

Course 16 ---4-Nixie tube

The purpose of the experiment:

In this experiment, arduino was used to drive a four-digit tube with a common Yin. Is the purpose of the experiment: the first Nixie tube display 1, the second Nixie tube display 2, the third Nixie tube display 3 and fourth Nixie tube display 4 with such intervals of 0.5 seconds to display.

Introduction to digital tube:

Nixie tube is a semiconductor luminescent device, its basic unit is a light-emitting diode. According to the number of digital tube is divided into 7-segment Nixie tube and 8-segment Nixie tube. 8-segment Nixie tube more than 7-segment Nixie tube a light-emitting diode unit (more than a decimal point), this experiment use the 8-segment Nixie tube. The actual object is shown below.



According to the light-emitting diode unit connection mode, it is divided into anode Nixie tubes and cathode Nixie tubes.

Anode Nixie tubes that connects the anodes of all light-emitting diodes together to form a common anode (COM). The common pole COM shall be connected to +5V when the common anode digital tube is applied. When the cathode of a certain field of light-emitting diode is low, the corresponding field will be light up. When the cathode of a field is high, the field does not light up.

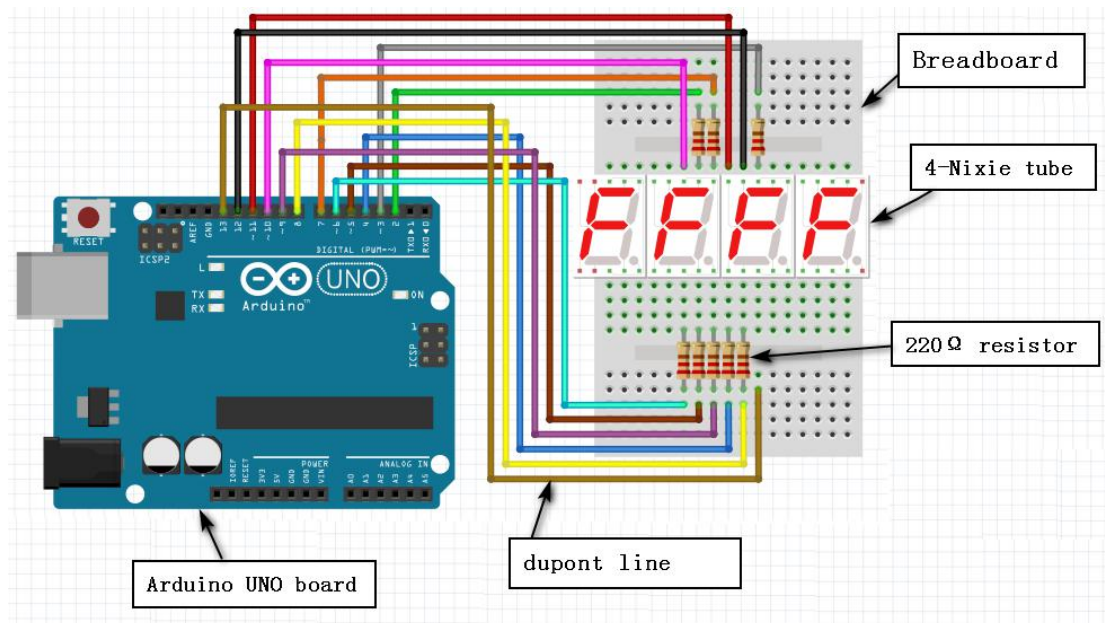
Cathode Nixie tubes that connects the cathodes of all light-emitting diodes together to form a common cathode (COM). The common pole COM shall be connected to GND when the common cathode digital tube is applied. When the anode of a certain field of light-emitting diode is high, the corresponding field will be light up. When the anode of a field is low, the field does not light up.

List of components required for the experiment:

Arduino UNO board *1
USB cable *1
220Ω resistor *8
4bit 8-segment digital tube *1
Breadboard *1
dupont line *1bunch

Actual object connection diagram:

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



Experimental code analysis:

```
#define SEG_A 2 //Arduino Pin2--->SegLed Pin11
#define SEG_B 3 //Arduino Pin3--->SegLed Pin7
#define SEG_C 4 //Arduino Pin4--->SegLed Pin4
#define SEG_D 5 //Arduino Pin5--->SegLed Pin2
#define SEG_E 6 //Arduino Pin6--->SegLed Pin1
#define SEG_F 7 //Arduino Pin7--->SegLed Pin10
#define SEG_G 8 //Arduino Pin8--->SegLed Pin5
#define SEG_H 9 //Arduino Pin9--->SegLed Pin3

#define COM1 10 //Arduino Pin10--->SegLed Pin12
#define COM2 11 //Arduino Pin11--->SegLed Pin9
#define COM3 12 //Arduino Pin12--->SegLed Pin8
#define COM4 13 //Arduino Pin13--->SegLed Pin6
```

```
unsigned char table[10][8] =
```

```
{
    {0, 0, 1, 1, 1, 1, 1, 1}, //0
    {0, 0, 0, 0, 0, 1, 1, 0}, //1
    {0, 1, 0, 1, 1, 0, 1, 1}, //2
    {0, 1, 0, 0, 1, 1, 1, 1}, //3
    {0, 1, 1, 0, 0, 1, 1, 0}, //4
    {0, 1, 1, 0, 1, 1, 0, 1}, //5
    {0, 1, 1, 1, 1, 1, 0, 1}, //6
```



```
{0, 0, 0, 0, 0, 1, 1, 1}, //7
{0, 1, 1, 1, 1, 1, 1, 1}, //8
{0, 1, 1, 0, 1, 1, 1, 1} //9
};

void setup()
{
    pinMode(SEG_A,OUTPUT); //Defining the port for the output port
    pinMode(SEG_B,OUTPUT);
    pinMode(SEG_C,OUTPUT);
    pinMode(SEG_D,OUTPUT);
    pinMode(SEG_E,OUTPUT);
    pinMode(SEG_F,OUTPUT);
    pinMode(SEG_G,OUTPUT);
    pinMode(SEG_H,OUTPUT);

    pinMode(COM1,OUTPUT);
    pinMode(COM2,OUTPUT);
    pinMode(COM3,OUTPUT);
    pinMode(COM4,OUTPUT);
}

void loop()
{
    Display(1,1); //Displaying 1 on the first bit of the Nixie tube
    delay(500);
    Display(2,2); //Displaying 2 on the second bit of the Nixie tube
    delay(500);
    Display(3,3); //Displaying 3 on the third bit of the Nixie tube
    delay(500);
    Display(4,4); //Displaying 4 on the fourth bit of the Nixie tube
    delay(500);
}

void Display(unsigned char com,unsigned char num)
{
    digitalWrite(SEG_A,LOW); //This is to get rid of the shadow
    digitalWrite(SEG_B,LOW);
    digitalWrite(SEG_C,LOW);
    digitalWrite(SEG_D,LOW);
    digitalWrite(SEG_E,LOW);
    digitalWrite(SEG_F,LOW);
    digitalWrite(SEG_G,LOW);
    digitalWrite(SEG_H,LOW);
```



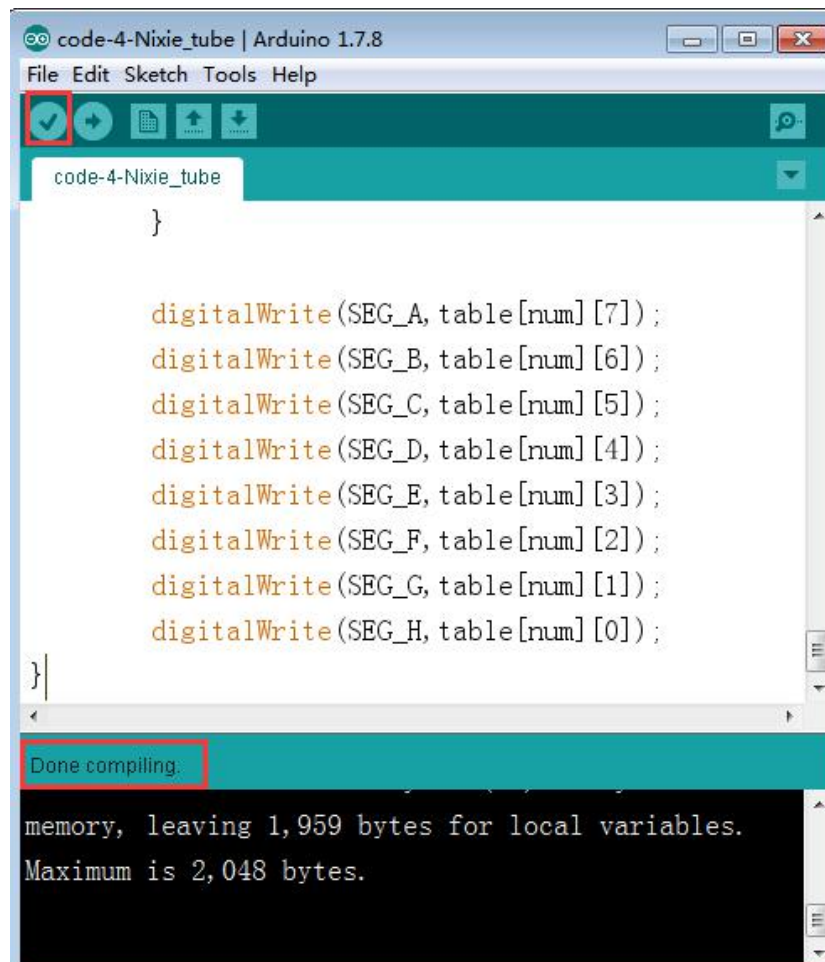
```
switch(com)                                //This is to select the display location
{
    case 1:
        digitalWrite(COM1,LOW);             //First bit of the Nixie tube
        digitalWrite(COM2,HIGH);
        digitalWrite(COM3,HIGH);
        digitalWrite(COM4,HIGH);
        break;
    case 2:
        digitalWrite(COM1,HIGH);
        digitalWrite(COM2,LOW);             //Second bit of the Nixie tube
        digitalWrite(COM3,HIGH);
        digitalWrite(COM4,HIGH);
        break;
    case 3:
        digitalWrite(COM1,HIGH);
        digitalWrite(COM2,HIGH);
        digitalWrite(COM3,LOW);             //Third bit of the Nixie tube
        digitalWrite(COM4,HIGH);
        break;
    case 4:
        digitalWrite(COM1,HIGH);
        digitalWrite(COM2,HIGH);
        digitalWrite(COM3,HIGH);
        digitalWrite(COM4,LOW);             //Fourth bit of the Nixie tube
        break;
    default:break;
}

digitalWrite(SEG_A,table[num][7]);
digitalWrite(SEG_B,table[num][6]);
digitalWrite(SEG_C,table[num][5]);
digitalWrite(SEG_D,table[num][4]);
digitalWrite(SEG_E,table[num][3]);
digitalWrite(SEG_F,table[num][2]);
digitalWrite(SEG_G,table[num][1]);
digitalWrite(SEG_H,table[num][0]);
}
```

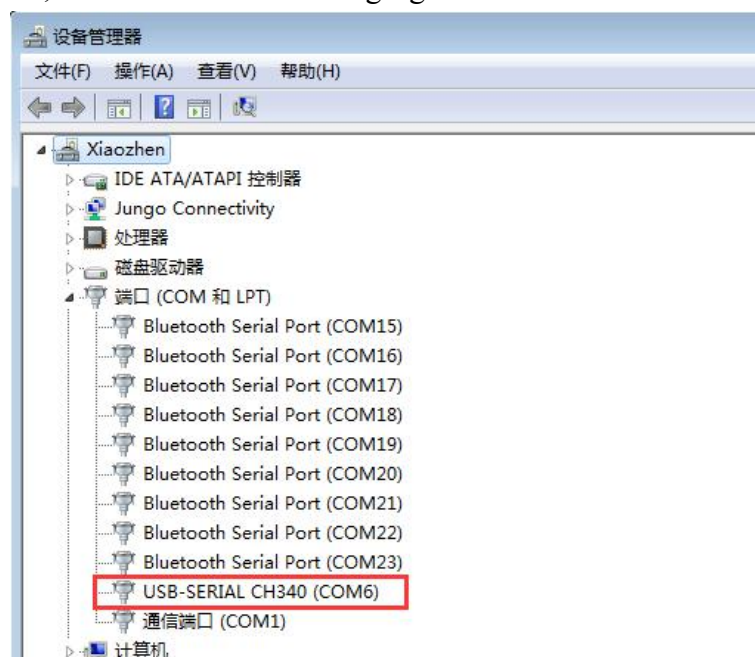
Experimental steps:

