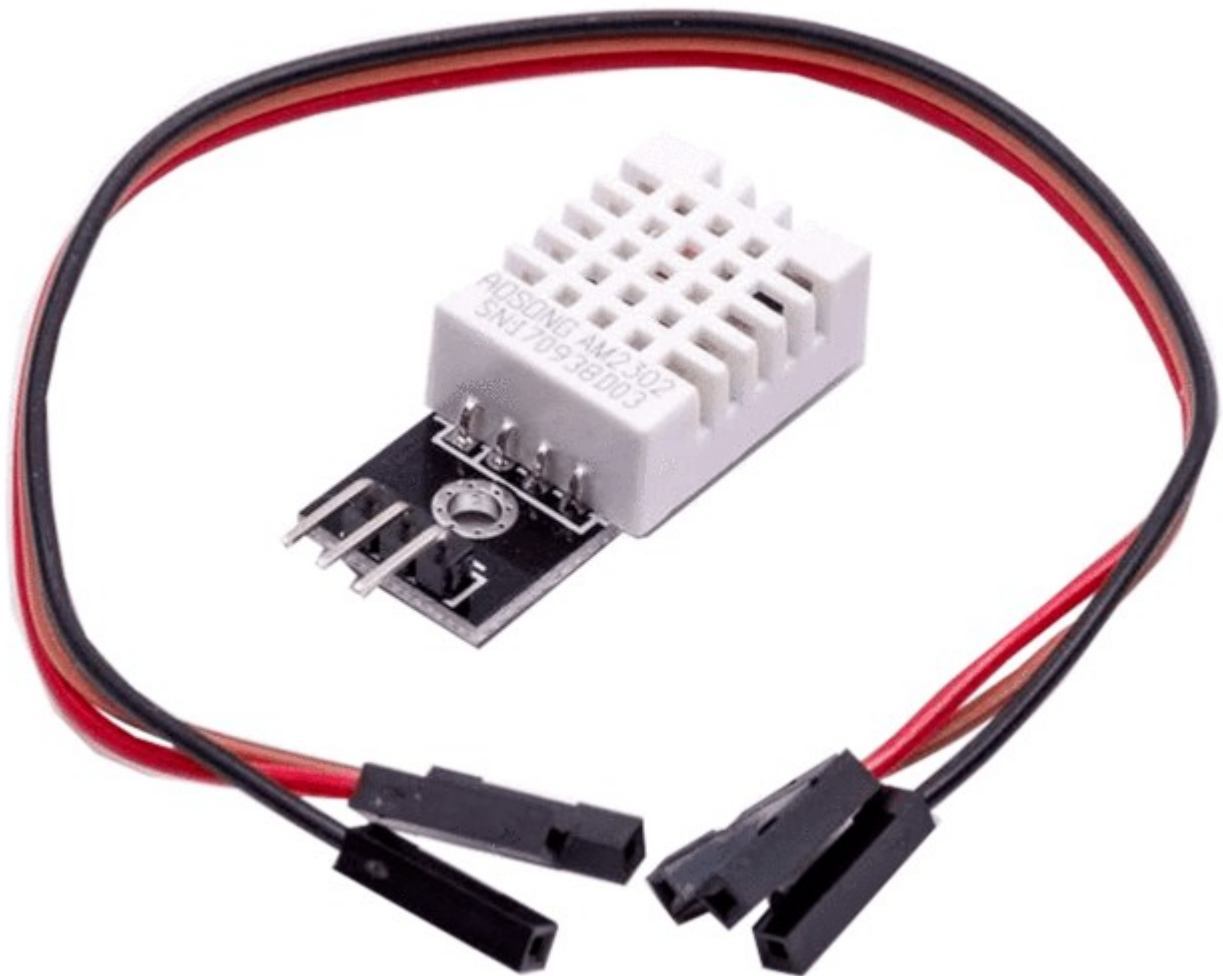


AZ-Delivery

Welcome!

Thank you very much for purchasing our AZ-Delivery DHT22 Temperature module. On the following pages, we will introduce you to how to use and setup this handy device.

Have fun!





The DHT-22 (also named as AM2302) is a relative humidity/temperature sensor that outputs a digital signal. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air.

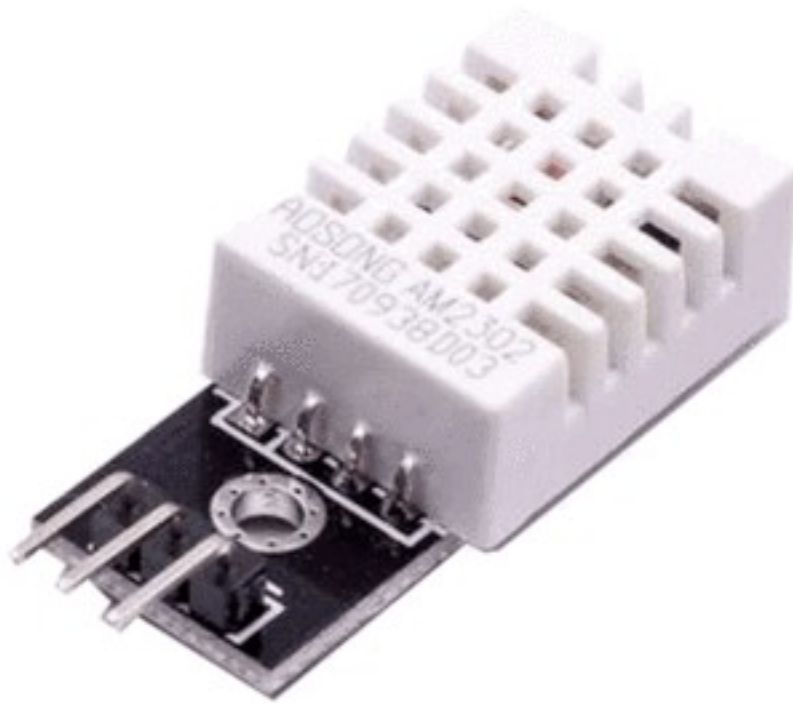
Temperature measuring range of the DHT22 is from -40°C to $+125^{\circ}\text{C}$ with ± 0.5 degrees accuracy, and humidity measuring range, from 0% to 100% with accuracy from 2% to 5%.

Technical Specifications:

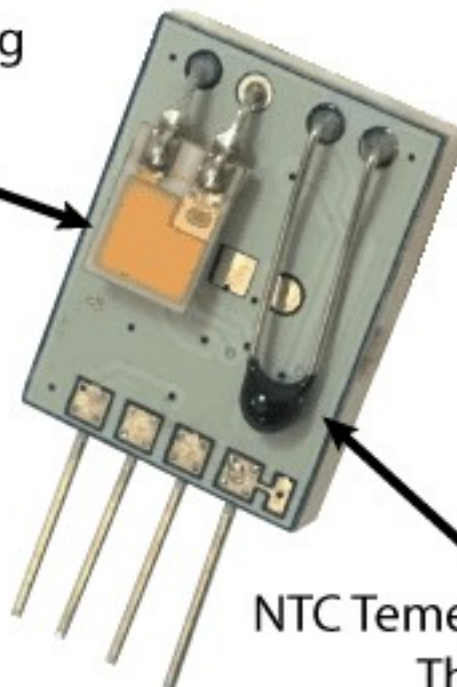
Operating Voltage:	3 to 5V
Max Operating Current:	2.5mA max
Humidity Range:	0% - 100% with accuracy of 2 - 5%
Temperature Range:	-40°C - 125°C with accuracy of $\pm 0.5^{\circ}\text{C}$
Sampling Rate:	0.5Hz (reading every 2s)
Dimensions:	15x38x9mm

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Inside the case, on the sensing side of DHT22 sensor, there is a humidity sensing component along with a NTC temperature sensor (or thermistor).

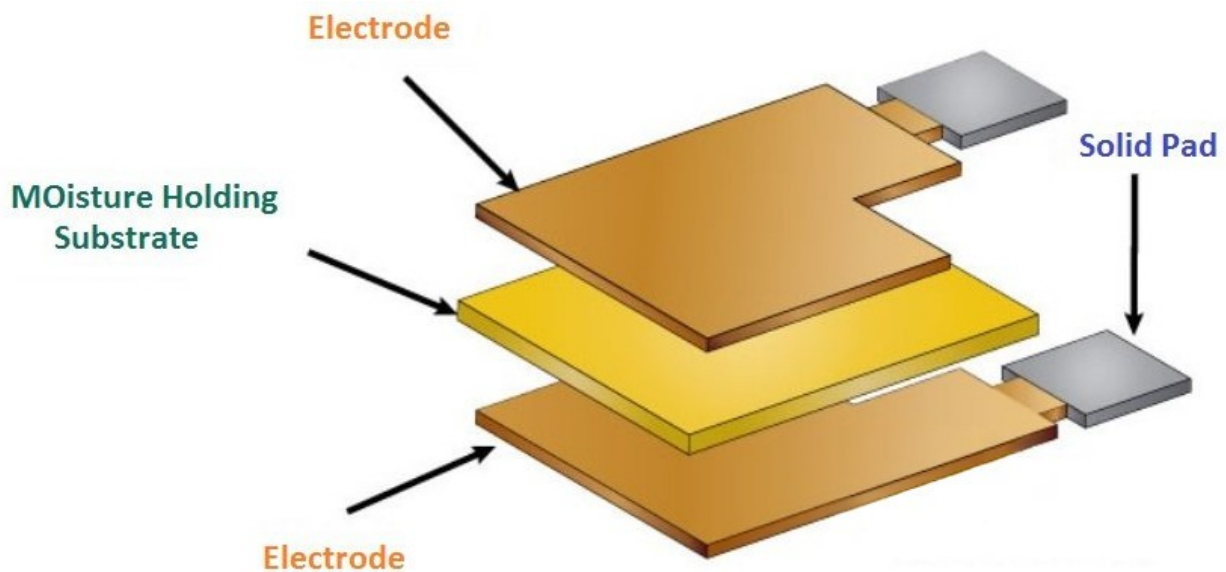


Humidity Sensing
Component



NTC Temperature Sensor
Thermistor

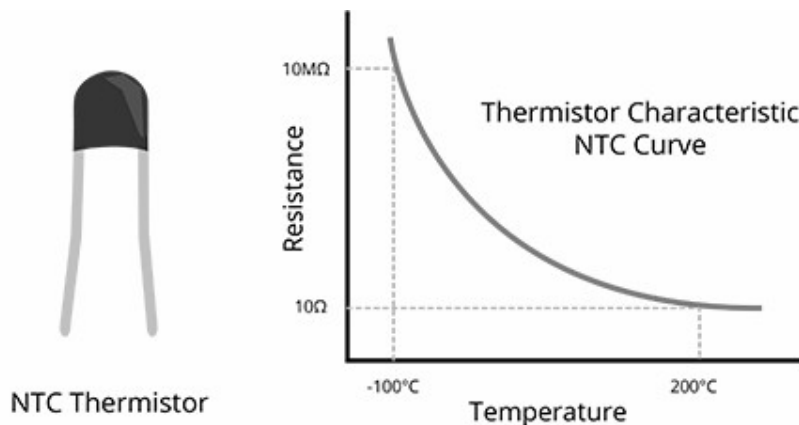
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Humidity sensing component is used, of course to measure humidity, which has two electrodes with moisture holding substrate (usually a salt or conductive plastic polymer) sandwiched between electrodes. The ions are released by the substrate as water vapor is absorbed by it, which in turn increases the conductivity between the electrodes. The change in resistance between the two electrodes is proportional to the relative humidity. Higher relative humidity decreases the resistance between the electrodes, while lower relative humidity increases the resistance between the electrodes.

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Temperature sensing part of the sensor consists of a NTC temperature sensor (thermistor) to measure temperature. A thermistor is a thermal resistor, a resistor that changes its resistance with temperature. Technically, all resistors are thermistors, their resistance changes slightly with temperature, but the change is usually small and difficult to measure. Thermistors are made so that the resistance changes drastically with temperature so that it can be 100Ω or more of change per degree of temperature. The term “NTC” means “*Negative Temperature Coefficient*”, which means that the resistance decreases with the increase of temperature.



On the other side, there is a small PCB with an 8-bit SOIC-14 packaged IC. This IC measures and processes the analog signal with stored calibration coefficients, does analog to digital conversion and outputs a digital signal with the data that contains information for temperature and humidity.

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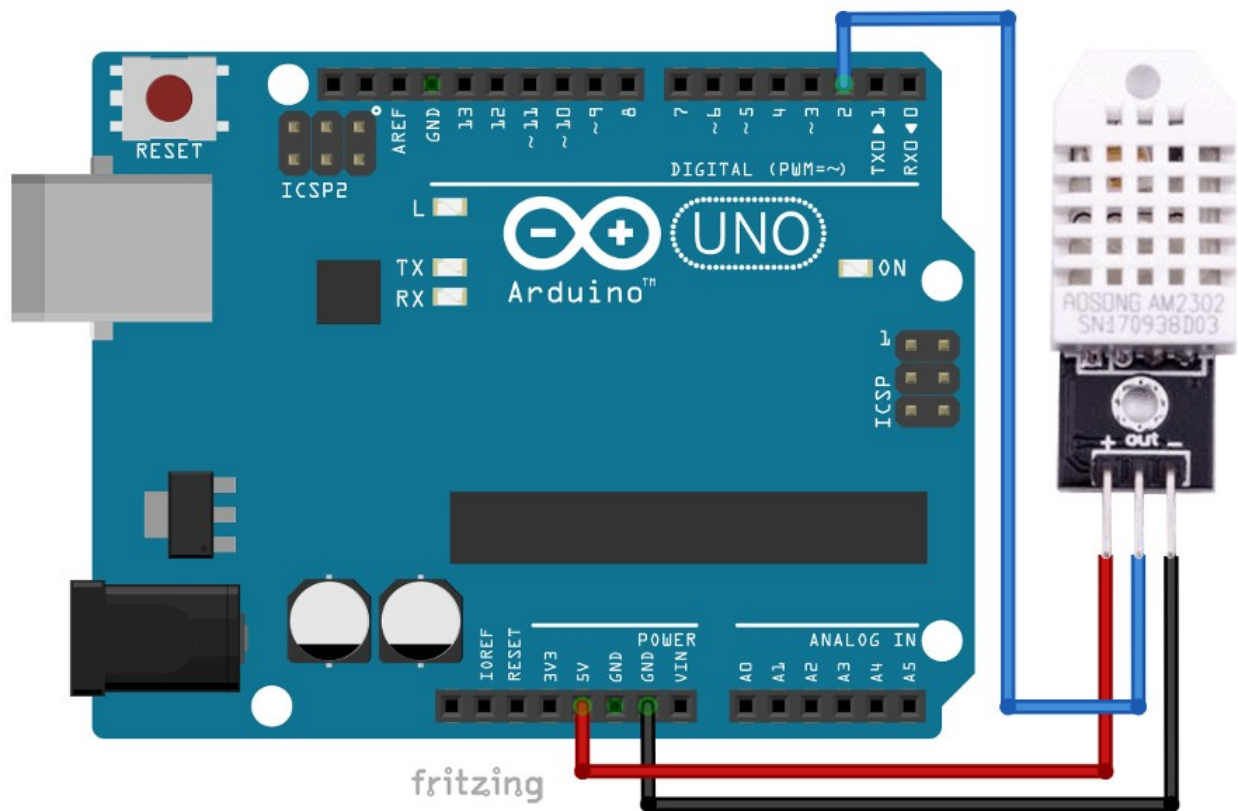
"+" pin - supplies power for the sensor. Although supply voltage can range between 3.3V and 5.5V, 5V supply is recommended. In case of 5V power supply, you can use cable that connect sensor and microcontroller as long as 20 meters. However, with 3.3V supply voltage, cable length shall not be greater than one meter. Otherwise, the line voltage drop will lead to errors in measurement.

"out" pin - is data pin, and is used to communication between the sensor and the microcontroller.

"-" pin - is ground pin and should be connected to the common ground, or 0V (on Arduino or Raspberry Pi).

Connecting the module with Arduino Uno

Connect Arduino Uno and DHT22 as shown on connection diagram below:



DHT22 pin > Arduino Uno pin

+ > 5V

out > D2

- > GND

Red Wire

Blue Wire

Black Wire



Arduino sketch example

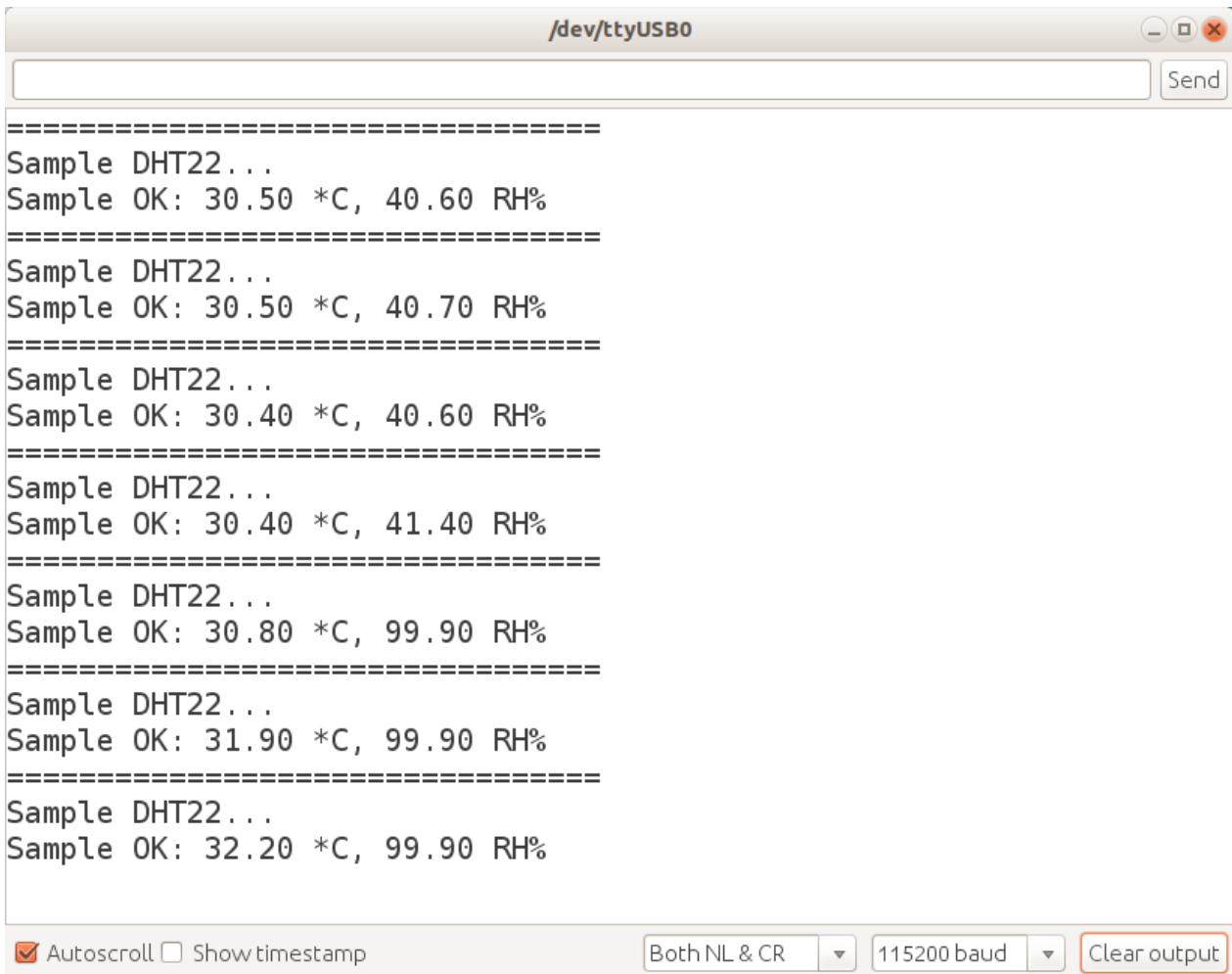
To write a sketch for DHT22 module we first need the library. The most simple library, we recommend, is SimpleDHT library which can be downloaded from: <https://github.com/winlinvip/SimpleDHT> .

When you download the “.zip” file, open Arduino Uno and go to: *Sketch > Include Library > Add .ZIP Library* and add the downloaded zip file. After this go to: *File > Examples > SimpleDHT > DHT22Default* and open that sketch. Here is the sketch:

```
#include <SimpleDHT.h>
int pinDHT22 = 2;
SimpleDHT22 dht22(pinDHT22);
void setup() { Serial.begin(115200); }
void loop() {
    Serial.println("=====");
    Serial.println("Sample DHT22...");
    float temperature = 0;
    float humidity = 0;
    int err = SimpleDHTErrSuccess;
    if((err=dht22.read2(&temperature, &humidity, NULL)) != SimpleDHTErrSuccess){
        Serial.print("Read DHT22 failed, err=");
        Serial.println(err);
        delay(2000);
        return;
    }
    Serial.print("Sample OK: ");
    Serial.print((float)temperature);
    Serial.print(" *C, ");
    Serial.print((float)humidity);
    Serial.println(" RH%");
    delay(2500); // DHT22 sampling rate is 0.5HZ.
}
```


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And when you open Serial Monitor (*Tools > Serial Monitor*), output should like this:



The screenshot shows a Serial Monitor window titled "/dev/ttyUSB0". The window contains a text area with the following output:

```
=====
Sample DHT22...
Sample OK: 30.50 *C, 40.60 RH%
=====
Sample DHT22...
Sample OK: 30.50 *C, 40.70 RH%
=====
Sample DHT22...
Sample OK: 30.40 *C, 40.60 RH%
=====
Sample DHT22...
Sample OK: 30.40 *C, 41.40 RH%
=====
Sample DHT22...
Sample OK: 30.80 *C, 99.90 RH%
=====
Sample DHT22...
Sample OK: 31.90 *C, 99.90 RH%
=====
Sample DHT22...
Sample OK: 32.20 *C, 99.90 RH%
```

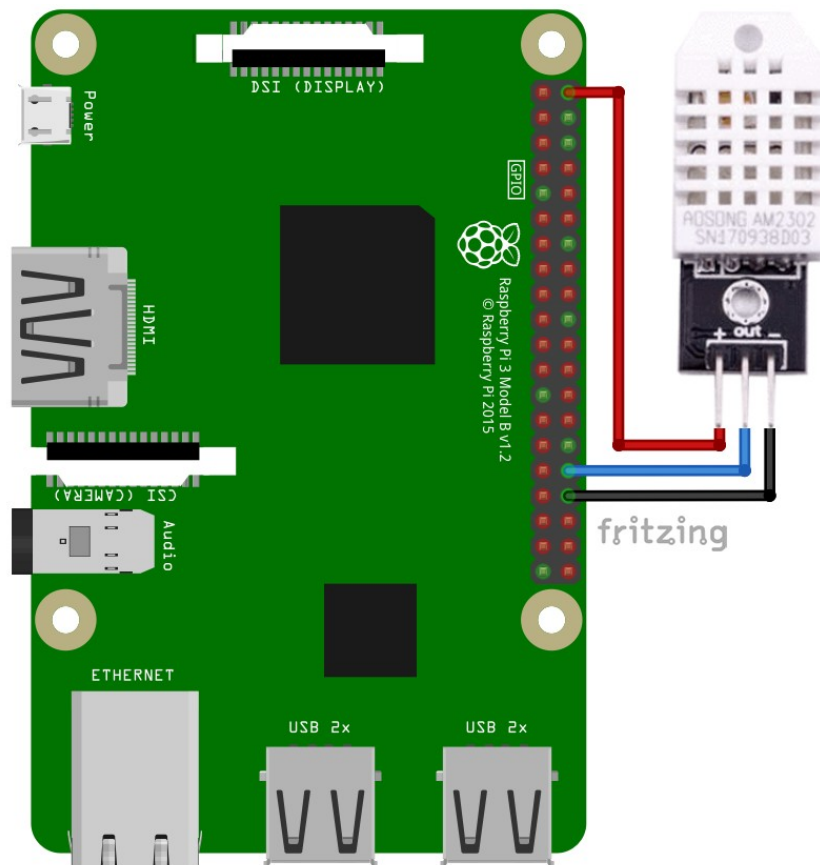
At the bottom of the window, there are several controls:

- ☒ Autoscroll ☐ Show timestamp
- Both NL & CR (dropdown menu)
- 115200 baud (dropdown menu)
- Clear output (button)

Just make sure that baud rate is set to 115200!

Connecting the module with Raspberry Pi

Connect Raspberry Pi and DHT22 as shown on connection diagram below:



DHT22 pin	>	Raspberry Pi pin
+	>	5V [PIN 2]
out	>	GPIO12 [PIN 32]
-	>	GND [PIN 30]

Red Wire

Blue Wire

Black Wire



Script example

Before we start creating scripts for DHT22, we first have to install a library. The library we are going to use is called *"Adafruit_DHT"*. To install it we first need to make sure Rasbian is up to date. Start your Raspberry Pi, open terminal and run these commands:

First command is for making the system up to date:

```
sudo apt-get update && sudo apt-get upgrade -y
```

Second command is for installing python3-pip app. We will use pip app to install library:

```
sudo apt-get install python3-pip
```

Third command is for installing other apps that pip app uses during installation:

```
sudo python3 -m pip install --upgrade pip setuptools wheel
```

And after this is completed, we can install library that we need. Run this command in terminal:

```
sudo pip3 install Adafruit_DHT
```

A screenshot of a terminal window on a Raspberry Pi. The prompt is 'pi@raspberrypi:~ \$'. The user enters 'sudo pip3 install Adafruit_DHT'. The terminal output shows the process of looking in indexes, collecting the package, downloading it from a URL, and successfully installing it.

```
pi@raspberrypi:~ $ sudo pip3 install Adafruit_DHT
Looking in indexes: https://pypi.org/simple, https://www.piwheels.org/simple
Collecting Adafruit_DHT
  Downloading https://www.piwheels.org/simple/adafruit-dht/Adafruit_DHT-1.4.0-cp35-cp35m-linux_armv7l.whl
Installing collected packages: Adafruit-DHT
Successfully installed Adafruit-DHT-1.4.0
```

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After everything is installed, we can start writing a script. Open text editor in Rasbian, and copy-paste this script:

```
import Adafruit_DHT
from time import sleep
sensor = Adafruit_DHT.DHT22
# DHT22 sensor connected to GPIO12.
pin = 12
print("[press ctrl+c to end the script]")
try: # Main program loop
    while True:
        humidity, temperature = Adafruit_DHT.read_retry(sensor,
                                                         pin)

        sleep(2.5)
        if humidity is not None and temperature is not None:
            print("Temp={0:0.1f}*C  Humidity={1:0.1f}%"
                  .format(temperature, humidity))
        else:
            print("Failed to get reading. Try again!")

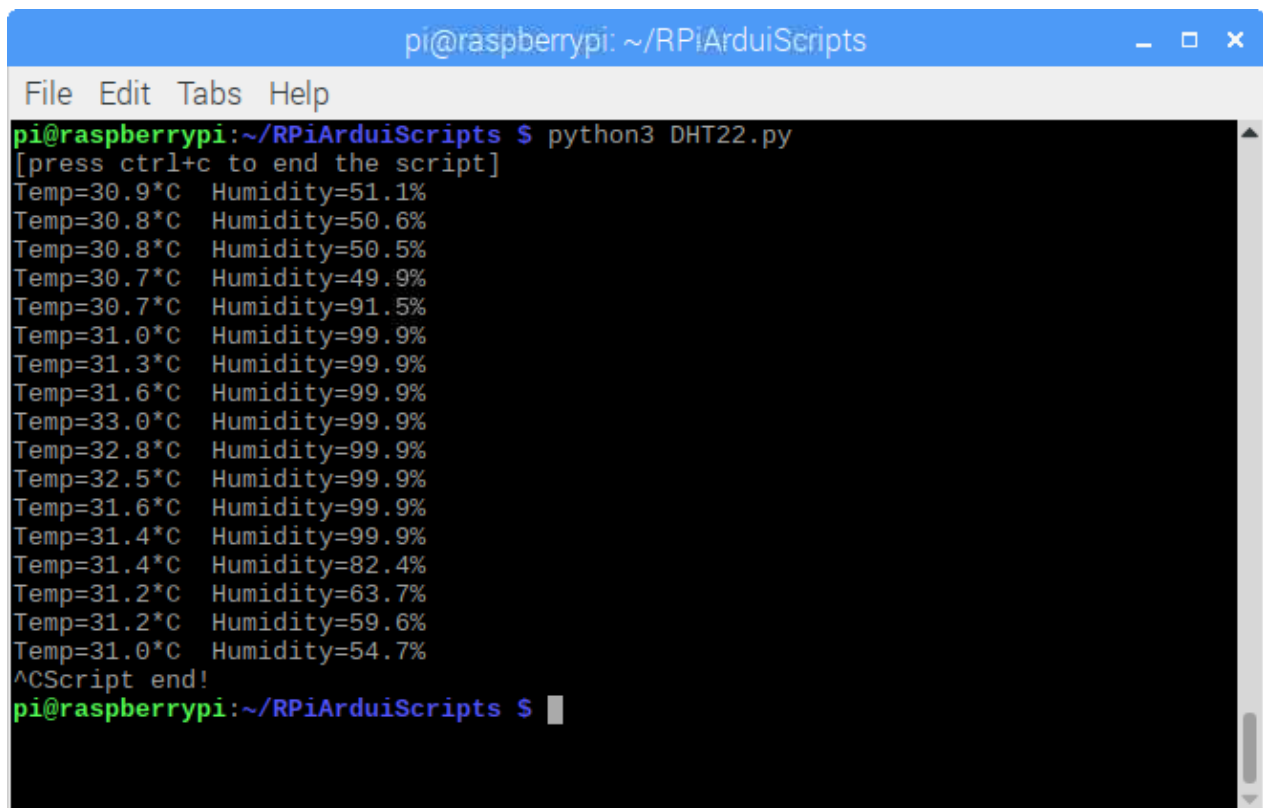
# Scavenging work after the end of the program
except KeyboardInterrupt:
    print("Script end!")
```

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Save this script as "*DHT22.py*" and to run it, run this command in terminal:

```
python3 DHT22.py
```

And the output should look like this:



```
pi@raspberrypi: ~/RPiArduiScripts
File Edit Tabs Help
pi@raspberrypi:~/RPiArduiScripts $ python3 DHT22.py
[press ctrl+c to end the script]
Temp=30.9°C Humidity=51.1%
Temp=30.8°C Humidity=50.6%
Temp=30.8°C Humidity=50.5%
Temp=30.7°C Humidity=49.9%
Temp=30.7°C Humidity=91.5%
Temp=31.0°C Humidity=99.9%
Temp=31.3°C Humidity=99.9%
Temp=31.6°C Humidity=99.9%
Temp=33.0°C Humidity=99.9%
Temp=32.8°C Humidity=99.9%
Temp=32.5°C Humidity=99.9%
Temp=31.6°C Humidity=99.9%
Temp=31.4°C Humidity=99.9%
Temp=31.4°C Humidity=82.4%
Temp=31.2°C Humidity=63.7%
Temp=31.2°C Humidity=59.6%
Temp=31.0°C Humidity=54.7%
^CScript end!
pi@raspberrypi:~/RPiArduiScripts $
```

You've done it, you can now use your module for your projects.



Now it is time to learn and make the Projects on your own. You can do that with the help of many example scripts and other tutorials, which you can find on the internet.

If you are looking for the high quality products for Arduino and Raspberry Pi, AZ-Delivery Vertriebs GmbH is the right company to get them from. You will be provided with numerous application examples, full installation guides, eBooks, libraries and assistance from our technical experts.

<https://az-delivery.de>

Have Fun!

Impressum

<https://az-delivery.de/pages/about-us>