Eight LED with 74HC595

Overview

In this lesson, you will learn how to use eight large red LEDs with an Mega2560 R3 without needing to give up 8 output pins!

Although you could wire up eight LEDs each with a resistor to an Mega2560 R3 pin you would rapidly start to run out of pins on your Mega2560 R3. If you don't have a lot of stuff connected to your Mega2560 R3. It's OK to do so - but often times we want buttons, sensors, servos, etc. and before you know it you've got no pins left. So, instead of doing that, you are going to use a chip called the 74HC595 Serial to Parallel Converter. This chip has eight outputs (perfect) and three inputs that you use to feed data into it a bit at a time.

This chip makes it a little slower to drive the LEDs (you can only change the LEDs about 500,000 times a second instead of 8,000,000 a second) but it's still really fast, way faster than humans can detect, so it's worth it!

Component Required:

1 x Mega2560 R3

1 x 830 tie-points breadboard

8 x leds

8 x 220 ohm resistors

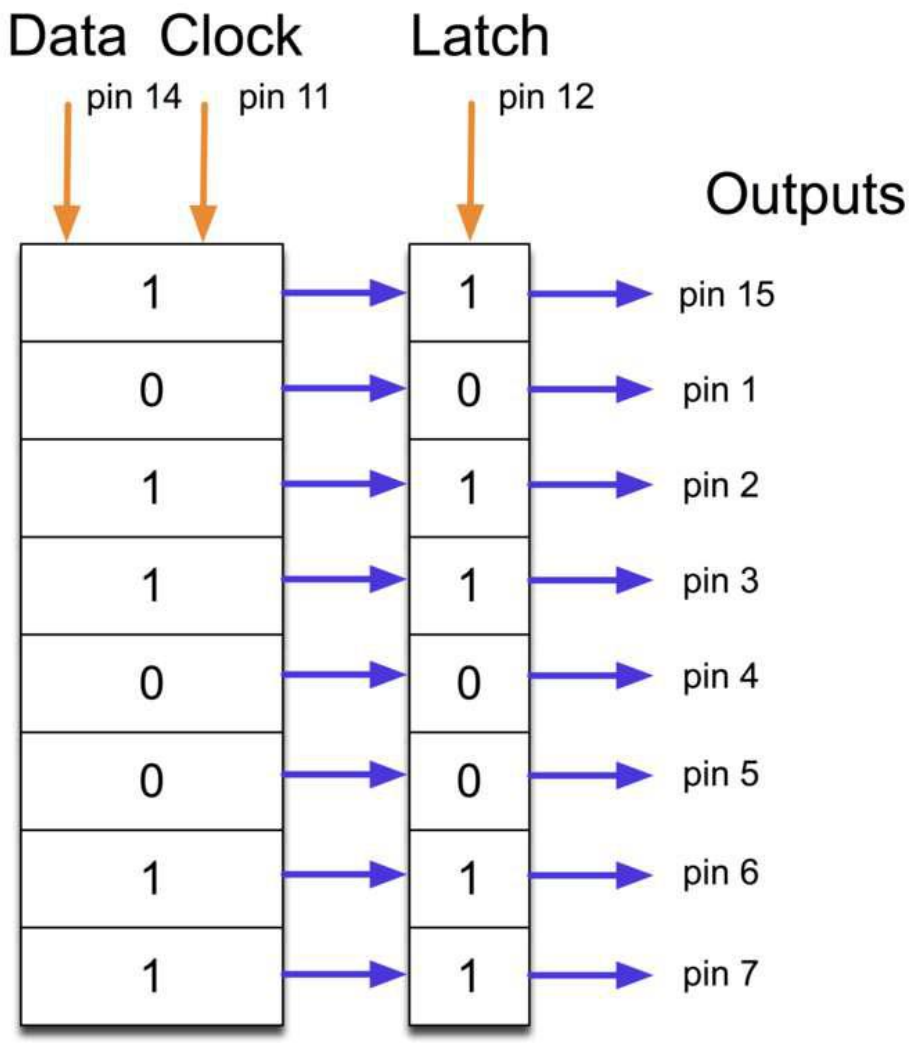
1 x 74hc595 IC

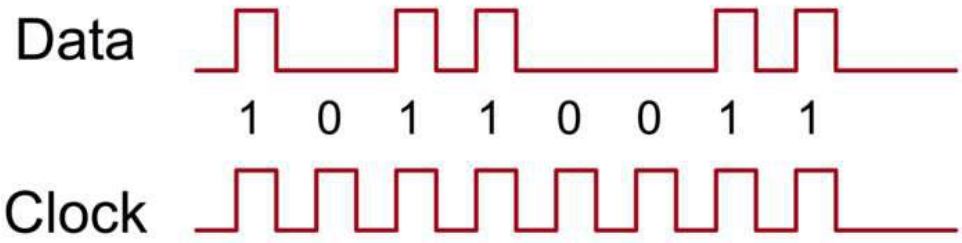
x M-M wires (Male to Male jumper wires)

Component Introduction

74HC595 Shift Register:

The shift register is a type of chip that holds what can be thought of as eight memory locations, each of which can either be a 1 or a 0. To set each of these values on or off, we feed in the data using the 'Data' and 'Clock' pins of the chip.



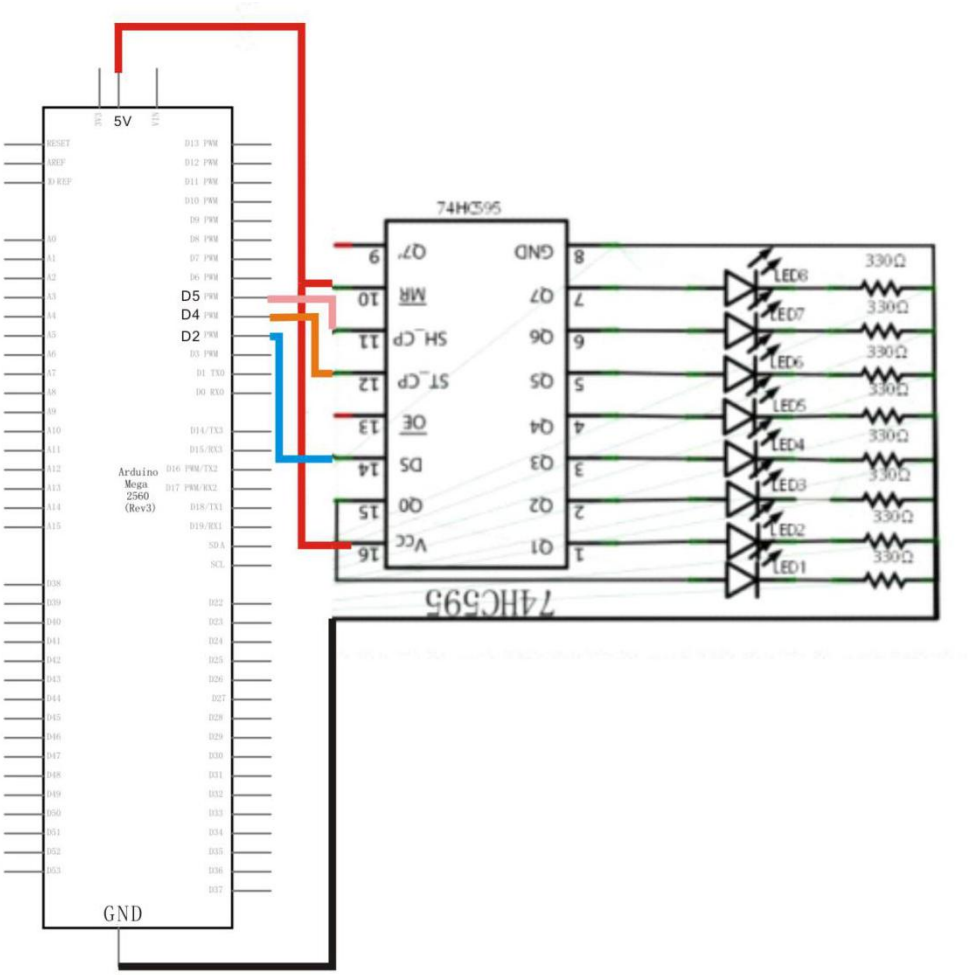


The clock pin needs to receive eight pulses. At each pulse, if the data pin is high, then a 1 gets pushed into the shift register; otherwise, a 0. When all eight pulses have been received, enabling the 'Latch' pin copies those eight values to the latch register. This is necessary; otherwise, the wrong LEDs would flicker as the data is being loaded into the shift register.

