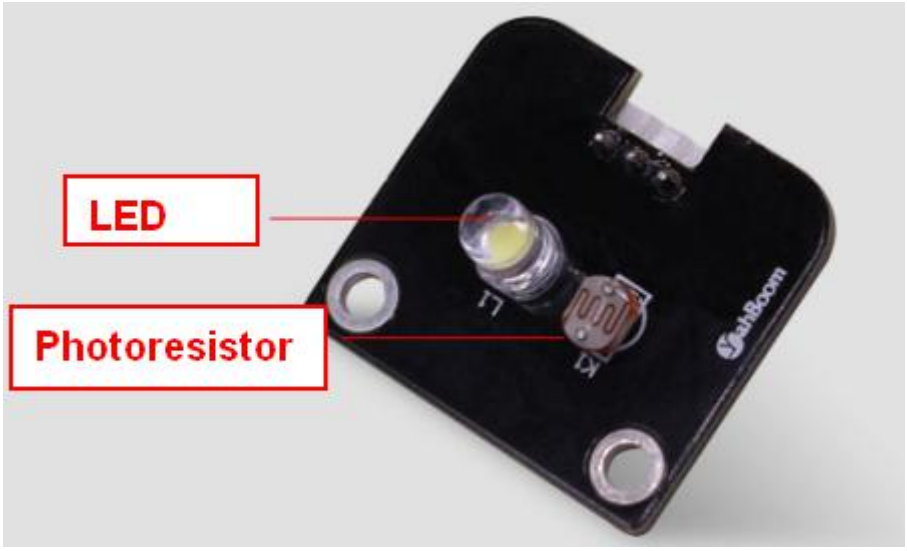
The purpose of the experiment:

In this course we mainly study the use of Grayscale module.

The actual object is shown below.



List of components required for the experiment:

Arduino UNO board *1

USB cable *1

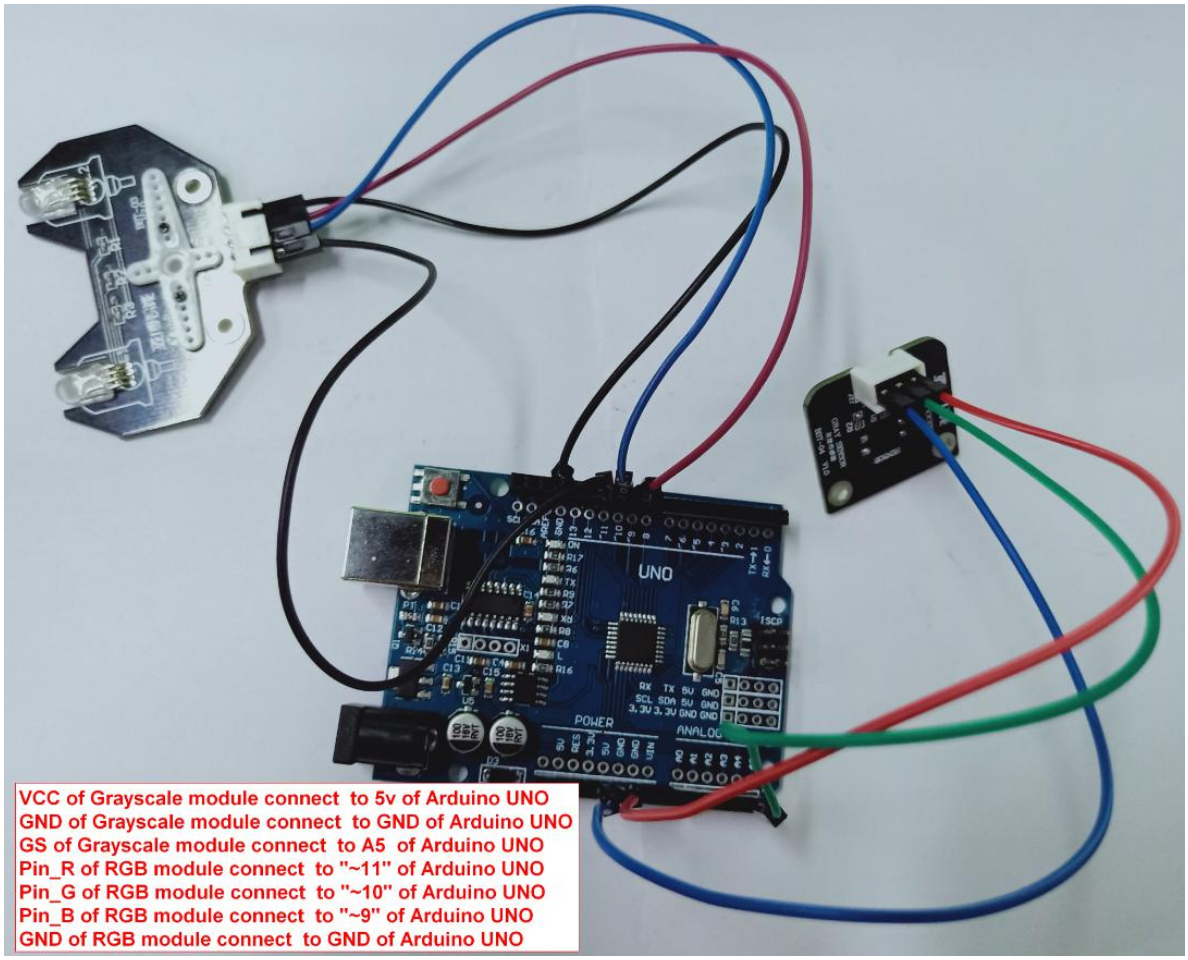
Grayscale module *1

RGB module *1

Dupont line *1 bunch

Actual object connection diagram:

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



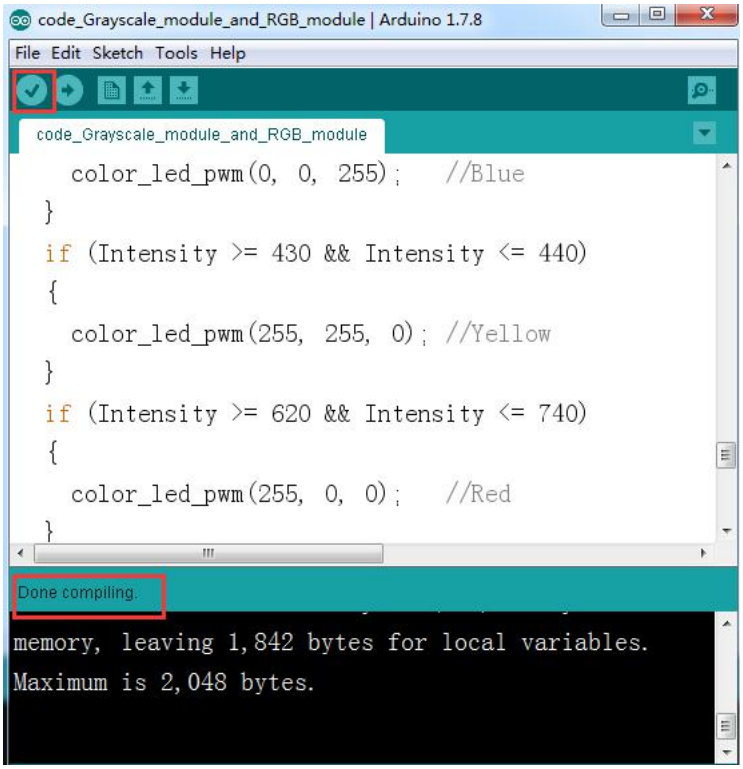
Experimental code analysis:

```
#define ON 1
#define OFF 0

int LED_R = 9;       //LED_R connect pin9 of Arduino UNO
int LED_G = 10;      //LED_G connect pin10 of Arduino UNO
int LED_B = 11;      //LED_B connect pin11 of Arduino UNO

void setup()
  {
     pinMode(LED_R, OUTPUT);
     pinMode(LED_G, OUTPUT);
     pinMode(LED_B, OUTPUT);
  }

//7 different colors formed by different combinations of LED_R,LED_G and LED_B
void color_led(int v_iRed, int v_iGreen, int v_iBlue)
{
     if (v_iRed == ON)
     {
          digitalWrite(LED_R, HIGH);
```

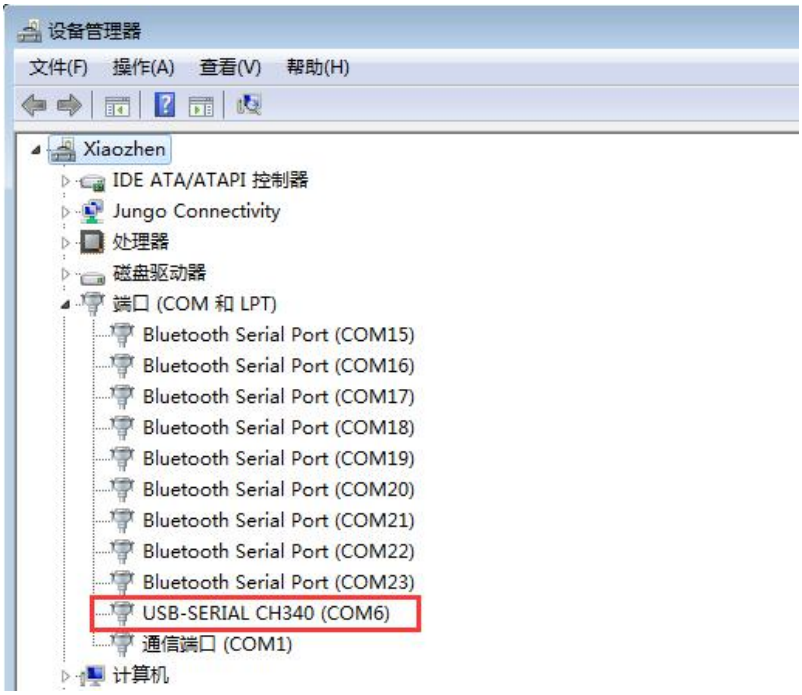
```
    }
    else
    {
        digitalWrite(LED_R, LOW);
    }
    if (v_iGreen == ON)
    {
        digitalWrite(LED_G, HIGH);
    }
    else
    {
        digitalWrite(LED_G, LOW);
    }
    if (v_iBlue == ON)
    {
            digitalWrite(LED_B, HIGH);
    }
    else
    {
        digitalWrite(LED_B, LOW);
    }
}

void loop()
{
        delay(2000);
        while(1)
        {                                   //LED_R    LED_G    LED_B
    color_led(ON,OFF,OFF);    //    1          0          0    Red
    delay(2000);
    color_led(OFF,ON,OFF);    //    0          1          0    Green
    delay(2000);
    color_led(OFF,OFF,ON);    //    0          0          1    Blue
    delay(2000);
    color_led(ON,ON,OFF);     //    1          1          0    Yellow
    delay(2000);
    color_led(ON,OFF,ON);     //    1          0          1     Magenta
    delay(2000);
    color_led(OFF,ON,ON);     //    0          1          1     Cyan
    delay(2000);
    color_led(ON,ON,ON);      //    1          1          1    White
        delay(2000);
      }
}
```

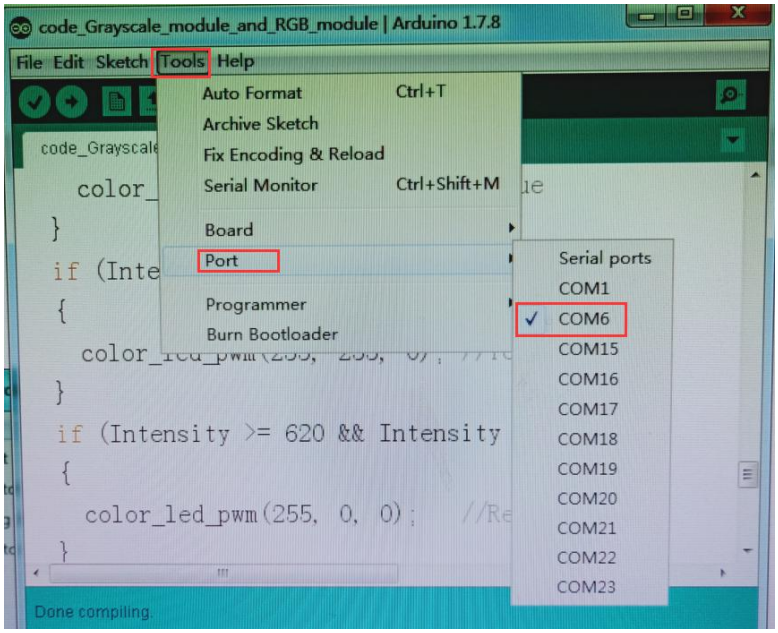
Experimental steps:

1. We need to open the program for this experiment: **code_Grayscale_module_and_RGB_module.ino**, click "√"under the menu bar,compile the program, and wait for the words of **Done compiling** in the lower left corner, as shown in the following figure.

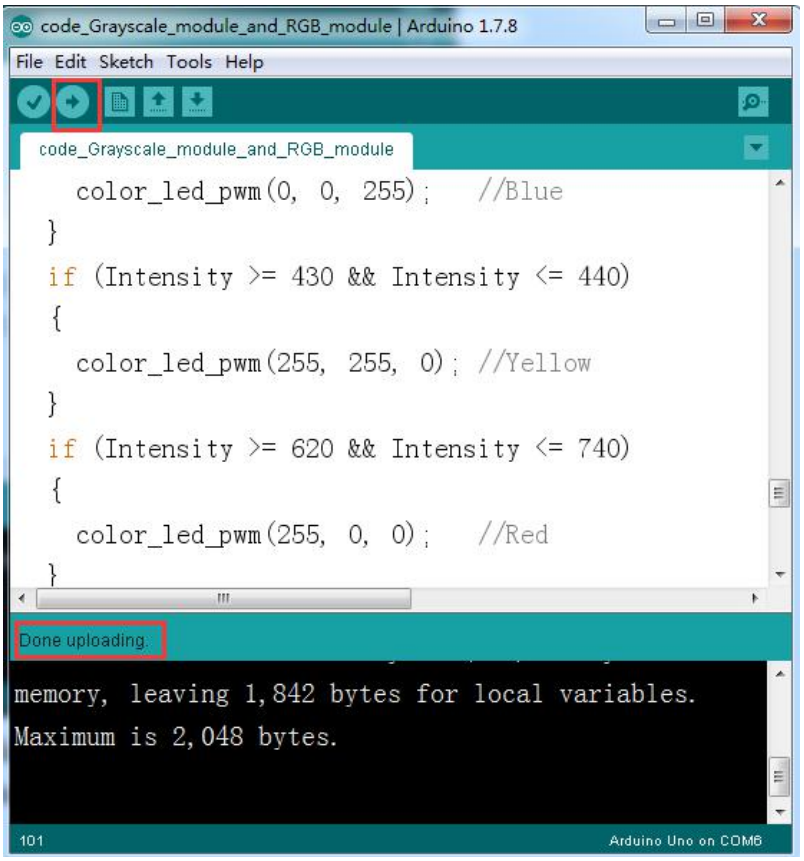


2. In the menu bar of Arduino IDE，you need to select the【Tools】---【Port】--- select the port that the serial number displayed by the device manager just now.for example:COM6,as shown in the following figure.

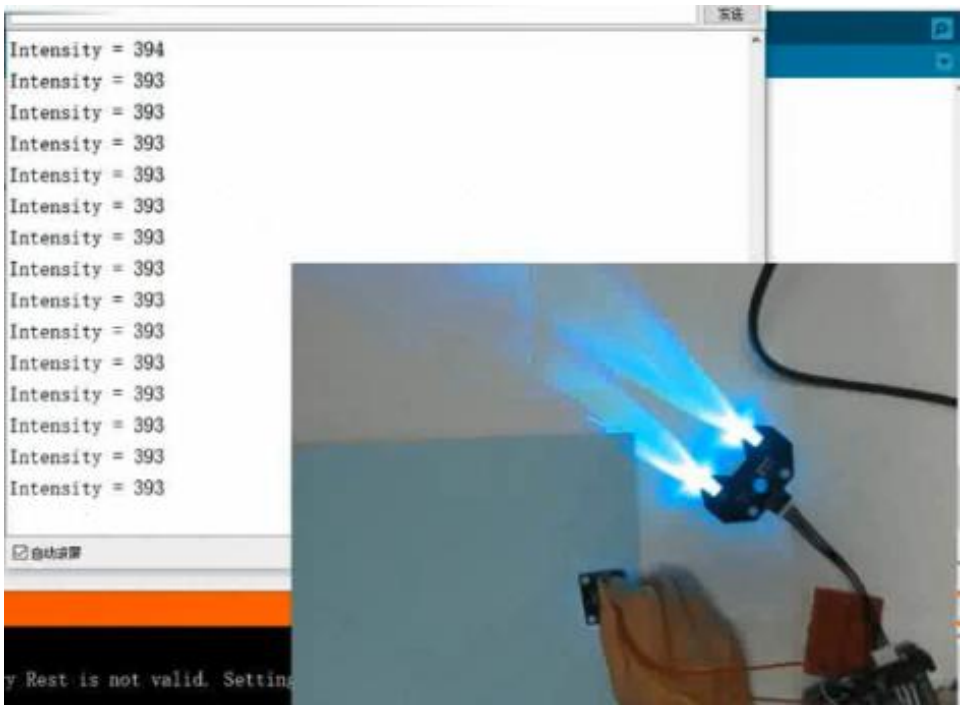


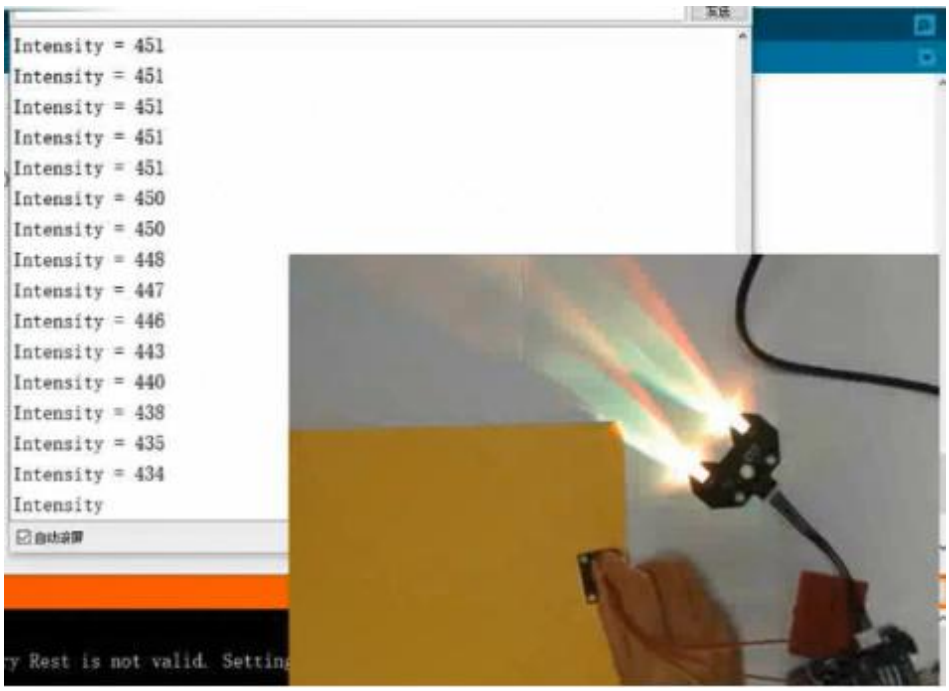


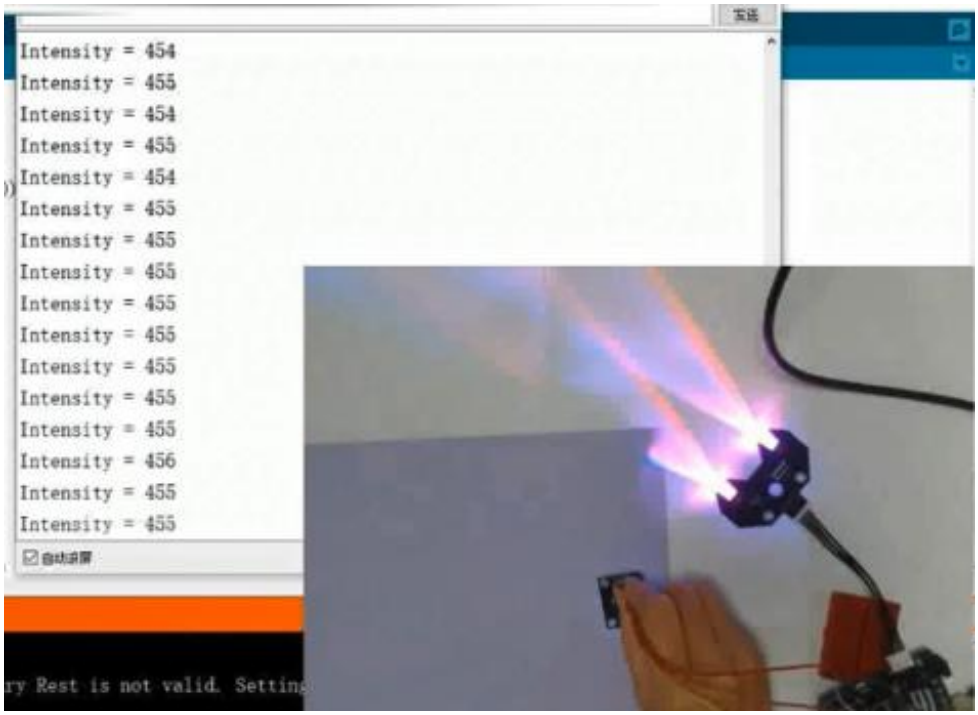
3. After the selection is completed, you need to click "→"under the menu bar,and upload the program to the Arduino UNO board, when appears to **Done uploading** on the lower left corner , that means that the program has been successfully uploaded to the Arduino UNO board, as shown in the following figure.



4. After the program upload is completed. When the grayscale sensor recognizes different colors, the RGB module will light the corresponding color of the light. As shown in the following figure.


Intensity = 394
Intensity = 393
Intensity = 393
Intensity = 393
Intensity = 393
Intensity = 393
Intensity = 393
Intensity = 393
Intensity = 393
Intensity = 393
Intensity = 393
Intensity = 393
Intensity = 393
Intensity = 393
自动滚屏
Rest is not valid. Setting


Intensity = 451
Intensity = 451
Intensity = 451
Intensity = 451
Intensity = 451
Intensity = 450
Intensity = 450
Intensity = 448
Intensity = 447
Intensity = 446
Intensity = 443
Intensity = 440
Intensity = 438
Intensity = 435
Intensity = 434
Intensity
自动滚屏
Rest is not valid. Setting



（Note: In the different lighting conditions, the parameters of the grayscale module in the code need to be adjusted by yourself. As shown in the following figure. Otherwise the grayscale module will recognize the wrong color.）

```
void loop()
{
  LDR_test();
  if (Intensity >= 520 && Intensity <= 600)
  {
    color_led_pwm(0,  255,  0);    //Green
  }
  if (Intensity  >= 500 && Intensity <= 520)
  {
    color_led_pwm(0,  0,  255);    //Blue
  }
  if (Intensity >= 430 && Intensity <= 440)
  {
    color_led_pwm(255,  255,  0); //Yellow
  }
  if (Intensity >= 620 && Intensity <= 740)
  {
    color_led_pwm(255,  0,  0);    //Red
  }
  if(Intensity >= 350 && Intensity<=360)
  {
    color_led_pwm(255,  255,  255); //White
  }
   if(Intensity >= 450 && Intensity<=480)
   {
```

```
    if(Intensity >= 450 && Intensity<=480)
    {
      color_led_pwm(255,  0,  255);    //purple
    }
     if(Intensity >= 390 && Intensity<=400)
    {
      color_led_pwm(0,  255,  255);   // Cyan
    }
```