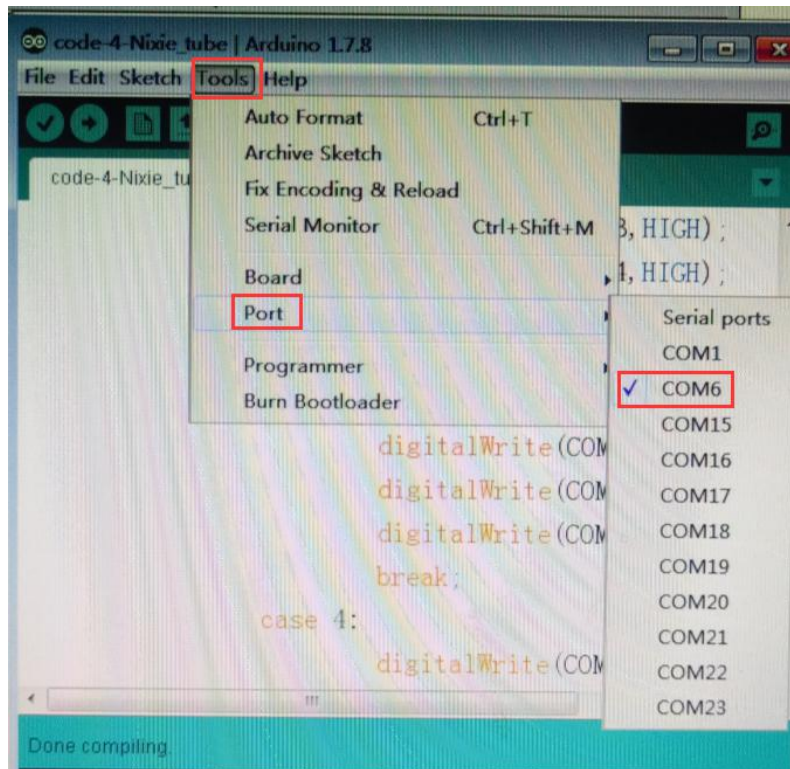
1.We need to open the code for this experiment: **code-4-Nixie_tube.ino**, click “√”under the menu bar,compile the code, and wait for the words of **Done compiling**

in the lower left corner, as shown in the following figure.

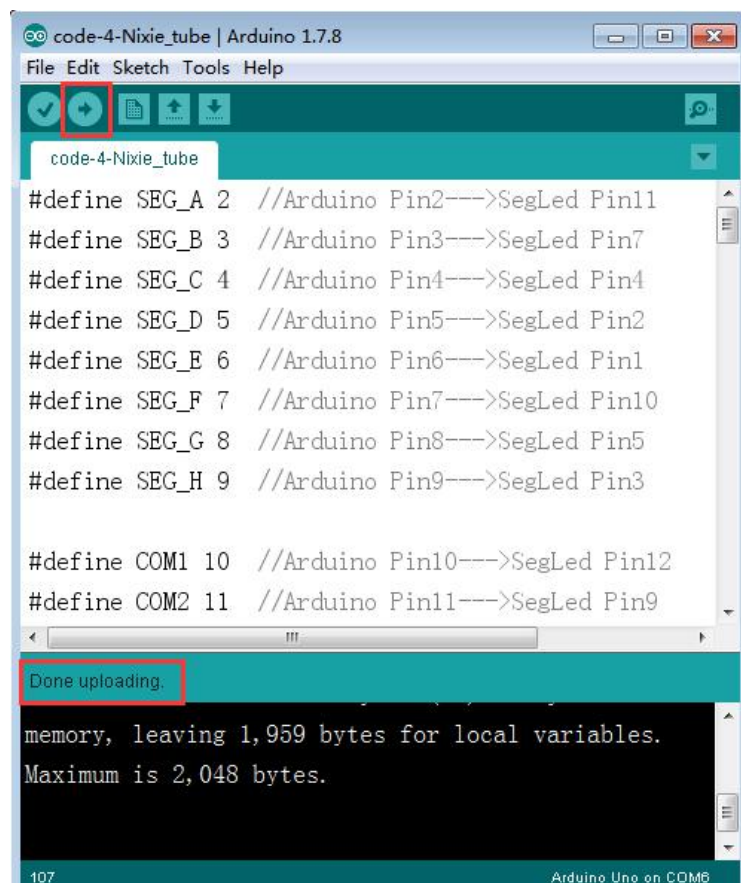


2. In the menu bar of Arduino IDE, we need to select the **【Tools】**---**【Port】**--- select the port that the serial number displayed by the device manager just now.for example:COM6,as shown in the following figure.

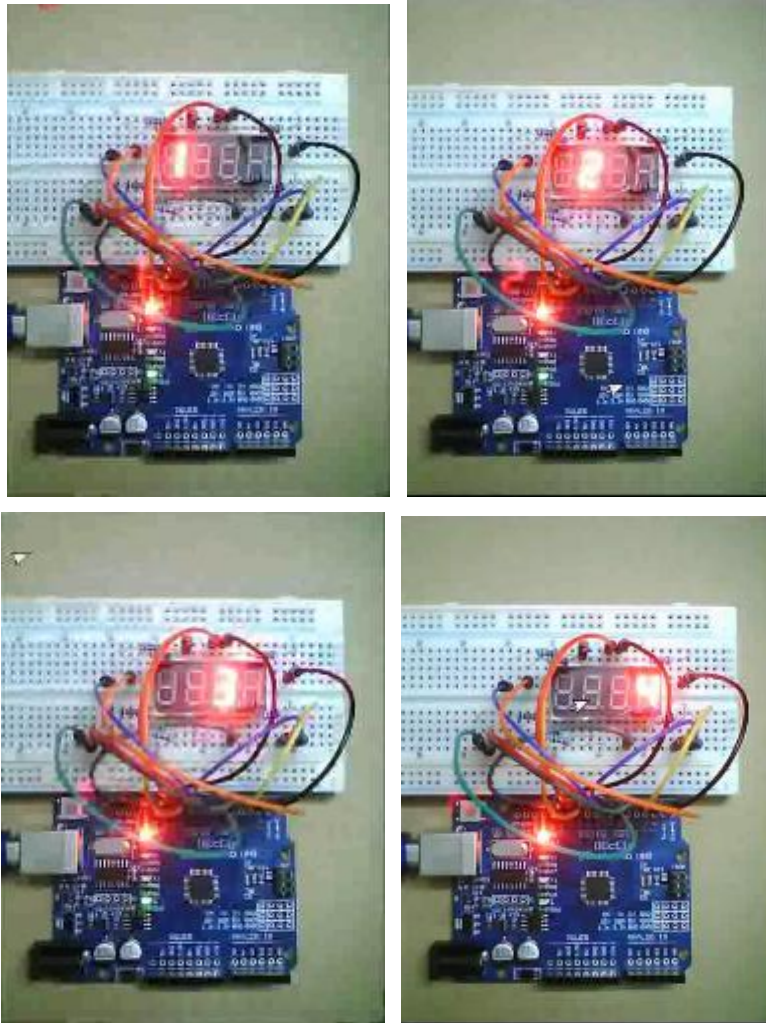




3. After the selection is completed, click “→” under the menu bar, and upload the code to the Arduino UNO board, when appears to **Done uploading** on the lower left corner, that means that the code has been successfully uploaded to the Arduino UNO board, as shown in the following figure.



4. After the code is uploaded, the first Nixie tube display 1, the second Nixie tube display 2, the third Nixie tube display 3 and fourth Nixie tube display 4 with such intervals of 0.5 seconds to display.



The code of the experiment: