

Lesson 7 Photoresistor

Introduction

In this lesson, you will learn how to measure light intensity using an Analog Input.

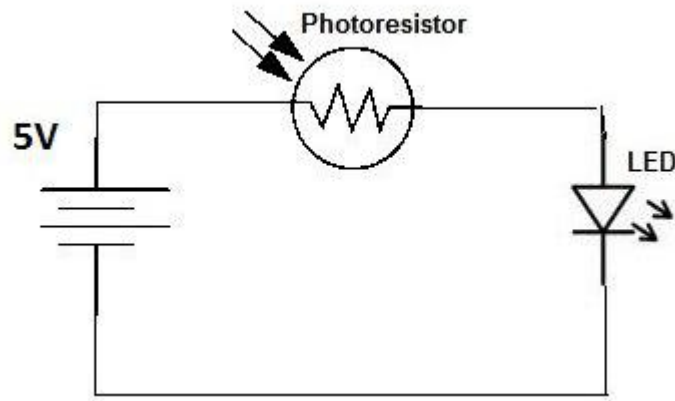
Hardware Required

- ✓ 1 * RexQualis Mega 2560
- ✓ 1 * Breadboard
- ✓ 8 * LED
- ✓ 8 * 220 ohm Resistors
- ✓ 1 * 74hc595 IC
- ✓ 1 * 1k ohm resistor
- ✓ 1 * Photoresistor
- ✓ 14 * M-M Jumper Wires

Principle

Photoresistor

A photoresistor is a light-controlled variable resistor. The resistance of a photoresistor decreases with increasing incident light intensity. A photoresistor can be applied in light-sensitive detector circuits, and light- and dark-activated switching circuits. It's also called light-dependent resistor (LDR).



Code interpretation

```
int lightPin = 0; // Pin to pin AO on the Arduino
```

```
int latchPin = 11; //Pin 12 (RCLK) of the shift register to pin 11 on  
the Arduino - this will be referred to as the "latch pin"
```

```
int clockPin = 12; //Pin 11 (SRCLK) of the shift register to pin 12  
on the Arduino - this will be referred to as the "clock pin"
```

```
int dataPin = 9; //Pin 14 (SER) of the shift register to pin 9 on the  
Arduino - this will be referred to as the "data pin"
```

```
int leds = 0;
```

```
void setup()
```

```
{
```

```
    //The 'setup' function just sets the three pins we are using  
to be digital outputs.
```

```
    pinMode(latchPin, OUTPUT);
```

```
    pinMode(dataPin, OUTPUT);
```

```
    pinMode(clockPin, OUTPUT);
```

```
}
```

```

void updateShiftRegister()
{
    digitalWrite(latchPin, LOW);

    shiftOut(dataPin, clockPin, LSBFIRST, leds);

    digitalWrite(latchPin, HIGH);
}

```

//divide the raw reading by 57 rather than 114. In other words, we divide it by half as much as we did with the pot to split it into nine zones, from no LEDs lit to all eight lit.

//This extra factor is to account for the fixed 1 k Ω resistor. This means that when the photocell has a resistance of 1 k Ω (the same as the fixed resistor), the raw reading will be 1023 / 2 = 511. This will equate to all the LEDs being lit and then a bit (numLEDsLit) will be 8.

```

void loop()
{
    int reading = analogRead(lightPin);

    int numLEDsLit = reading / 57; //1023 / 9 / 2

    if (numLEDsLit > 8) numLEDsLit = 8;

    leds = 0; // no LEDs lit to start

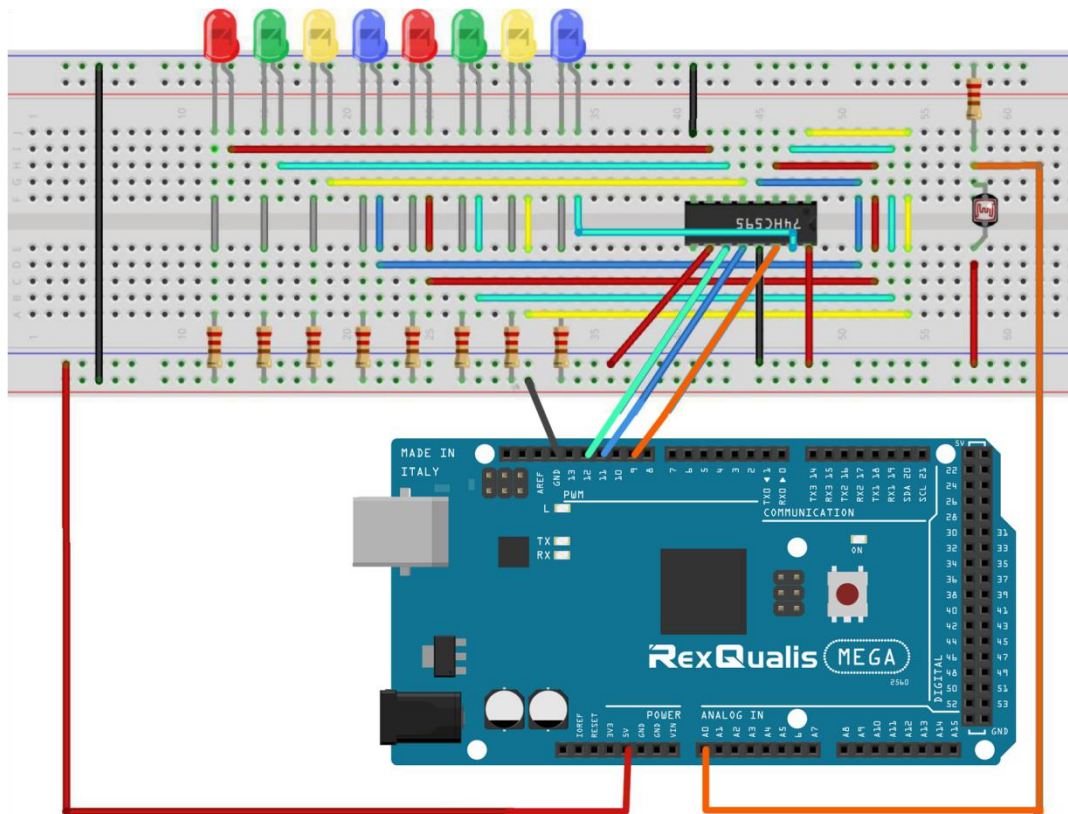
    for (int i = 0; i < numLEDsLit; i++)
    {
        leds = leds + (1 << i); // sets the i'th bit
    }
}

```

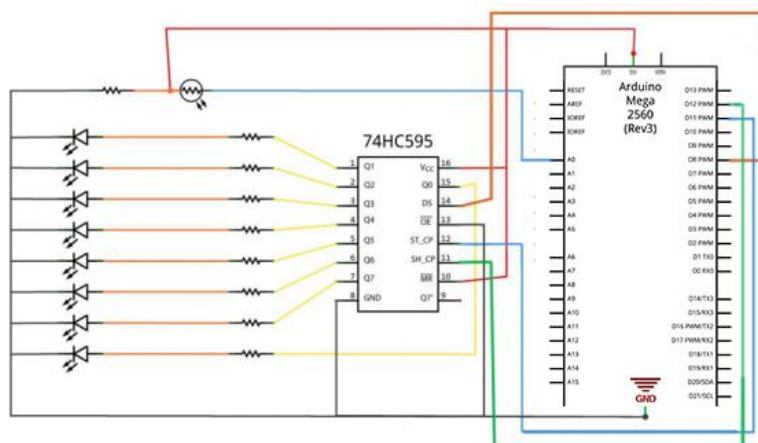
```
updateShiftRegister();
```

Experimental Procedures

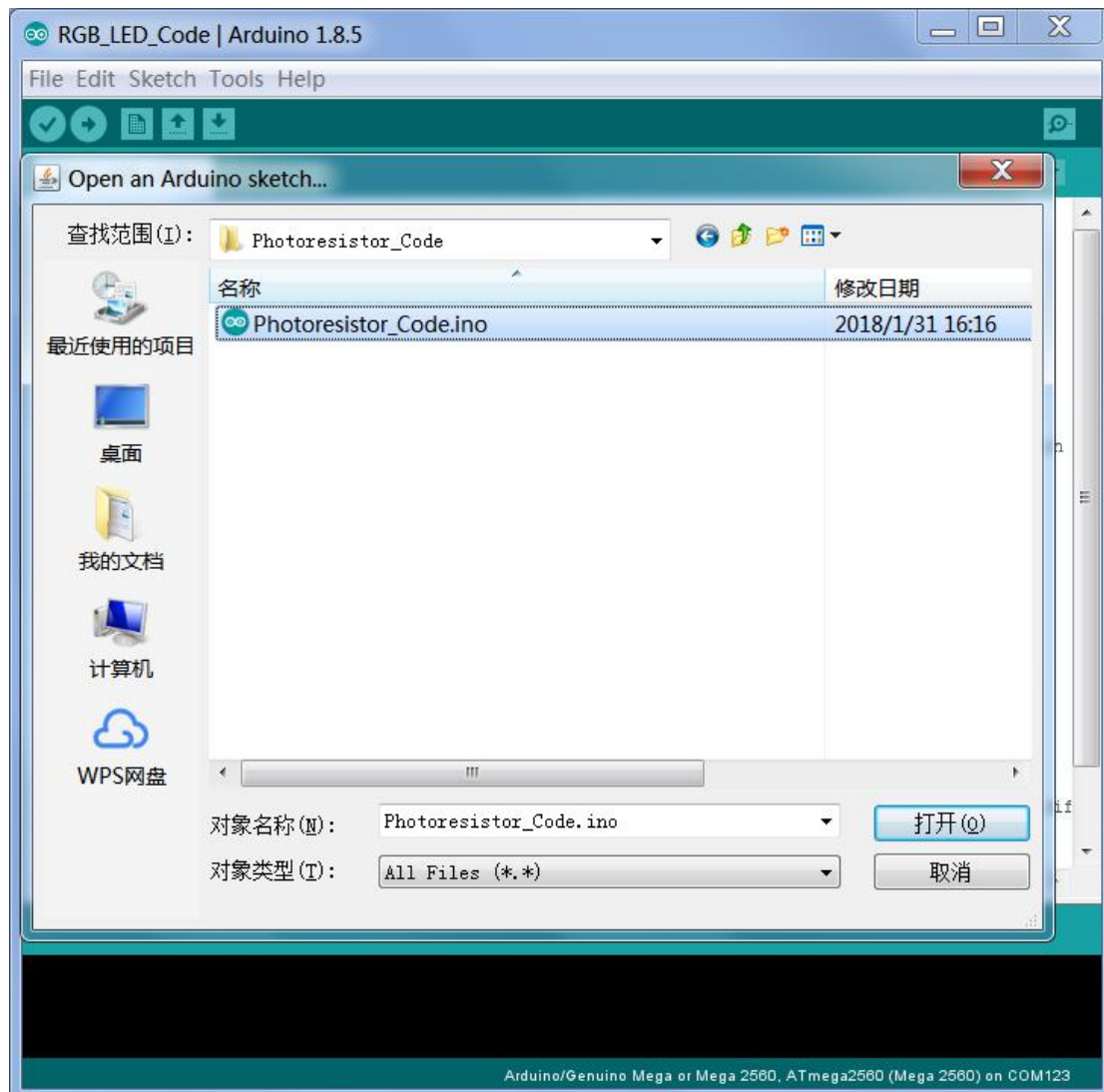
Step 1: Build the circuit



Schematic Diagram



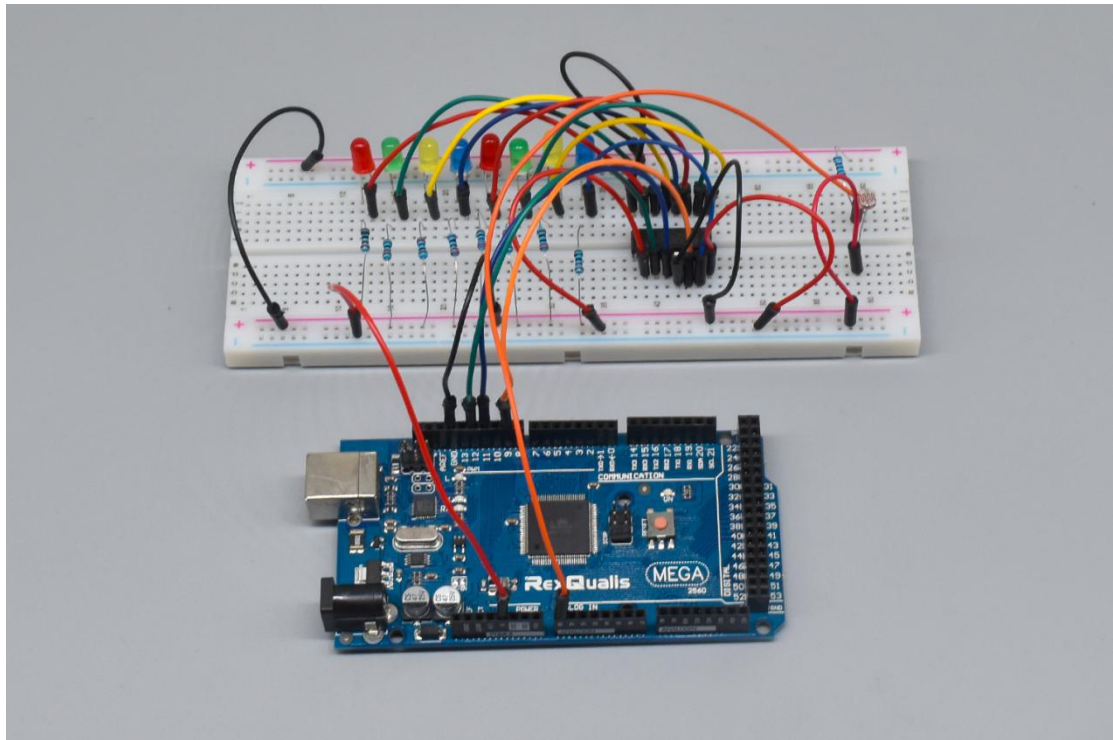
Step 2:Open the code: Photoresistor_Code



Step 3:Attach Arduino Mega 2560 board to your computer via USB cable and check that the 'Board Type' and 'Serial Port' are set correctly.

Step 4:Upload the code to the RexQualis Mega 2560 board.

Then, When you place the light source close to the photoresistor, LED is on in turn.



You can see the video of the experiment results on YouTube:

<https://youtu.be/J20jFA-CZQQ>

If it isn' t working, make sure you have assembled the circuit correctly, verified and uploaded the code to your board. For how to upload the code and install the library, check Lesson 0 Preface.