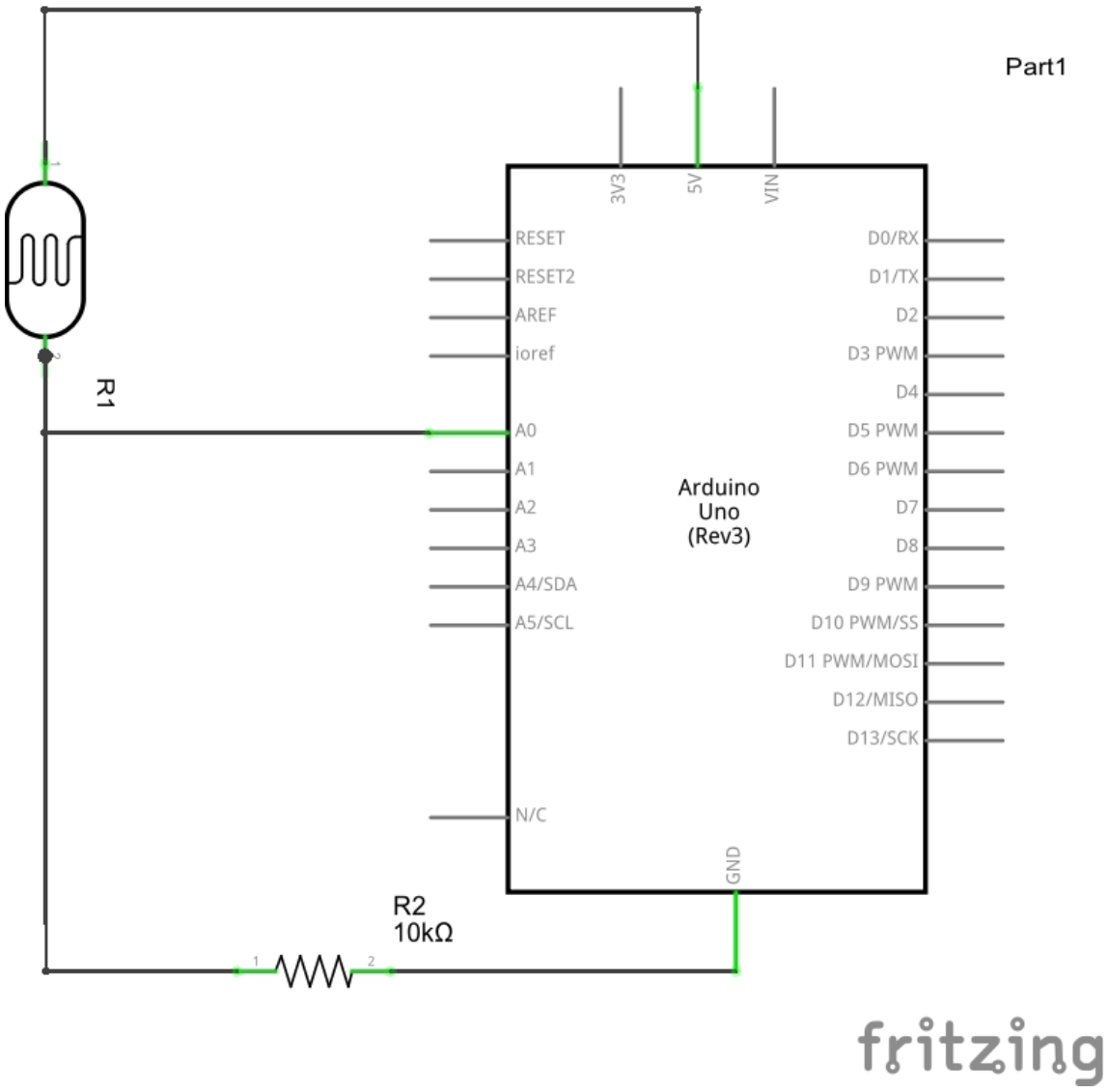
Light Sensor to PC Interface

Before You Start

You should know the basics of inputs and outputs, as well as how to connect circuits on a breadboard. There are many tutorials that teach these skills online, and the previous tutorials (Make Your Own Blink and Keyboard in C Major) will teach you everything you need to know before beginning this workshop.

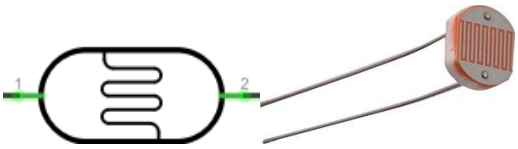
The Circuit

Before we begin to build, lets take a quick look at what the circuit schematic looks like.



THE PHOTO RESISTOR

The only part of the above circuit that should look unfamiliar is the photo resistor, labelled R1. This is a device that is sensitive to light. It varies in resistance from 300Ω to 7MΩ, and can be used to measure light levels.

