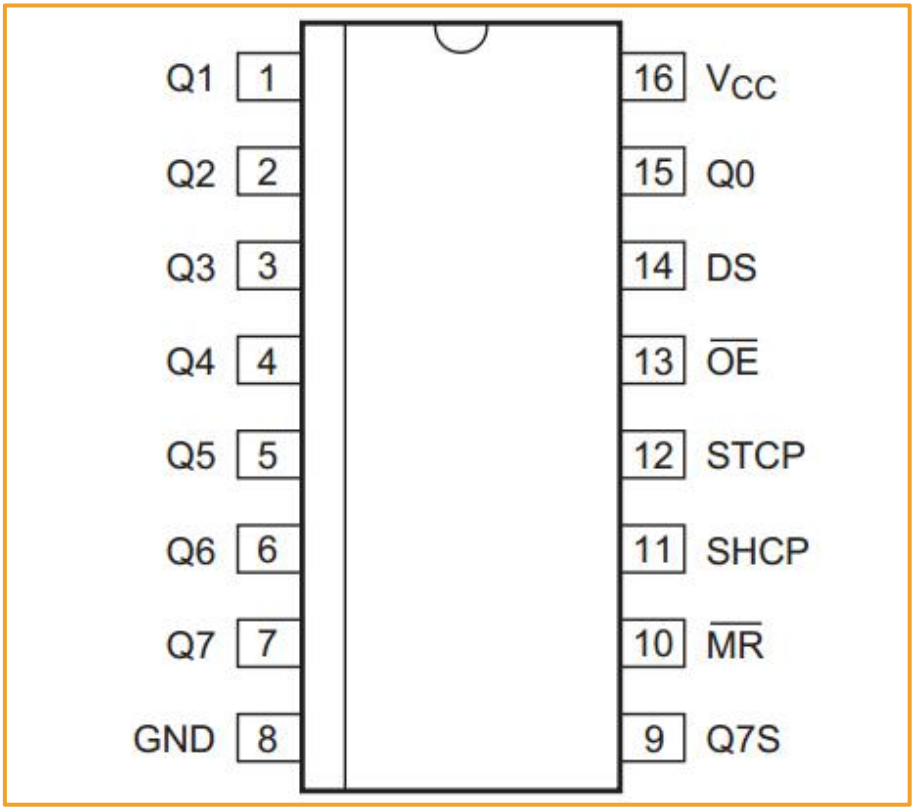
74HC595 Introduction

74HC595 is a 8 bits serial input and parallel open-drain output CMOS shift register which provides data to a register with three state outputs. Shift register and storage register, respectively, have an independent clock, the 74HC595 shift register has the highest priority direct clear terminal (SRCLR), serial input (DS) is used to cascade serial output at the upper level. When the output enable pin (OE) is at high level, 74HC595 parallel output is at a high impedance state and low level which enables parallel output. The shift register clock SHCP and storage register clock STCP are both rising edge triggering.

Pinning information



Pin description

Symbol	Pin	Description
Q0	15	parallel data output 0
Q1	1	parallel data output 1
Q2	2	parallel data output 2
Q3	3	parallel data output 3
Q4	4	parallel data output 4
Q5	5	parallel data output 5
Q6	6	parallel data output 6
Q7	7	parallel data output 7
GND	8	ground(0V)
Q7S	9	serial data output
MR	10	master reset(active low)
SHCP	11	shift register clock input
STCP	12	storage register clock input
OE	13	output enable input(active low)
DS	14	serial data input
Vcc	16	supply voltage

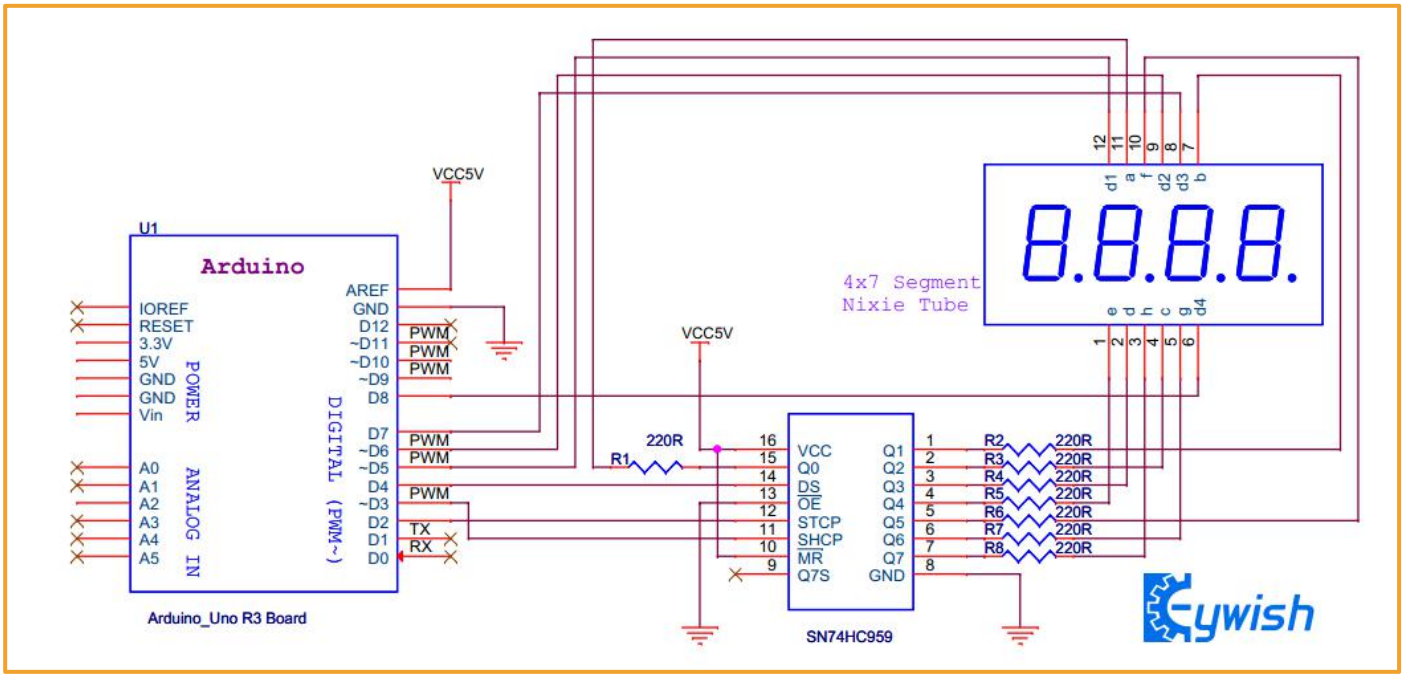
Experiment Purpose

The aim is to use the arduino to drive serial output to 74HC595, then 74HC595 parallel port drives a 4 bits common cathode tube. After that, the arduino directly drives bit selection of the tube. Eight 220Ω resistors will be used in this experiment to limit the current and make the tube dynamically display digit from 9 to 0.

Component List

- Keywish Arduino UNO R3 mainboard
- Breadboard
- USB cable
- 4-7Segment cathode tube * 1
- SN74HC595 * 1
- 220 Ω resistor* 8
- Several jumper wires

