Course 11 ---Sensible heat light

The purpose of the experiment:

In this course, we use sensor -- thermistor to control PWM by controlling the change of thermistor resistance value, so as to control the brightness of LED light.

Introduction of thermistor:

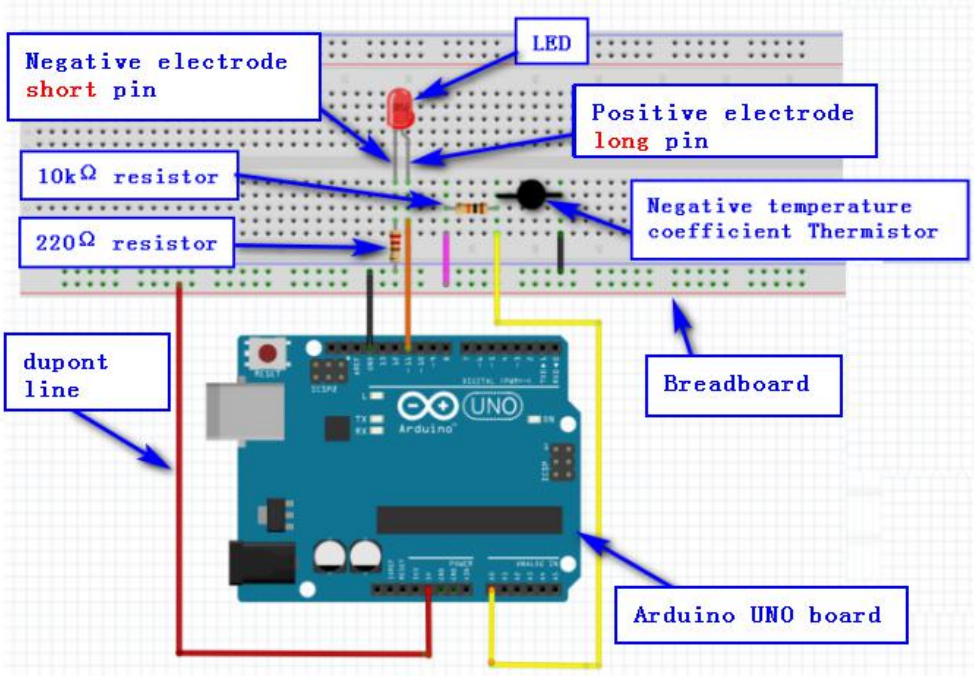
Thermistor is a kind of sensitive element, which can be divided into positive temperature coefficient thermistor (PTC) and negative temperature coefficient thermistor (NTC) according to different temperature coefficient. The typical characteristic of thermistors is that they are sensitive to temperature and show different resistance values at different temperatures. Resistance value of positive temperature coefficient (PTC) thermistor will become higher when the higher the temperature, Resistance value of negative temperature coefficient (NTC) thermistor will become lower when the higher the temperature. They are both semiconductor devices.

List of components required for the experiment:

Arduino UNO board *1
USB cable *1
Negative temperature coefficient Thermistor*1
220Ω resistor *1
10kΩ resistor *1
LED *1
Breadboard *1
Dupont line *1 bunch

Actual object connection diagram:

We need to connect the circuit as shown in the figure below.

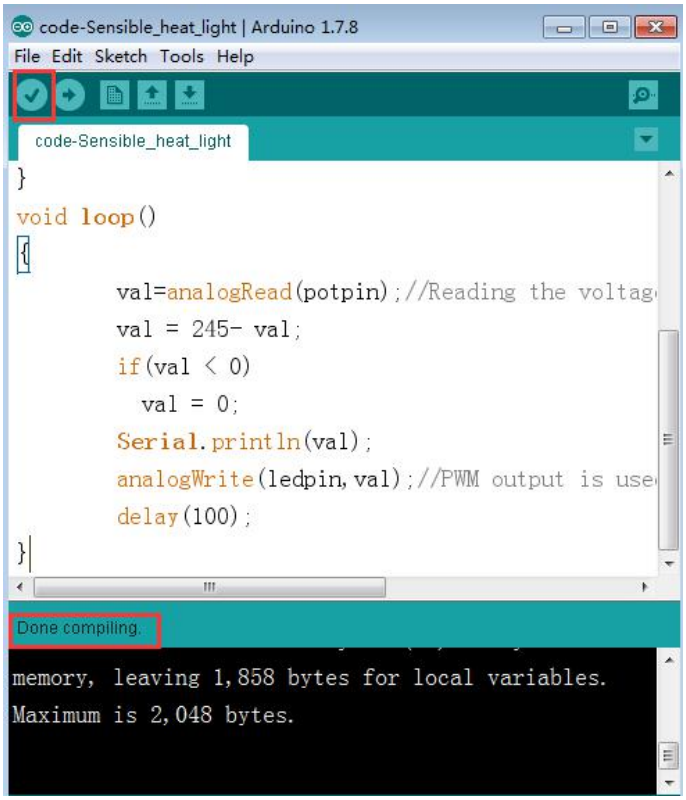


Experimental code analysis:

