

Project 9: Laser Bar



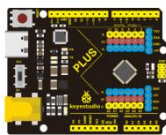
1. Project Introduction

In the previous project, we have learned how to light up a LED. There are only 22 IO ports on the Plus development board. How can we light up a large number of LEDs? At sometime may run out of pins on your Arduino board and need to extend it with shift registers.

You can use the 74HC595N to control 8 outputs at a time while only taking up a few pins on your microcontroller. You can also link multiple registers together to extend your output even more.

In this project, we will use 4 Red M5 LEDs, 3 Green M5 LEDs and the laser stick card we provide to make an exciting laser stick model.

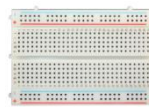
2. Project Hardware



Plus Development
Board*1



Plus Board
Holder



400-Hole
Breadboard



USB
Cable*1



74HC595 chip*1



Red M5 LED
*4



Green M5
LED *3



220Ω
Resistor*7

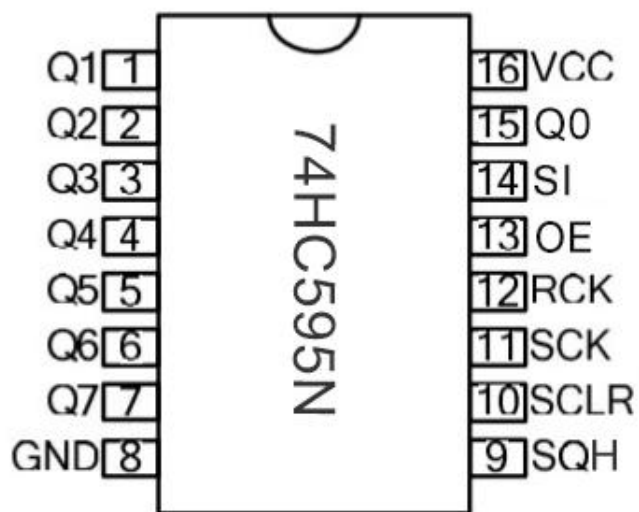


Preformed/Flaxible
Jumper Wire*20+



Laser Stick
Paper
Card*1

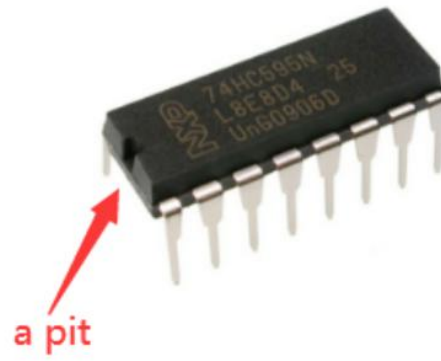
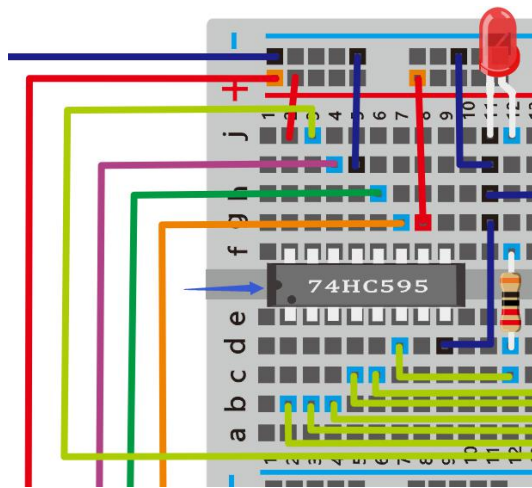
3. 74HC595 Chip Pins Description :

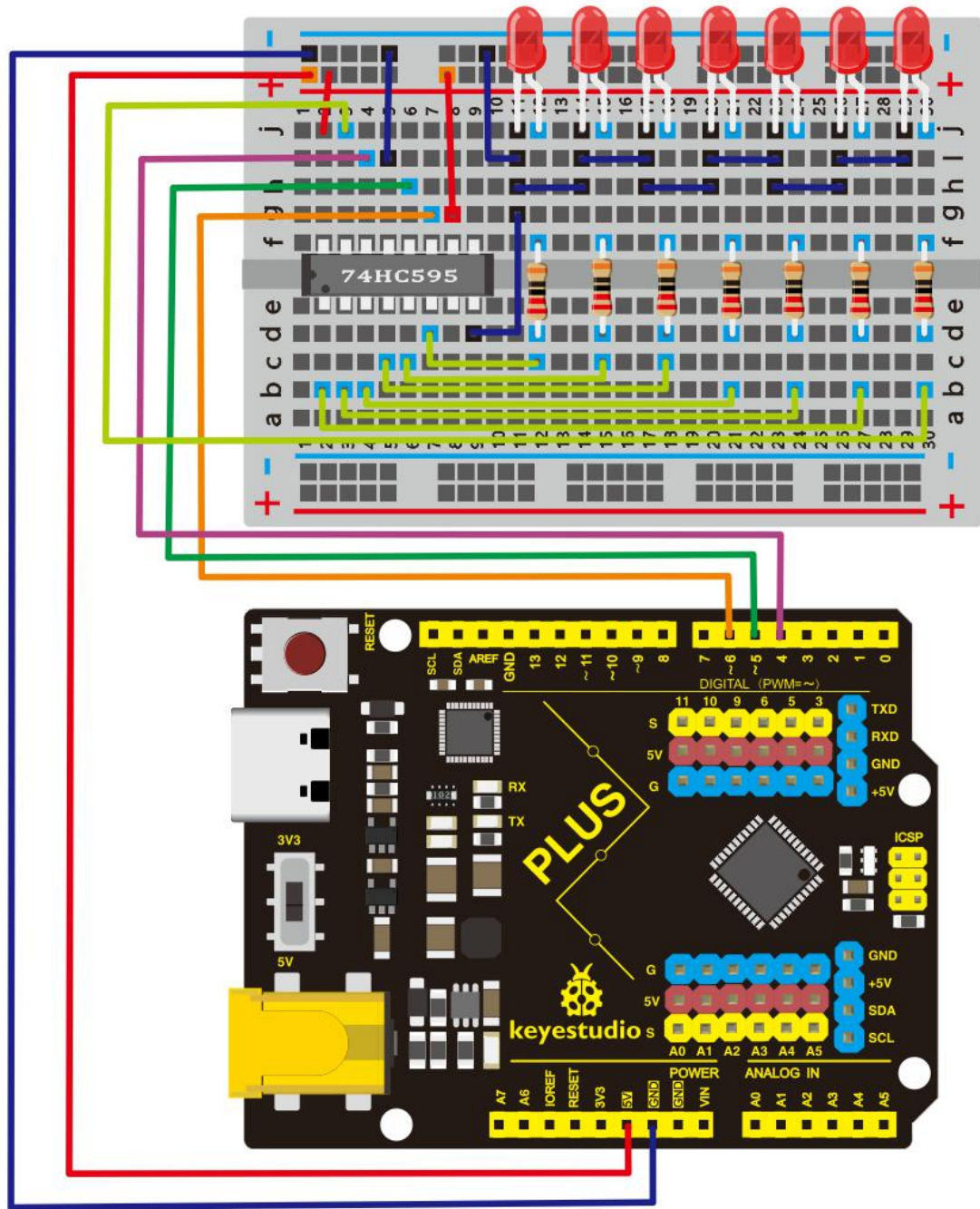


Pins No	Name	Function
1-7, 15	Q0-Q7	Parallel Output
8	GND	GND
9	MR	Serial Output
10		Master Reserve , connect 5V
11	SH_CP	Shift Register Clock Output
12	ST_CP	Storage Register Clock Input

13	OE	Output Enable (active LOW)
14	DS	Serial data input
16	Vcc	5V working voltage

- VCC and GND are used to supply power for chip, the working voltage is 5V.
- Q0~Q7: This eight pins are output pins.
- DS pin is serial input pin, we need to write data into this pin by bit.
- STCP is a latch pin. The data can be copied to latch and output in parallel after 8-digit data of latch is all transmitted.
- SHCP is a clock pin. The data can be written into storage register.
- OE is an output enable pin, which is used to make sure if the data of latch is input into Q0-Q7 pins. When in low level, high level is not output. In this experiment, we directly connect to GND to keep low level output data.
- MR is a pin to initialize the pin of storage register. Initialize the internal storage register when low level. In this experiment, we connect to VCC to keep high level.





5.Project Code

```
/*  
keyestudio STEM Starter Kit  
Project 9  
Star Wars Laser Rod  
http://www.keyestudio.com  
*/  
  
int data = 4;// set pin 4 of 74HC595as data input pin SI  
int clock = 6;// set pin 6 of 74hc595 as clock pin SCK  
int latch = 5;// set pin 5 of 74hc595 as output latch RCK  
  
int ledState = 0;  
  
const int ON = HIGH;  
const int OFF = LOW;  
  
void setup()  
{  
  pinMode(data, OUTPUT);  
  pinMode(clock, OUTPUT);  
  pinMode(latch, OUTPUT);  
}  
  
void loop()  
{  
  for(int i = 0; i < 256; i++)
```



```

{
  updateLEDs(i);
  delay(500);
}
}

void updateLEDs(int value)
{
  digitalWrite(latch, LOW);//
  shiftOut(data, clock, MSBFIRST, ~value);// serial data
  "output", high level first
  digitalWrite(latch, HIGH);// latch
}

////////////////////////////////////

```

1. Open up the Arduino IDE and copy the above code into a new sketch.
2. Select the correct Board type and COM port for the Arduino IDE.
3. Click Upload button to upload the code.

6. Project Result

Done uploading !

Put the Laser stick paper card on the LED, you can see 7 LEDs are light one by one, Just like a laser stick full of power.

