

## Course 17 ---74HC595

### The purpose of the experiment:

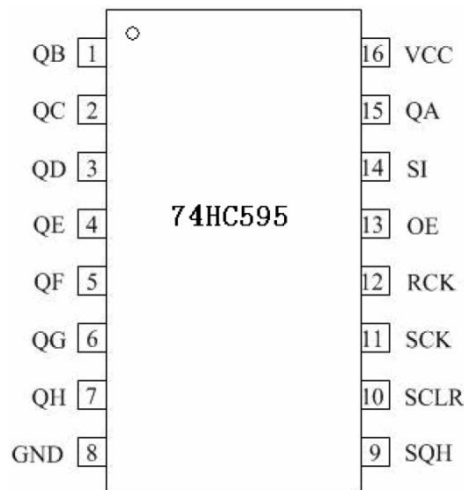
74HC595 is an 8-bit serial input and parallel output displacement buffer: the parallel output is three-state output. In this course, we use three digital I/O ports of Arduino to control 8 LED lights by 74HC595, so that they were lit in 8-bit binary (0-256) order.

The actual object is shown below.



Binary order:

00000001 00000010 00000011 00000100 00000101 00000110  
00000111 00001000 00001001 00001010 00001011 00001100  
.....  
10000000



number of pin	name of pin	Description
1,2,3,4,5,6,7,15	QB,QC,QD,QE,QG,QH,QA	Tri-state output pin
8	GND	GND
9	SQH	Serial port data output pin
10	SCLR	Shift register clear
11	SCK	Data input clock line
12	RCK	Output memory latch clock line

13	OE	Output enable
14	SI	Data line
16	VCC	VCC

### List of components required for the experiment:

Arduino UNO board \*1

USB cable \*1

74HC595 \*1

220 $\Omega$  resistor \*8

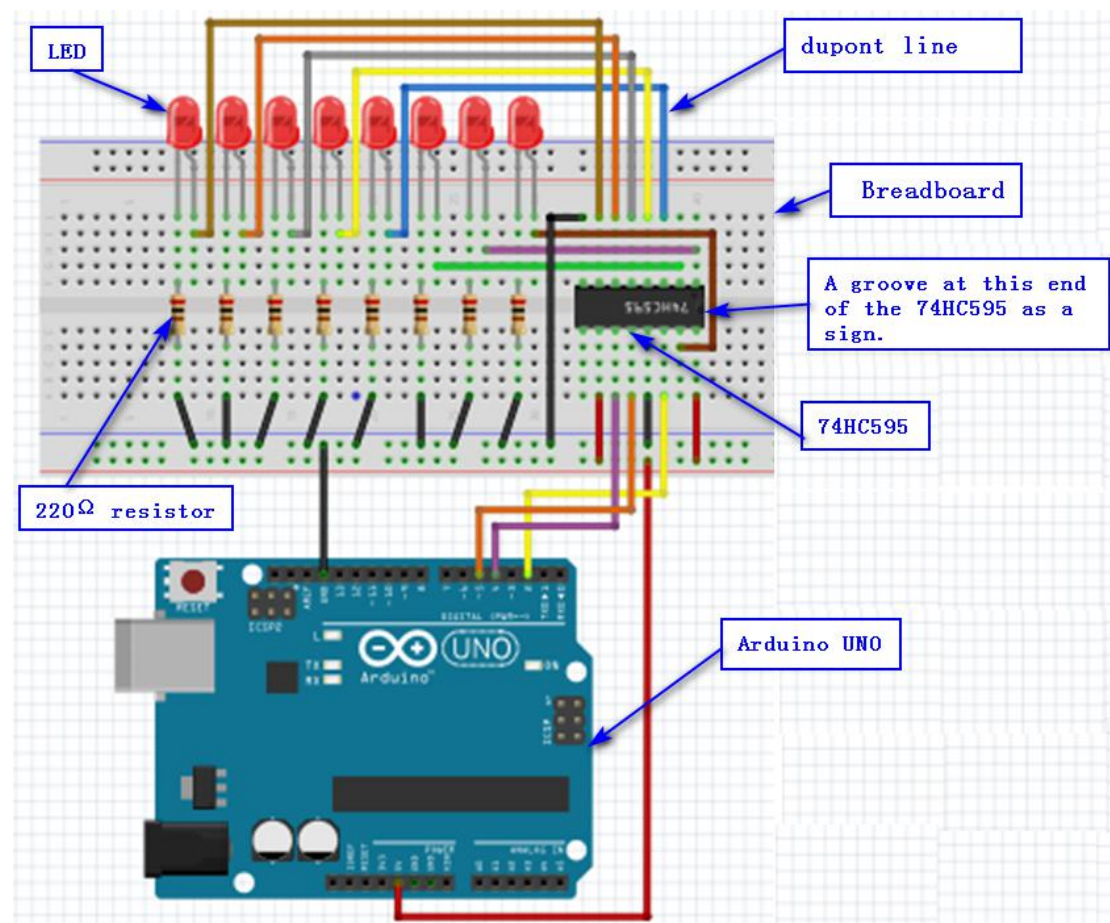
LED \*8

Breadboard \*1

Dupont line \*1 bunch

### Material object connection diagram:

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



### Experimental code analysis:



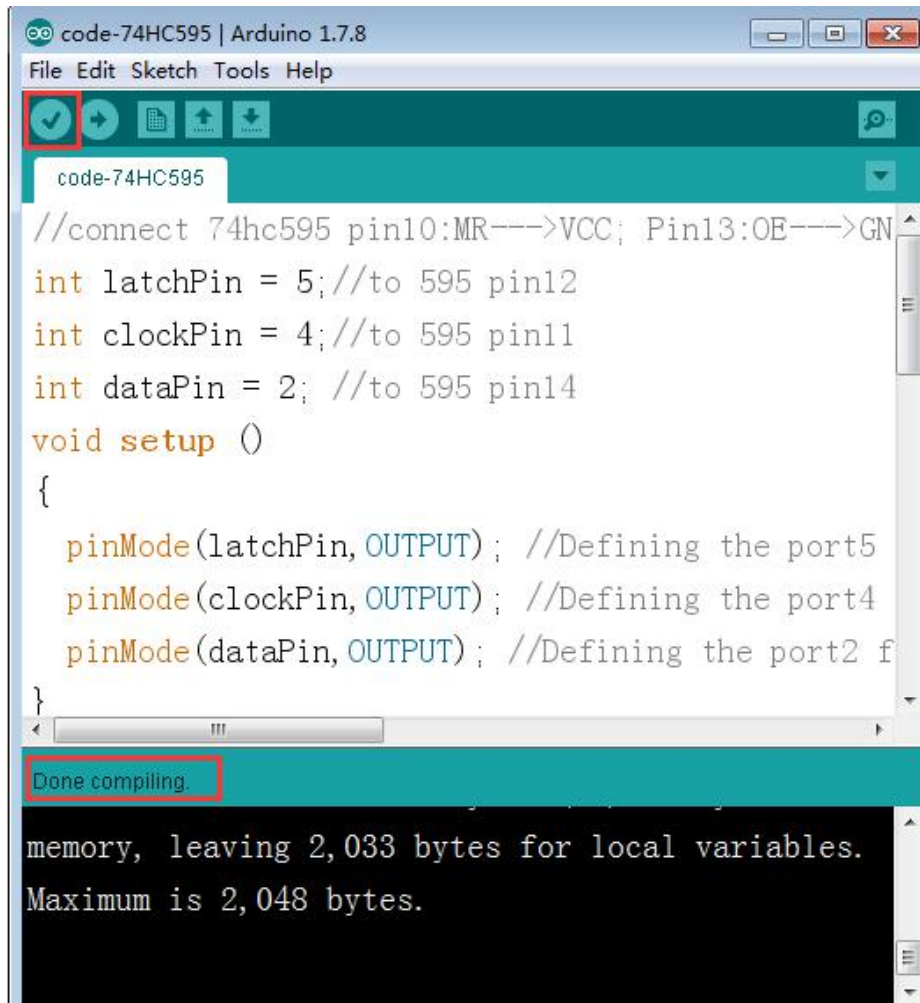
```
//connect 74hc595 pin10:MR--->VCC; Pin13:OE--->GND
int latchPin = 5;    //to 595 pin12
int clockPin = 4;    //to 595 pin11
int dataPin = 2;     //to 595 pin14
void setup ()
{
    pinMode(latchPin,OUTPUT); //Defining the port5 for the output port
    pinMode(clockPin,OUTPUT); //Defining the port4 for the output port
    pinMode(dataPin,OUTPUT); //Defining the port2 for the output port
}
void loop()
{
    for(int a=0; a<256; a++) //The meaning of this loop is to let a variable increase by
    1 until it is equal to 256.

        //The following activities are performed every cycle.

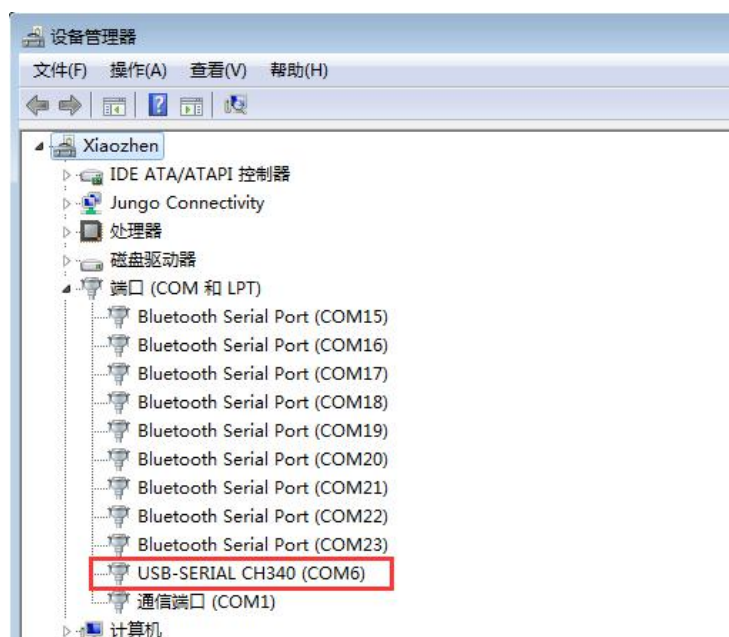
        {
            digitalWrite(latchPin,LOW); //Giving a low level to the port ST_CP indicates
            that the chip is ready to receive data.
            shiftOut(dataPin,clockPin,MSBFIRST,a);
            /*
            dataPin: Data output pin, each bit of data will be output sequentially. Mode of
            pin needs to be set to output.
            clockPin: Clock output pin. Mode of pin needs to be set to output
            bitOrder: Data shift order selection bit.The type of this parameter is byte,
            High-level first-entry MSBFIRST or low-level first-entry LSBFIRST
            Can be selected by yourself.
            a: The data value to be output.
            */
            digitalWrite(latchPin,HIGH); //Giving a low level to the port ST_CP
            delay(1000); //Pause for 1 second to make you see the effect
        }
}
```

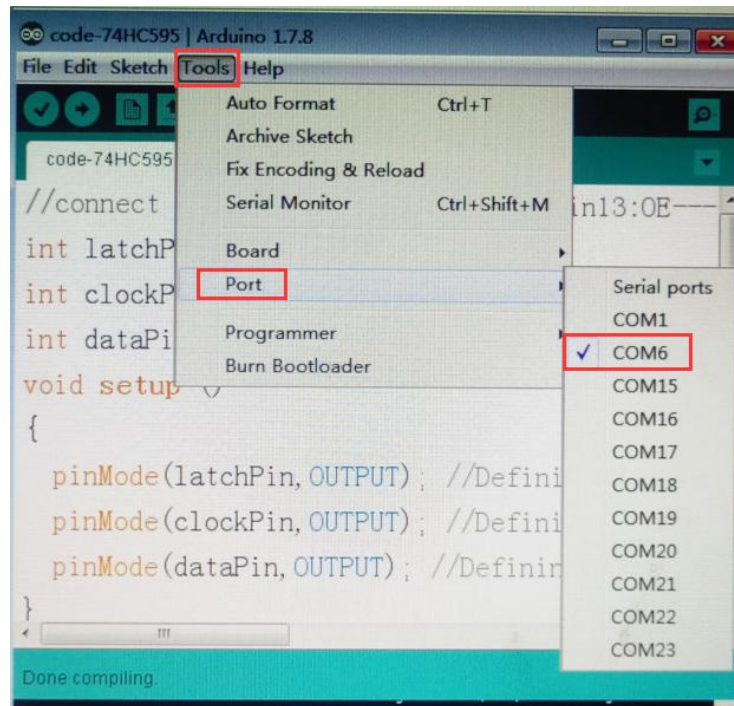
### Experimental steps:

1.We need to open the code for this experiment: **code-74HC595.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.

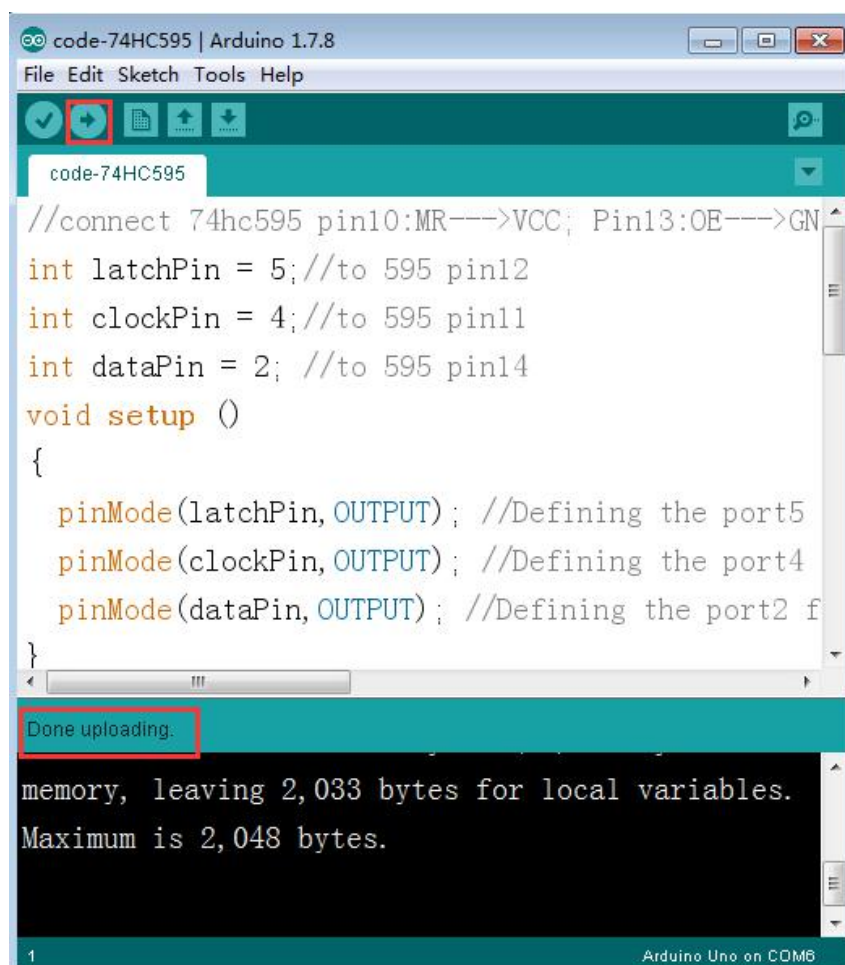


2. In the menu bar of Arduino IDE, we need to select the **Tools**---**Port**--- select the port that the serial number displayed by the device manager just now. for example: COM6, as shown in the following figure.



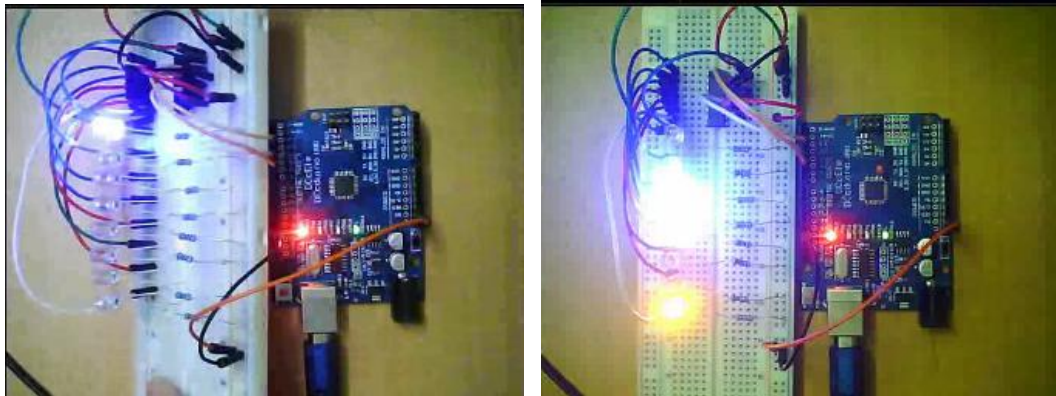


3. After the selection is completed, you need to click “→” under the menu bar, and upload the code to the Arduino UNO board, when appears to **Done uploading** on the lower left corner, that means that the code has been successfully uploaded to the Arduino UNO board, as shown in the following figure.





4. After the code is uploaded, We can see that 8 LEDs will be lit from 00000001 to 10000000, as shown in the following figure.(Just an example)



The code of the experiment: