Lesson 14 DHT11 Temperature and Humidity Sensor

Introduction

In this lesson,you will learn how to use a DHT11 Temperature and Humidity Sensor.

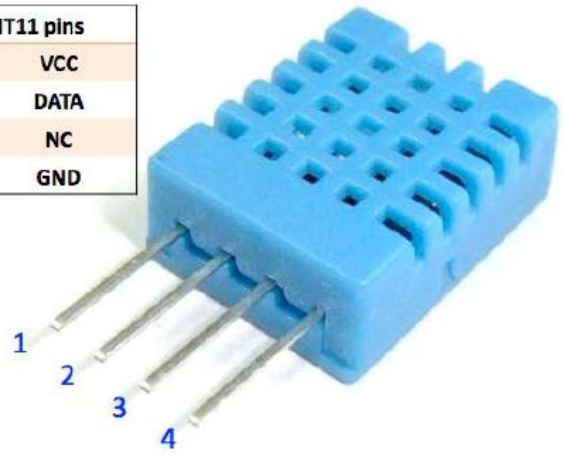
Hardware Required

- ✓ 1 * RexQualis UNO R3
- ✓ 1 * DHT11 Temperature and Humidity module
- ✓ 3 * F-M Jumper Wires

Principle

DHT11 Temperature and Humidity Sensor

DHT11 pins	
1	VCC
2	DATA
3	NC
4	GND



DHT11 output calibrated digital signal. It applies exclusive digital-signal-colle cting-technique and humidity sensing technology, assuring its reliability and st ability. Its sensing elements are connected with an 8-bit single-chip computer. Every sensor of this model is temperature compensated and calibrated in an accurate calibration chamber and the calibration-coefficient is saved in the

type of program in OTP memory when the sensor is detecting, it will cite the coefficient from memory.

Small size & low consumption & long transmission distance(100m) enable DH T11 to be suited in all kinds of
harsh application occasions. Single-row packaged with four pins, making the c onnection very convenient.

Supply voltage: DC 3.3 to 5.5V

Measuring range (T) : -20 to +60 Celsius(-4 to +140 Fahrenheit)

Measuring range (RH): 5 to 95% relative humidity

Typ. Temperature accuracy: ±2 Celsius

Typ. Humidity accuracy: ±5%RH at 25 Celsius

Long term drift(T): <1 Celsius/year

Long term drift(RH) : <1%RH/year

Resolution(T): 0.1 Celsius

Resolution(RH): 1%RH

Sensor Type: Capacitive sensor

Interface: One line digital

Housing material: ABS

Net weight: 1g

Code interpretation

```
#define DHT11_PIN 0 // pin A0

byte read_dht11_dat()

{
```