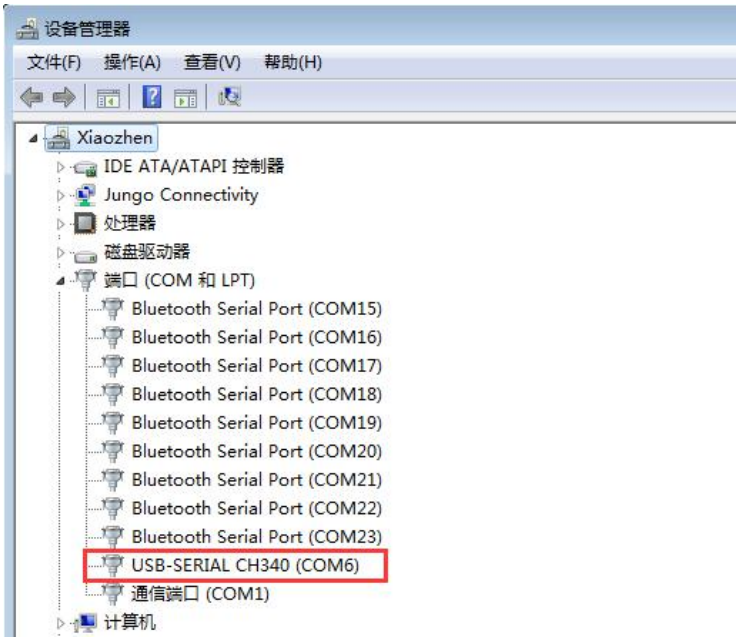
```
int potpin=0;      //Defining the analog port A0
int ledpin=11;     //Defining the digital port 11(for output PWM)
int val=0;      //Defining Variable val
void setup()
{
      pinMode(ledpin,OUTPUT);    //Defining the port11 for the output port
      Serial.begin(9600);    //The baud rate is 9600
}
void loop()
{
      val=analogRead(potpin);      //Reading the voltage value of the A0 port and assign it to val
      val = 245- val;
            if(val < 0)
               val = 0;
      Serial.println(val);
      analogWrite(ledpin,val);    //PWM output is used to drive LED
      delay(100);
}
```

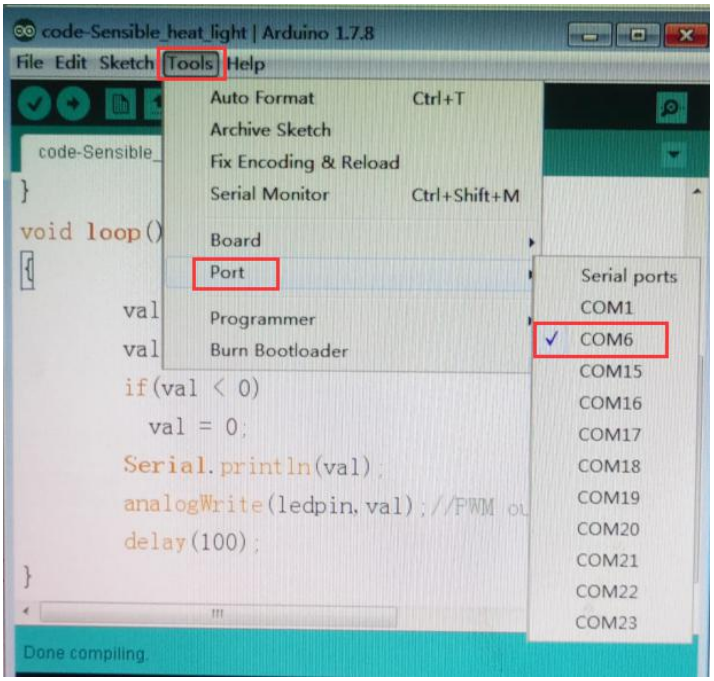
Experimental steps:

1.We need to open the code of this experiment: **code-Sensible_heat_light.ino**, click “ √ ” under the menu bar to compile the code, and wait for the word "**Done compiling** " in the lower right corner, as shown in the figure below.

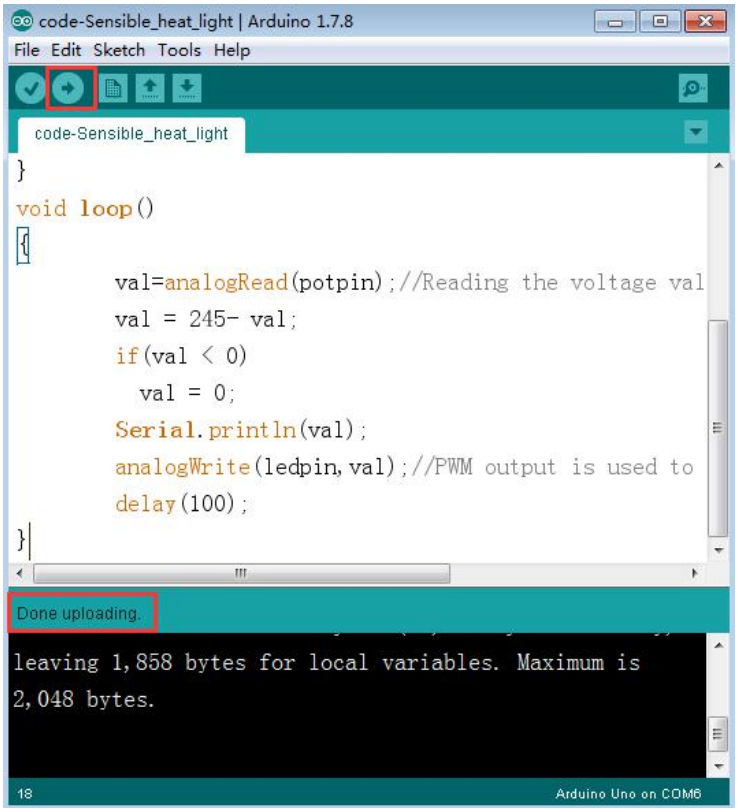


2. In the menu bar of Arduino IDE, we need to select 【Tools】---【Port】--- selecting the port that the serial number displayed by the device manager just now, as shown in the figure below. For example:COM6,as shown in the following figure.

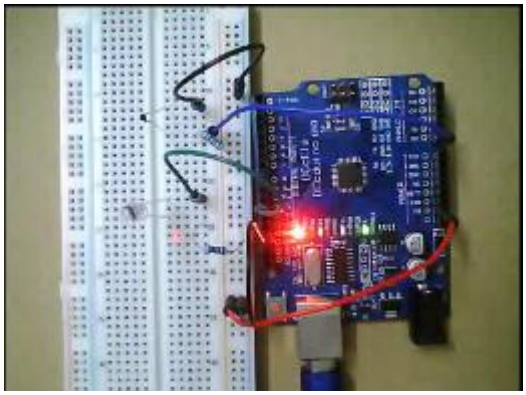


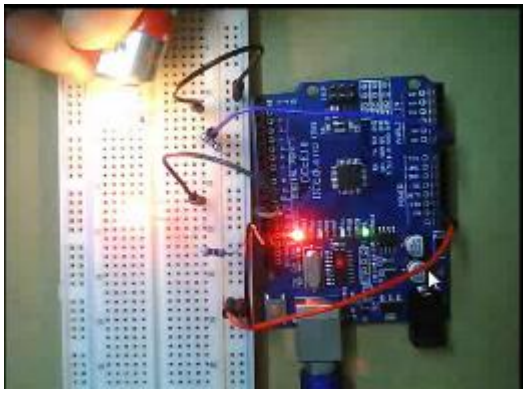


3.After the selection is completed, you need to click "→"under the menu bar to upload the code to the Arduino UNO board. When the word "**Done uploading**" appears in the lower left corner, the code has been successfully uploaded to the Arduino UNO board, as shown in the figure below.



4. After the code is uploaded. When we do not heat the thermistor, the LED extinguish. When we heat the thermistor, the LED will bright, and the brightness of the LED will change with the change of the heat of the thermistor. At the same time, we can open the serial port monitor, and we can also see the change of the voltage value at both ends of the LED, as shown in the following figure.





The code of the experiment: