Experiment - 6

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Semester: 6th semester **Subject: Internet of Things**

Aim:

Interfacing of Arduino/Raspberry Pi with temperature and humidity sensor with real time application.

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Objective:

1. Learn about temperature and humidity Sensors.
2. Learn about IoT programming.

Components Required:

You will need the following components –

- Arduino Uno R3 board
- Breadboard
- Jumper Wires
- DH11 Temperature and Humidity Sensor
- USB or 5V Power Supply

About DH11 Sensor:

DHT11 Module features a temperature & humidity sensor complex with a calibrated digital signal output. The exclusive digital-signal-acquisition technique and temperature & humidity sensing technology ensure high reliability and excellent long-term stability. This sensor includes an NTC for temperature measurement and a resistive-type humidity measurement component for humidity measurement. These are connected to a high-performance 8-bit microcontroller, offering excellent quality, fast response, anti-interference ability, and cost-effectiveness.

DHT11 Module Pinout

The DHT11 module has a total of 3 pins. In which two are for power and one is for communication. The pinout of a DHT11 Sensor module is as follows:

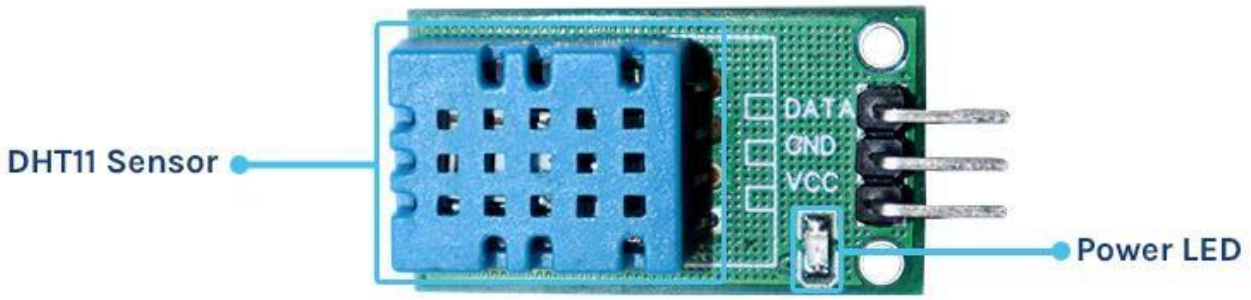
DATA Data pin for 1-wire communication.

GND Ground Connected to Ground pin of the Arduino.

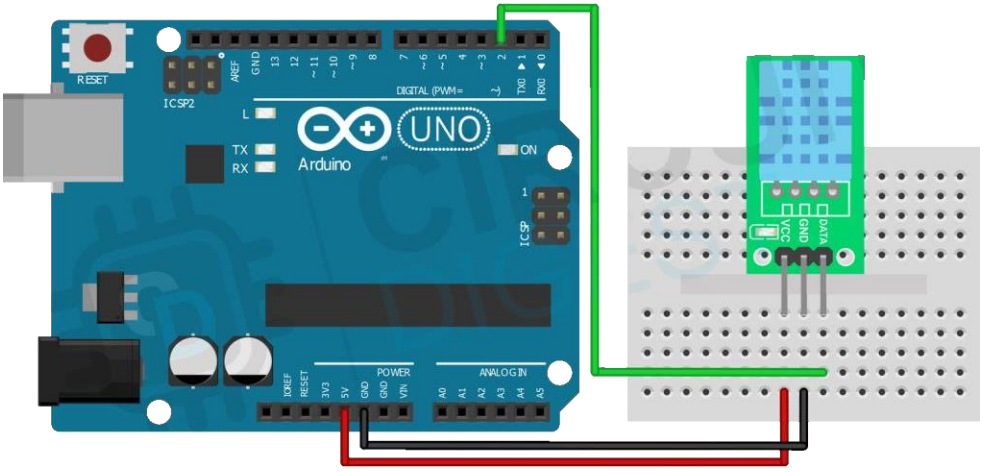
VCC Provides power for the module, Connect to the 5V pin of the Arduino.

DHT11 Module Parts

The DHT11 module has only a very low number of parts that includes the DHT11, pullup resistor, bypass capacitor, and power led with a current limiting resistor.



Circuit Diagram:



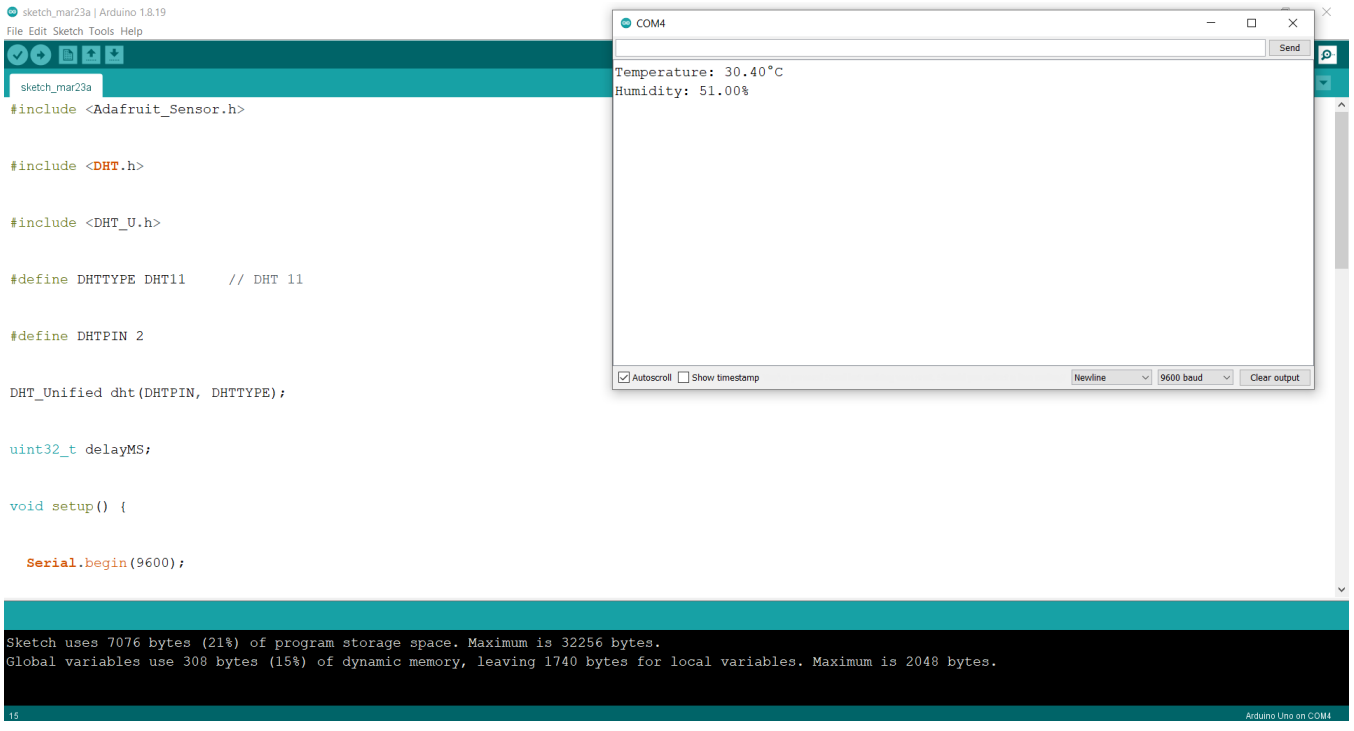
Connections are pretty simple and only require three wires. Connect the VCC and GND of the module to the 5V and GND pins of the Arduino. Then connect the DATA pin to the Arduino's digital pin 2. We communicate with DHT11 through this pin.

Arduino Code (Output in Serial monitor):

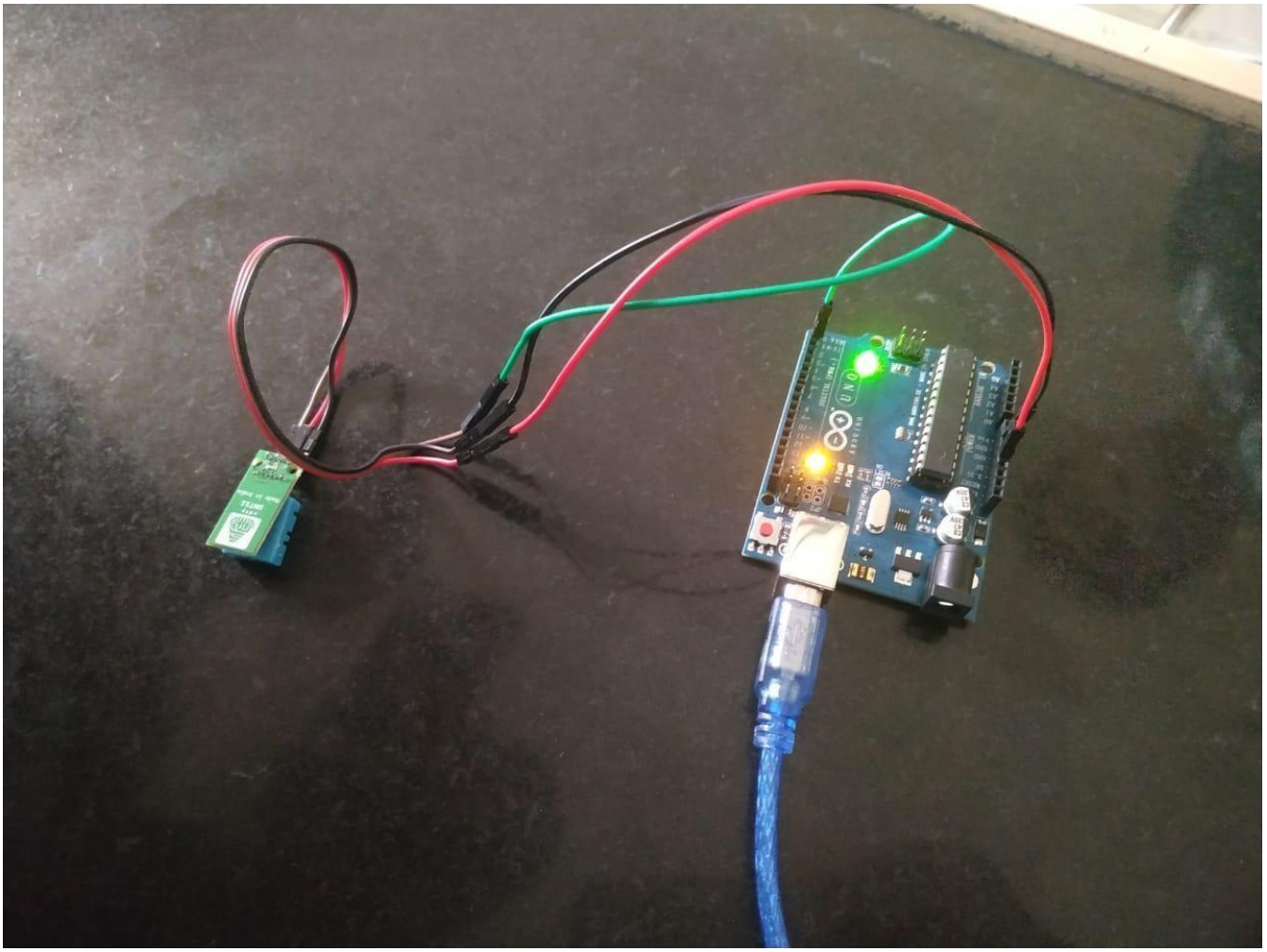
```
#include <Adafruit_Sensor.h>
#include <DHT.h>
#include <DHT_U.h>
#define DHTTYPE DHT11     // DHT 11
#define DHTPIN 2
DHT_Unified dht(DHTPIN, DHTTYPE);
uint32_t delayMS;
```

```
void setup() {
  Serial.begin(9600);
  dht.begin();
  sensor_t sensor;
  delayMS = sensor.min_delay / 10000;
}
void loop()
{
  sensors_event_t event;
  dht.temperature().getEvent(&event);
  Serial.print(F("Temperature: "));
  Serial.print(event.temperature);
  Serial.println(F("°C"));
  dht.humidity().getEvent(&event);
  Serial.print(F("Humidity: "));
  Serial.print(event.relative_humidity);
  Serial.println(F("%"));
  delay(delayMS);
}
```

Output (in Serial Monitor):



Output:



Learning Outcomes:

- Learn about IoT based simulations.
- Learn about temperature and humidity Sensors.
- These devices are used to provide the actual humidity condition within the air at any given point or in any given place.
- A temperature monitoring system allows a company to track the environmental parameters on a secure web/mobile-based platform