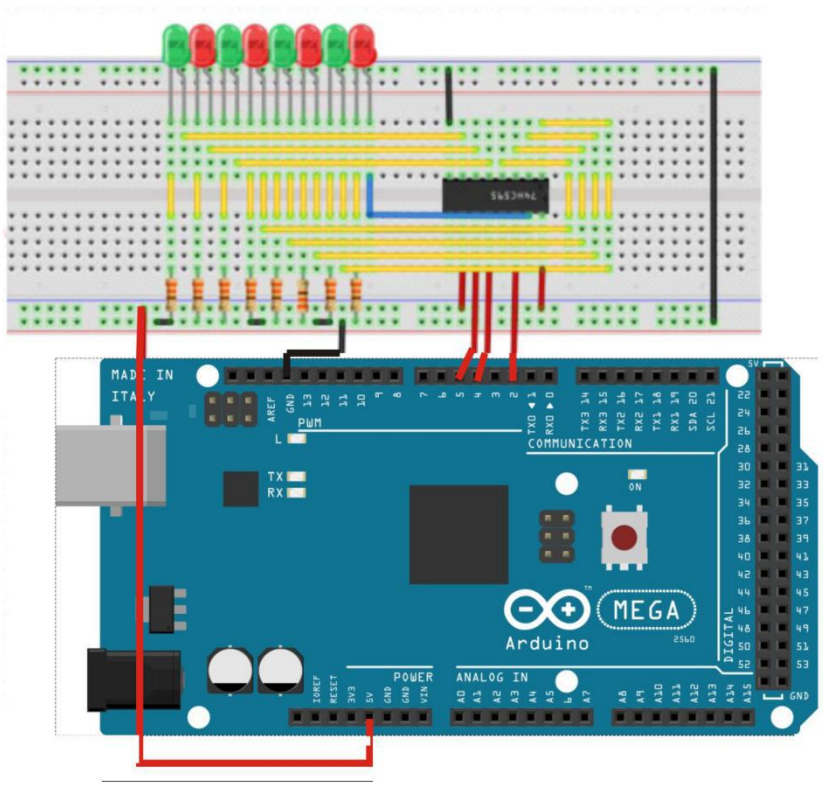
The chip also has an output enable (OE) pin, which is used to enable or disable the outputs all at once.

Connection

Schematic



Wiring diagram



Digital 2 from the UNO goes to pin #14 of the shift register

Digital 4 from the UNO goes to pin #12 of the shift register

Digital 5 from the UNO goes to pin #11 of the shift register

Code

After wiring，please open the program in the code folder- " Eight LED with 74HC595" and click UPLOAD to upload the program. See "Blink" for details about program uploading if there are any errors.

```
int latchPin = 5;
int clockPin = 4;
int dataPin = 2; //The three feet are defined here
void setup ()
{
   pinMode(latchPin,OUTPUT);
   pinMode(clockPin,OUTPUT);
   pinMode(dataPin,OUTPUT); //Three pins are all output states
}
void loop()
```

```
{
  for(int a=0; a<256; a++)
      //The following code loops 256 times
    {
      digitalWrite(latchPin,LOW); //ST_CP writes low levels and is ready to receive data
      shiftOut(dataPin,clockPin,MSBFIRST,a);
      //This is to use the MSBFIRST parameter to make 0-7 pins at a high level (LSBFIRST low level).
It is the parameter of the dataPin.
      //The parameter of clockPin is the variable 'a'
      // After entering the chip, 8 binary numbers will be produced to achieve the function of the
switch.
      digitalWrite(latchPin,HIGH); //Restore the pin of ST_CP to high level
      delay(1000); //Delay one second
    }
}
```