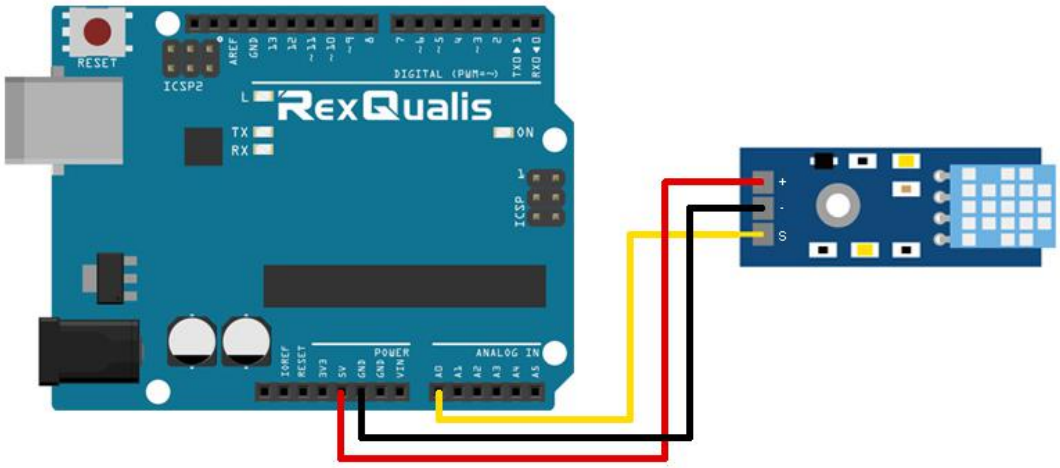
```
  byte i = 0;
  byte result=0;
  for(i=0; i< 8; i++){
  while(!(PINC & _BV(DHT11_PIN))); // wait for 50us
  delayMicroseconds(30);
  if(PINC & _BV(DHT11_PIN))
  result |=(1<<(7-i));
  while((PINC & _BV(DHT11_PIN))); // wait '1' finish
  }
  return result;
}
void setup()
{
  DDRC |= _BV(DHT11_PIN);
  PORTC |= _BV(DHT11_PIN);
  Serial.begin(19200);
  Serial.println("Ready");
}
void loop()
{
  byte dht11_dat[5];
  byte dht11_in;
```

```
byte i;
// start condition
// 1. pull-down i/o pin from 18ms
PORTC &= ~_BV(DHT11_PIN);
delay(18);
PORTC |= _BV(DHT11_PIN);
delayMicroseconds(40);
DDRC &= ~_BV(DHT11_PIN);
delayMicroseconds(40);
dht11_in= PINC & _BV(DHT11_PIN);
if(dht11_in){
Serial.println("dht11 start condition 1 not met");
return;
}
delayMicroseconds(80);
dht11_in = PINC & _BV(DHT11_PIN);
if(!dht11_in){
Serial.println("dht11 start condition 2 not met");
return;
}
delayMicroseconds(80);
// now ready for data reception
```

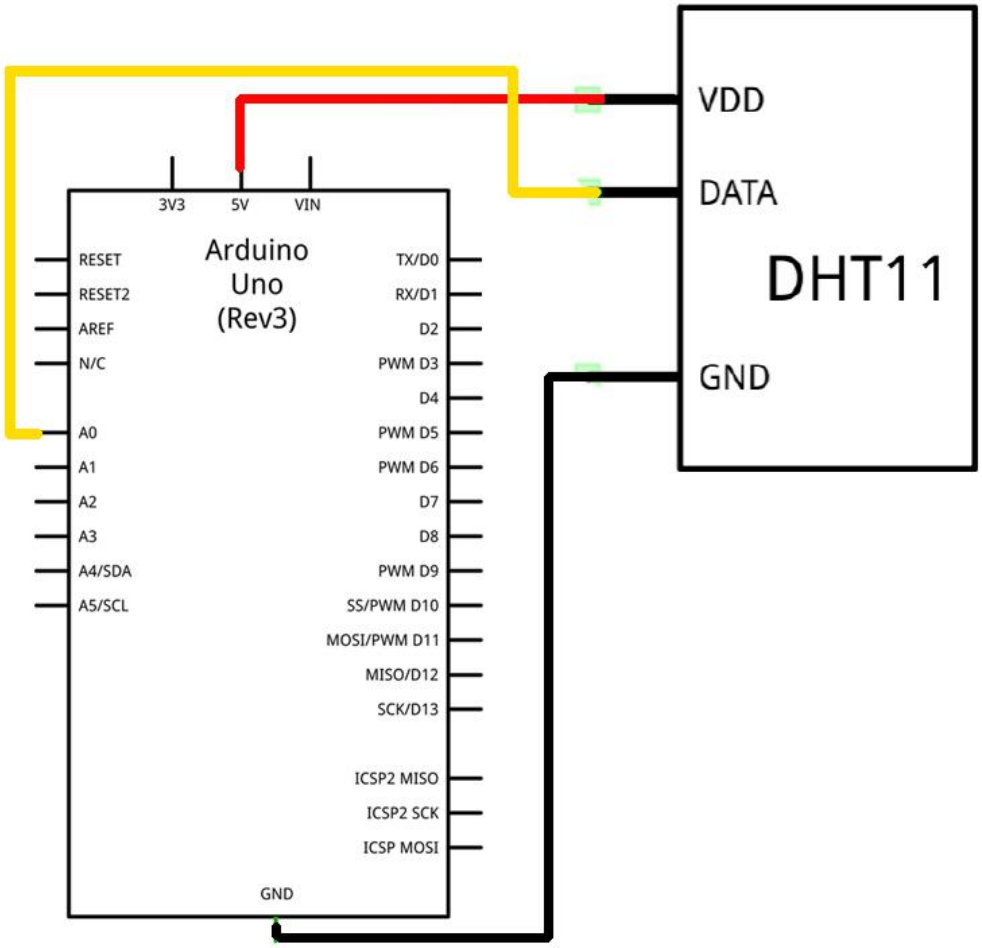
```
  for (i=0; i<5; i++)
  dht11_dat[i] = read_dht11_dat();
  DDRC |= _BV(DHT11_PIN);
  PORTC |= _BV(DHT11_PIN);
  byte dht11_check_sum =
dht11_dat[0]+dht11_dat[1]+dht11_dat[2]+dht11_dat[3];
  // check check_sum
  if(dht11_dat[4]!= dht11_check_sum)
  {
  Serial.println("DHT11 checksum error");
  }
  Serial.print("Current humdity = ");
  Serial.print(dht11_dat[0], DEC);
  Serial.print(".");
  Serial.print(dht11_dat[1], DEC);
  Serial.print("% ");
  Serial.print("temperature = ");
  Serial.print(dht11_dat[2], DEC);
  Serial.print(".");
  Serial.print(dht11_dat[3], DEC);
  Serial.println("C ");
  delay(2000);
}
```

Experimental Procedures

Step 1:Build the circuit

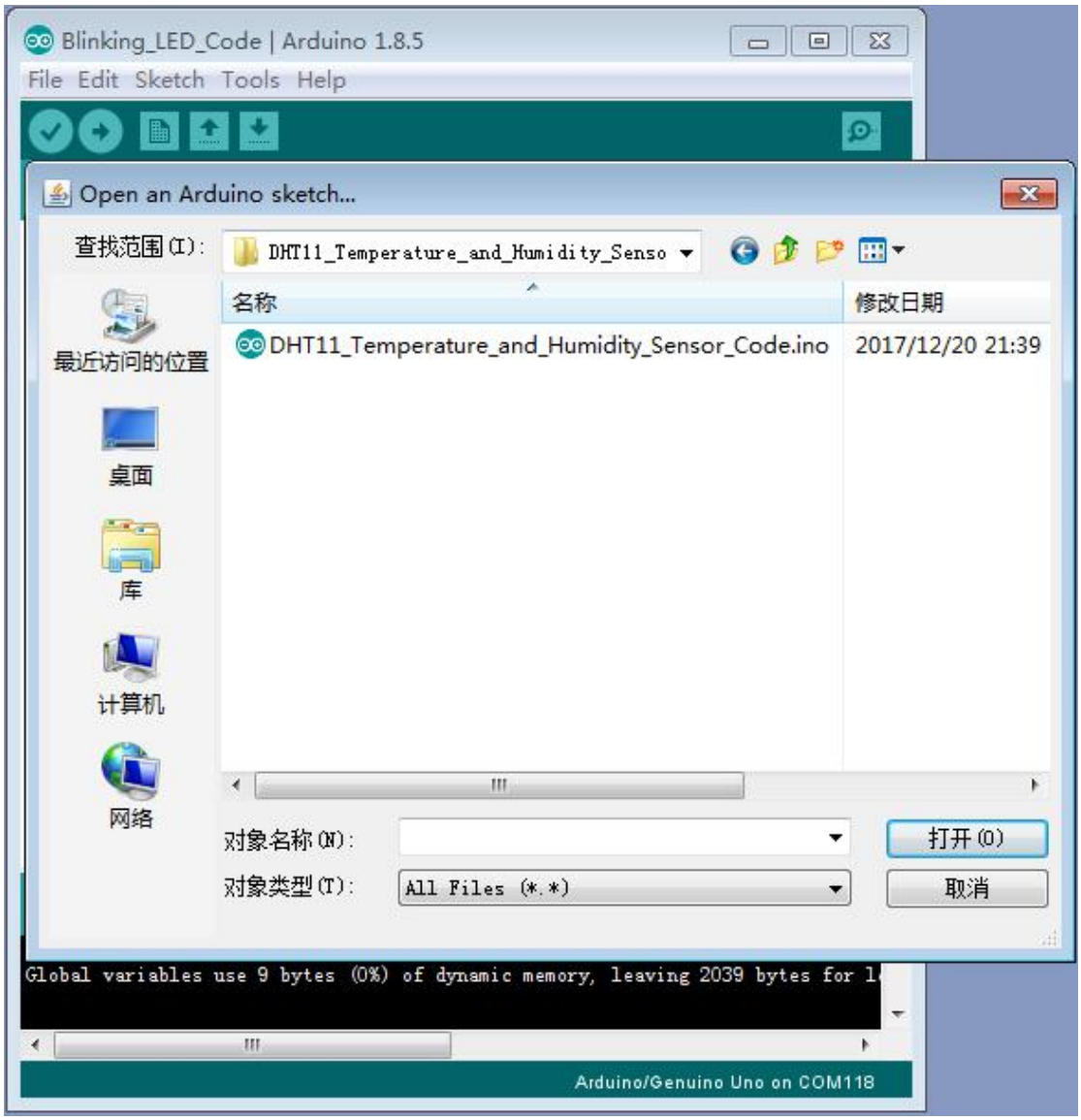


Schematic Diagram



Step 2: Open the code:

DHT11_Temperature_and_Humidity_Sensor_Code

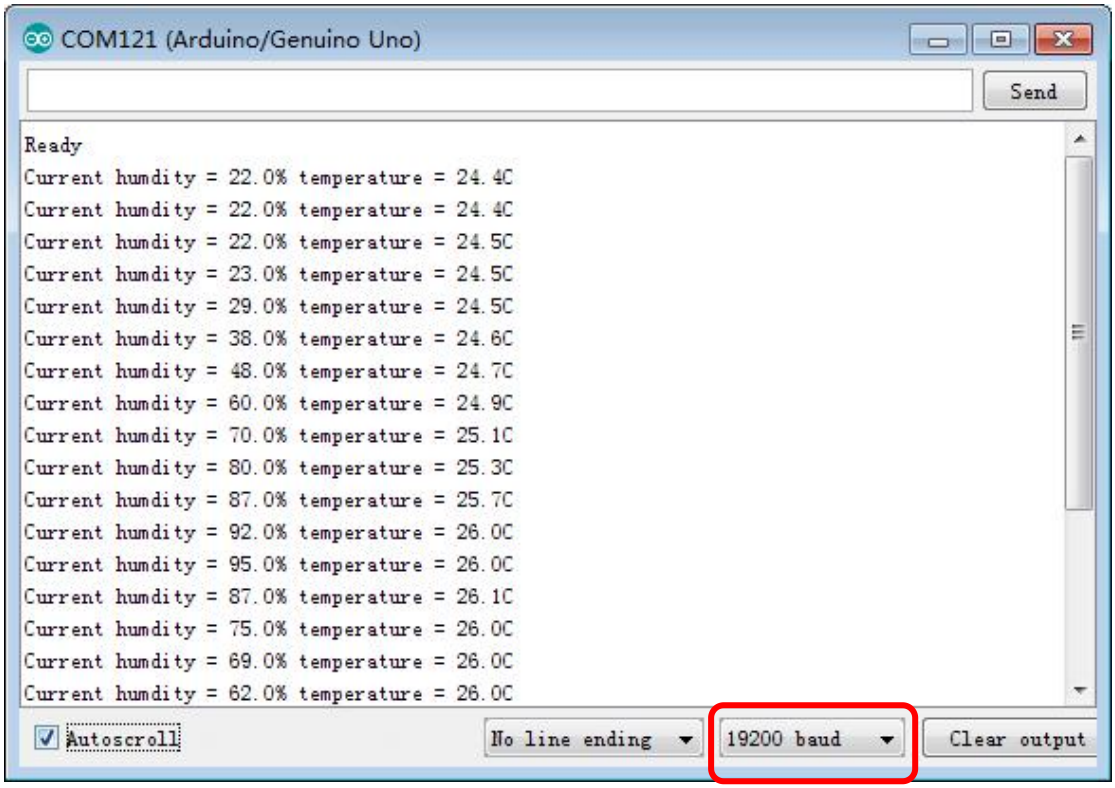


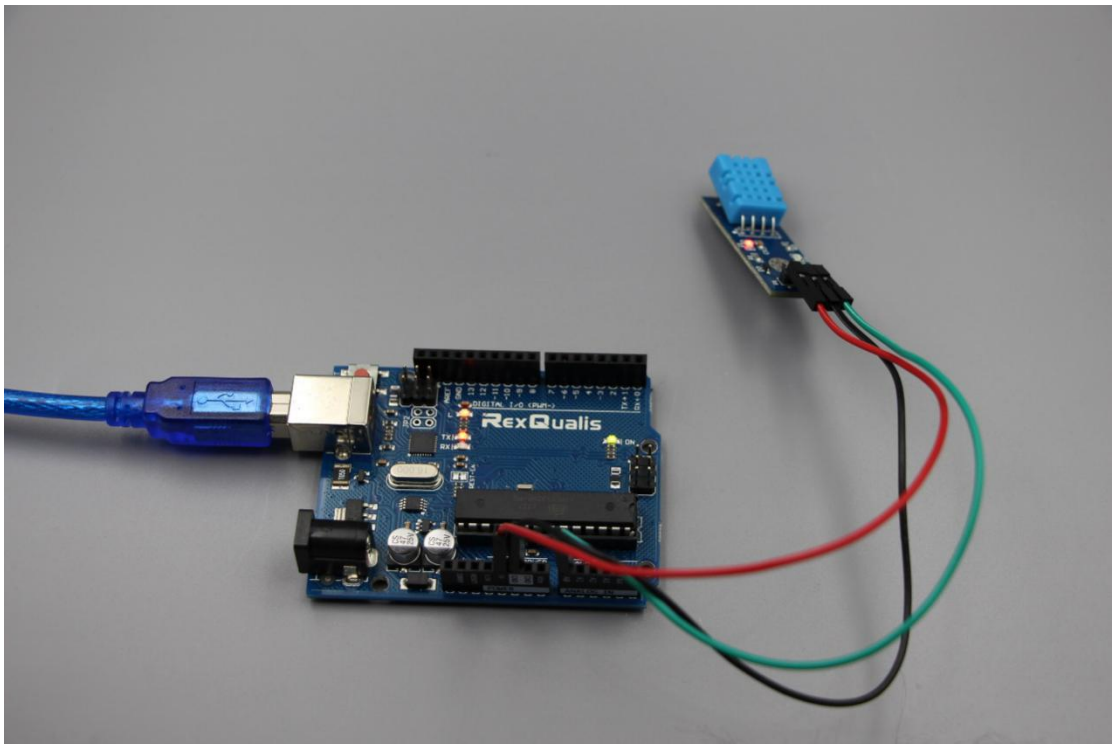
Step 3: Attach Arduino UNO R3 board to your computer via USB cable and check that the 'Board Type' and 'Serial Port' are set correctly.

Step 4: Upload the code to the RexQualis UNO R3 board.

Step 5: Open the Serial Monitor,alter the baud rate to 19200, then you can see the data as below:

(How to use the Serial Monitor is introduced in details in Lesson 0 Preface)





If it isn’t working, make sure you have assembled the circuit correctly, verified and uploaded the code to your board. For how to upload the code and install the library, check Lesson 0

Preface.