Schematic Diagram

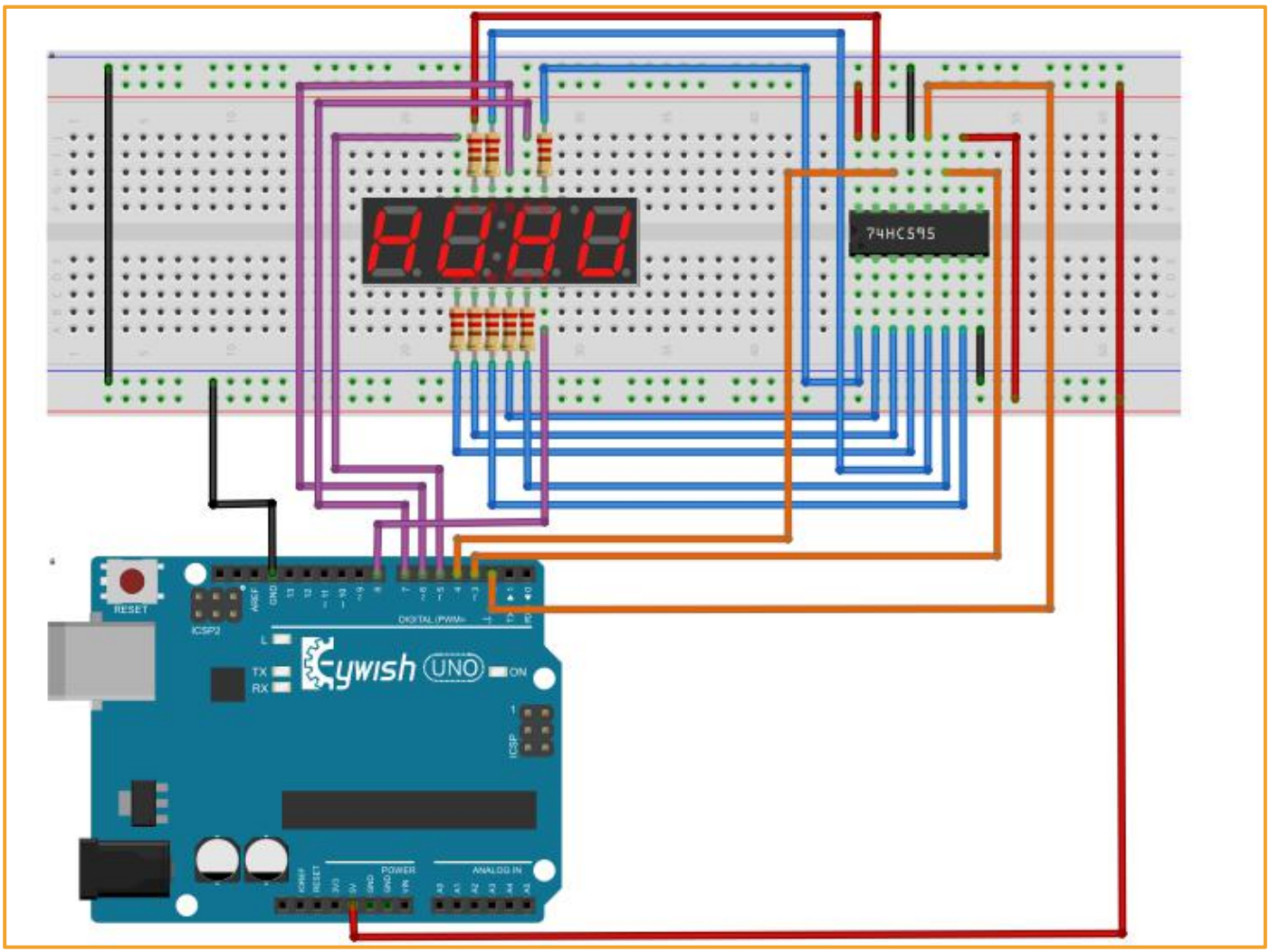


Wiring of Circuit

arduino Uno	SN74HC595
2	12(STCP)
3	11(SHCP)
4	14(DS)

arduino Uno	7 Segment nixie tube
5	12
6	9
7	8
8	6

SN74HC595	7 Segment nixie tube
15	11
1	7
2	5
3	2
4	1
5	10
6	5
7	3


74HC595
RESET
ICSP2
TX
RX
UNO
ON
ICSP
POWER
ANALOG IN

Code

```
#define BIT_CHOICE_1  5
#define BIT_CHOICE_2  6
#define BIT_CHOICE_3  7
#define BIT_CHOICE_4  8
#define STCP_PIN  2
#define SHCP_PIN  3
#define DATA_PIN  4 //define stcp shcp ds pin
int BIT_CHOICE[4]= {BIT_CHOICE_1 ,
BIT_CHOICE_2 ,BIT_CHOICE_3,BIT_CHOICE_4};// 4x8bit
unsigned char
DisplayNumble[10]={0x00,0x6F,0x7F,0x07,0x7D,0x6D,0x66,0x4F,0x5B,0X06};
void setup()
{
   pinMode(STCP_PIN,OUTPUT);
    pinMode(SHCP_PIN,OUTPUT);
    pinMode(DATA_PIN,OUTPUT); //set stcp shcp ds pin putput mode
    for(int i=0;i<4;i++)
    {
        pinMode(BIT_CHOICE[i],OUTPUT);
        digitalWrite(BIT_CHOICE[i],HIGH);
    }
}
void  nixie_pin_chioce_set(int value)
{
    for(int i=0;i<4;i++)
    {
        digitalWrite(BIT_CHOICE[i],value);
    }
}
```

```
void loop()
{
    int i=0;
    for(i = 9; i>=0 ;i-- )  // numble 9 - > 0 down
    {
        nixie_pin_chioce_set(HIGH);
        digitalWrite(STCP_PIN,LOW);
        shiftOut(DATA_PIN,SHCP_PIN,MSBFIRST,DisplayNumble[i]); //serial
          shift out put display numble
        digitalWrite(STCP_PIN,HIGH);
        nixie_pin_chioce_set(LOW);
        delay(1000);
    }
}
```

Experiment Result