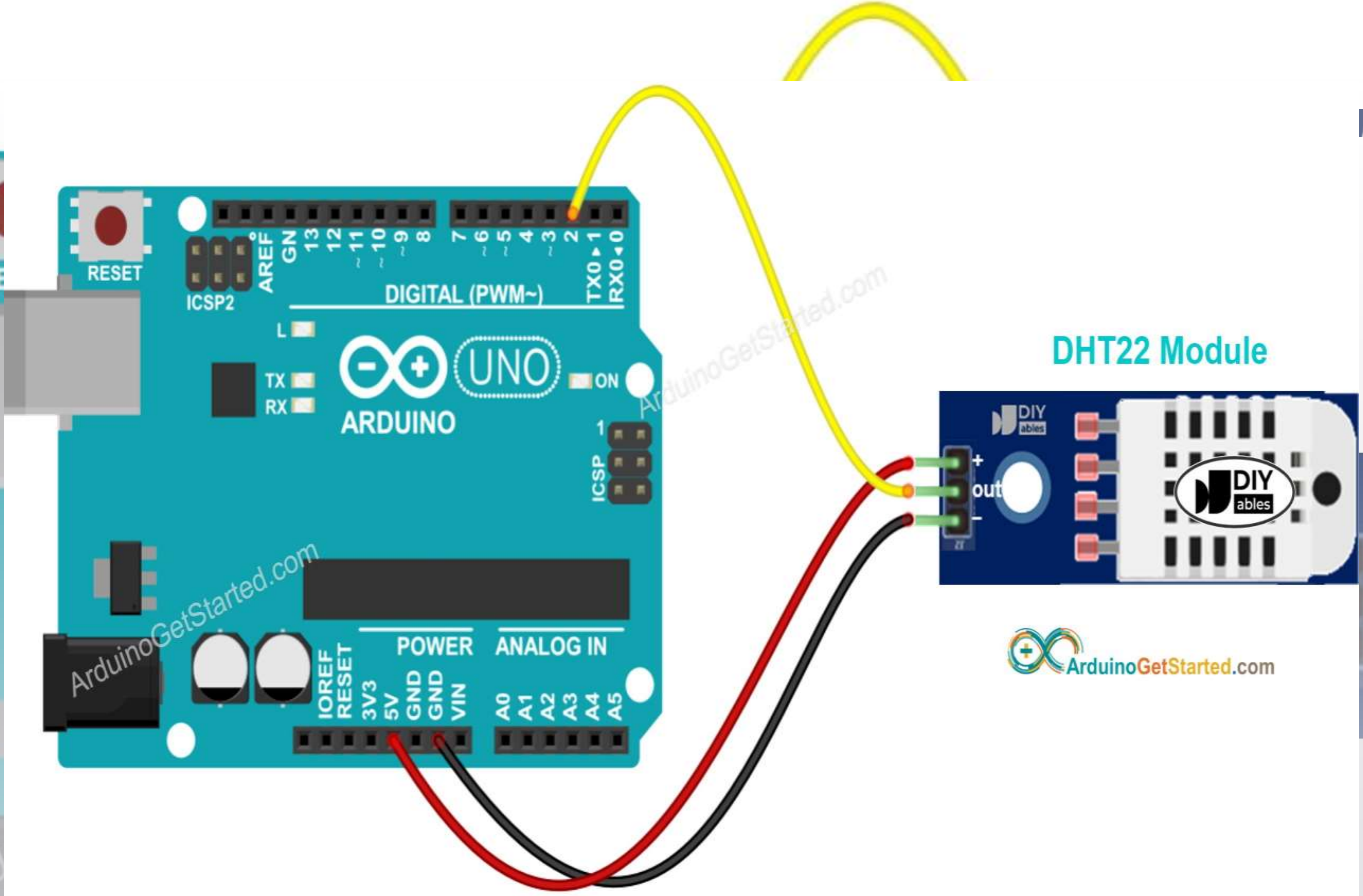
DHT22 Temperature and Humidity Sensor

DHT22 Temprature and Humidity Sensor Module

Supply Voltage-5V
Temperature Range -40°C to 80°C
Temperature Resolution-0.1°C
Temperature Error-< ±0.5°C
Humidity Range 0% to 100% RH

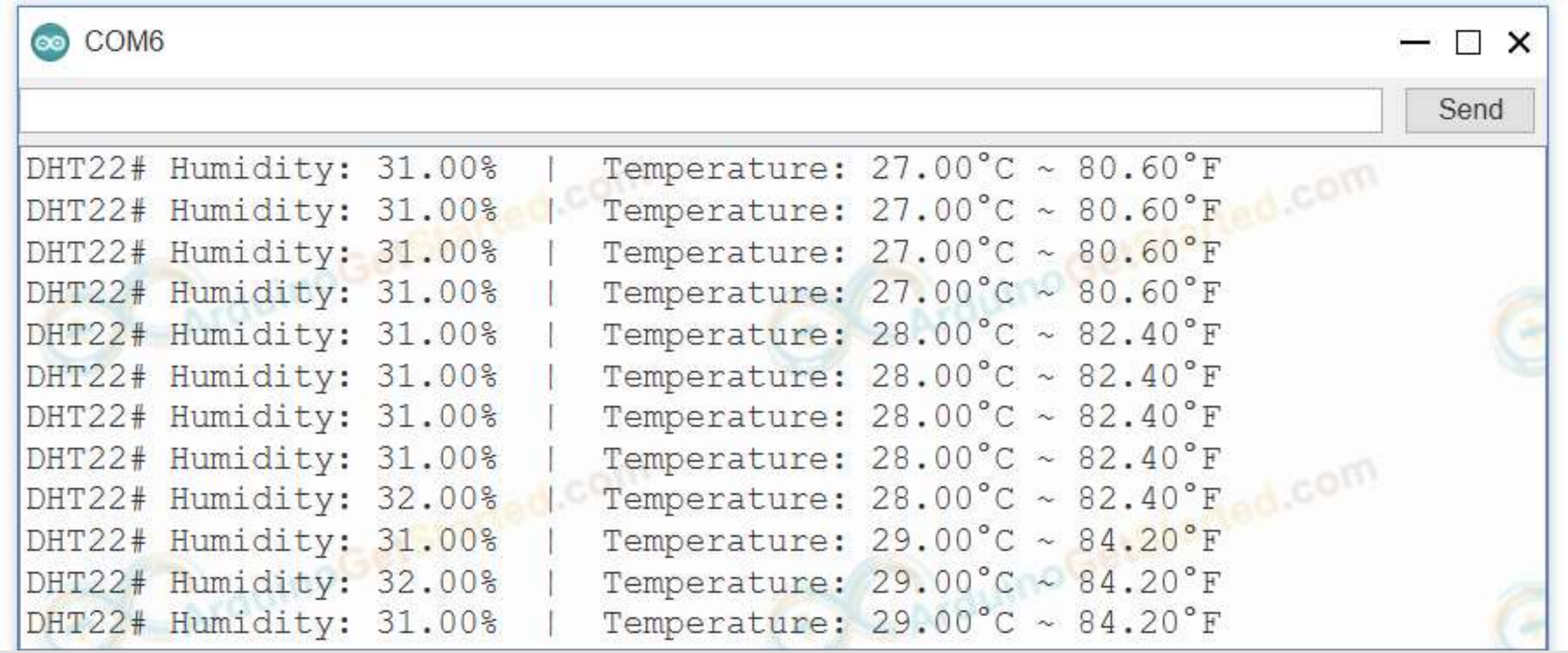
Pinout:

1. **VCC** - Power supply (3.3V or 5V)
2. **Data** - Digital output (connect to a pull-up resistor, typically 4.7kΩ)
3. **GND** - Ground

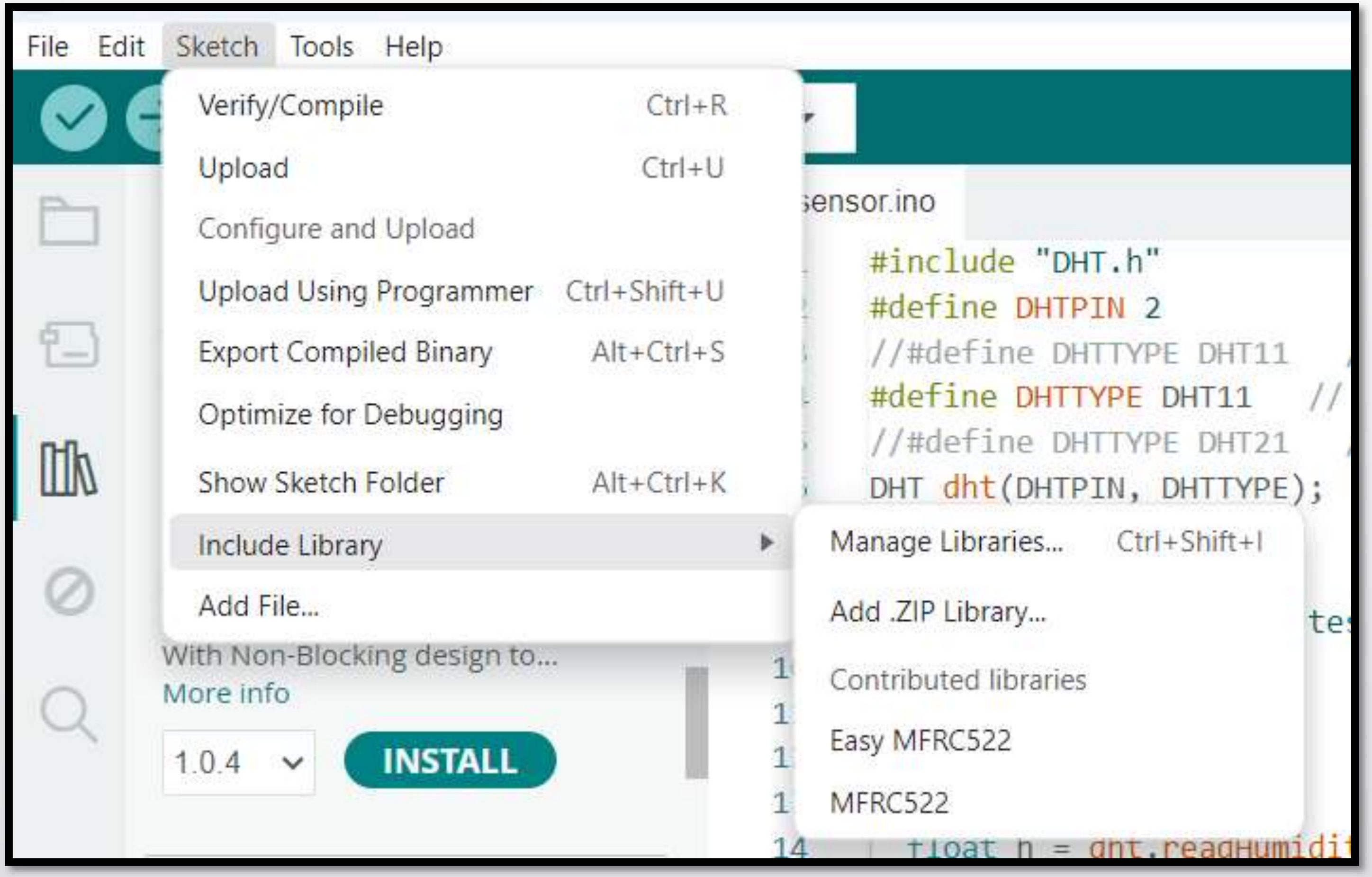


DHT22 Temperature and Humidity Sensor

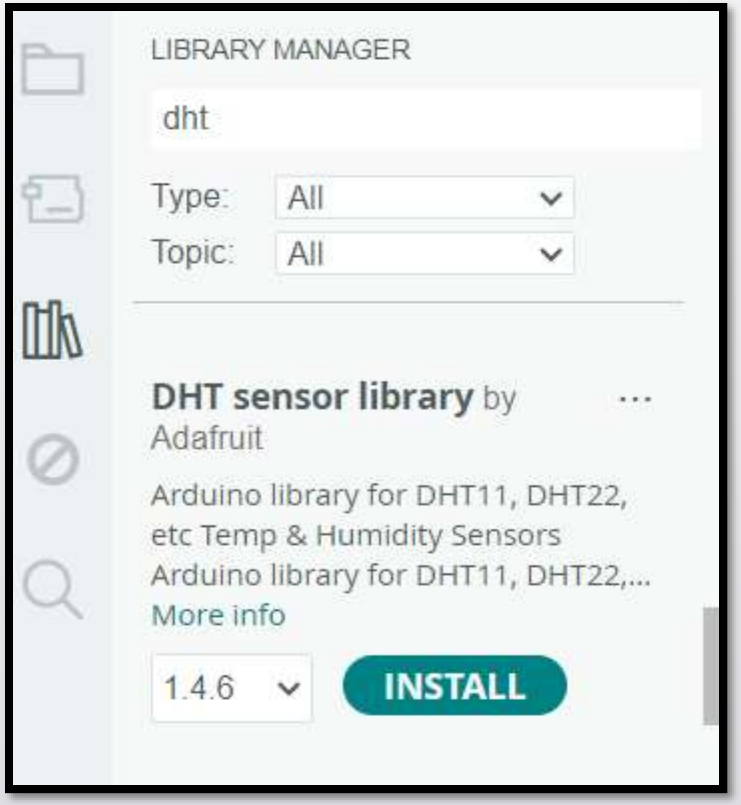
OUTPUT



```
DHT22# Humidity: 31.00%  |  Temperature: 27.00°C ~ 80.60°F
DHT22# Humidity: 31.00%  |  Temperature: 27.00°C ~ 80.60°F
DHT22# Humidity: 31.00%  |  Temperature: 27.00°C ~ 80.60°F
DHT22# Humidity: 31.00%  |  Temperature: 27.00°C ~ 80.60°F
DHT22# Humidity: 31.00%  |  Temperature: 28.00°C ~ 82.40°F
DHT22# Humidity: 31.00%  |  Temperature: 28.00°C ~ 82.40°F
DHT22# Humidity: 31.00%  |  Temperature: 28.00°C ~ 82.40°F
DHT22# Humidity: 31.00%  |  Temperature: 28.00°C ~ 82.40°F
DHT22# Humidity: 32.00%  |  Temperature: 28.00°C ~ 82.40°F
DHT22# Humidity: 31.00%  |  Temperature: 29.00°C ~ 84.20°F
DHT22# Humidity: 32.00%  |  Temperature: 29.00°C ~ 84.20°F
DHT22# Humidity: 31.00%  |  Temperature: 29.00°C ~ 84.20°F
```



```
#include "DHT.h"
#define DHTPIN 2
//#define DHTTYPE DHT11
#define DHTTYPE DHT11   //
//#define DHTTYPE DHT21
DHT dht(DHTPIN, DHTTYPE);
```



DHT sensor library by Adafruit

Arduino library for DHT11, DHT22, etc Temp & Humidity Sensors
Arduino library for DHT11, DHT22,...

Source Code:

```
#include "DHT.h"
#define DHTPIN 2
//#define DHTTYPE DHT11   // DHT 11
#define DHTTYPE DHT11   // DHT 22  (AM2302), AM2321
//#define DHTTYPE DHT21   // DHT 21 (AM2301)
DHT dht(DHTPIN, DHTTYPE);
void setup() {
 Serial.begin(9600);
Serial.println(F("DHTxx test!"));
dht.begin();
}
void loop() {
 delay(2000);
  float h = dht.readHumidity();
  // Read temperature as Celsius (the default)
  float t = dht.readTemperature();
// Read temperature as Fahrenheit (isFahrenheit = true)
  float f = dht.readTemperature(true);
  if (isnan(h) || isnan(t) || isnan(f)) {
Serial.println(F("Failed to read from DHT sensor!"));
    return;
  }
  float hif = dht.computeHeatIndex(f, h);
  float hic = dht.computeHeatIndex(t, h, false);
  Serial.print(F("Humidity: "));
  Serial.print(h);
  Serial.print(F("%  Temperature: "));
  Serial.print(t);
  Serial.print(F("°C "));
Serial.print(f);
  Serial.print(F("°F  Heat index: "));
  Serial.print(hic);
  Serial.print(F("°C "));
  Serial.print(hif);
  Serial.println(F("°F"));
}
```

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