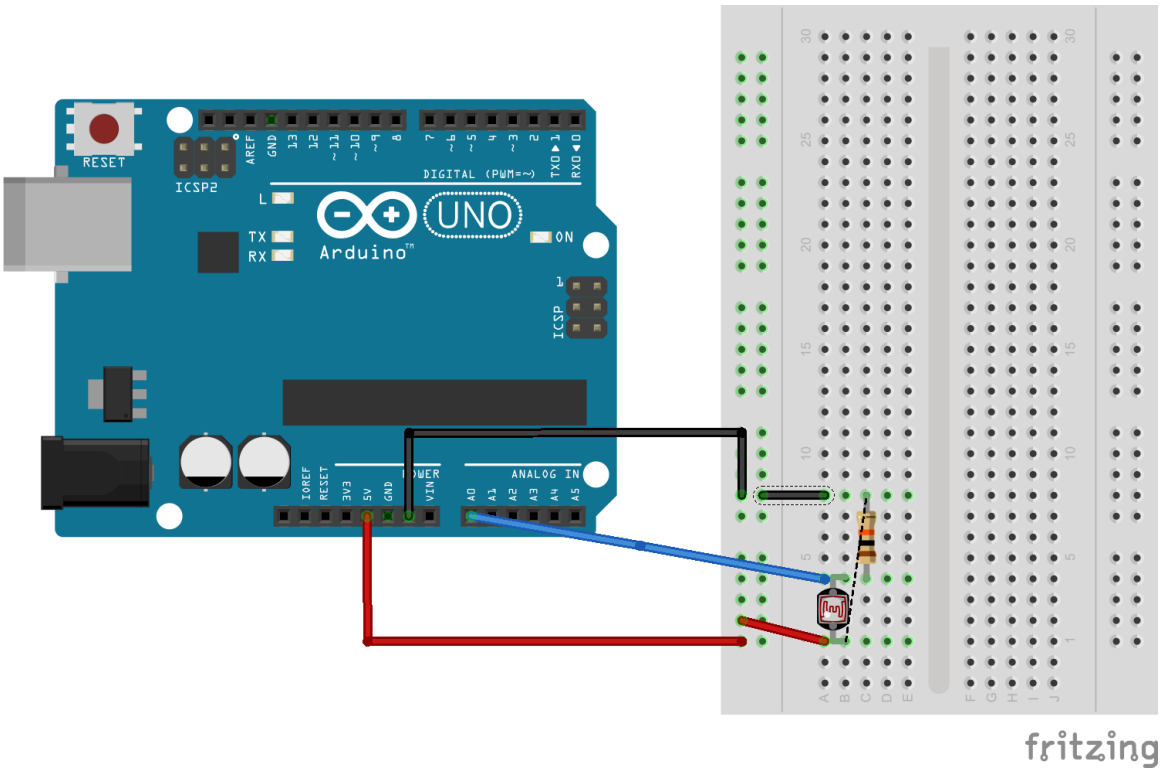


Luckily, this symbol looks very similar to the physical device. These devices generally have a squiggly line on the top, and two leads from either side. You can measure the resistance and see it change using a multimeter.

The Breadboard

Below is an illustration of how the circuit is laid out on a breadboard. It is important to note where we are taking our reading from. The A0 pin is referred to as an “Analog Input”. This means that the microcontroller can read a value that is not 1 or 0, and convert it to a number that we can do computations with.

The reading is being taken from between the photo resistor and the 10kΩ resistor. Using general circuit knowledge, what will the voltage be at the A0 pin when the photo resistor changes it’s resistance to 10kΩ?



The Code

The code for this project is below. The comments walk you through step by step on what each part means. To learn about some of the main concepts in this tutorial's code, look of the following on the Arduino website.

- analogRead()
- Serial
- Serial.println()

```
/*
 * In this program, we will read and print the level of ambient
 * light using an LDR (photoresistor).
 */

 // First we define a value. light_pin is the value of the
 // analog pin to be read. The Arduino automatically knows that
 // we want to use an analog pin when we use analogRead().
#define light_pin 0

// Next, we create a variable that will hold our light value.
// Later, we will see the maximum and minimum value of this
// variable.
int light_value = 0;

void setup()
{
    // You cannot output a true analog value from the analog
    // pins, so their default state (when using analogRead()) is
    // as an input. Therefore we do not need to define any pins
    // as input or output.

    // We want to display the data that we are collecting in
    // a data terminal. The line below sets up a serial
    // connection to the PC, communicating at 9,600 bits per
    // second.
    Serial.begin(9600);  //Begin serial communcation
}

void loop()
{
    // In the loop of the program, we place the code that we
    // want to run over and over again.

    // First, we read the light value from the first analog pin
    // using analogRead(). The Arduino documentation does a very
    // good job of explaining how this function works.
    light_value = analogRead(light_pin);

    // Next, we print a line using println() to the serial
    // connection we opened before. What are we printing? The
    // light value!
    Serial.println(light_value);
```

```
    // Finally, we wait 10 milliseconds, before starting the loop
    // again.
    delay(10);

}
```

Connect your Arduino to your computer, and open the Arduino IDE. Ensure that your Arduino is connected. Next, enter the code above (you don't need to include the comments) into your Arduino IDE.

Click verify (the check mark) to ensure that your code is error free. If everything looks good, then upload the code to the Arduino.

Once the code has successfully uploaded, go to the Tools menu, and select "Serial Monitor". You can view the values the Arduino is reading here. Also try looking at the data in "Serial Plotter".

The Result

The result should be a fully functional light sensor! Time to explore a few things!

1. What are the maximum and minimum values for the light source? Why might that be the case?
2. Are we measuring light levels directly? Or are we measuring something different?