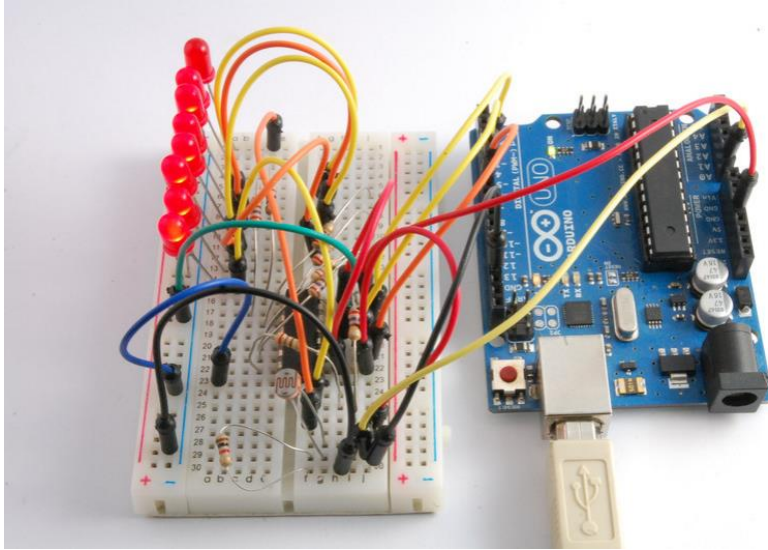


Overview

In this lesson, you will learn how to measure light intensity using an Analog Input. You will build on lesson 8 and use the level of light to control the number of LEDs to be lit.



The photocell is at the bottom of the breadboard, where the pot was in lesson 6.

Parts



5 mm Red LED - 8



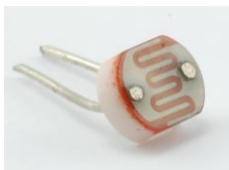
220 ohm resistor (red, red, black, black, brown) - 8



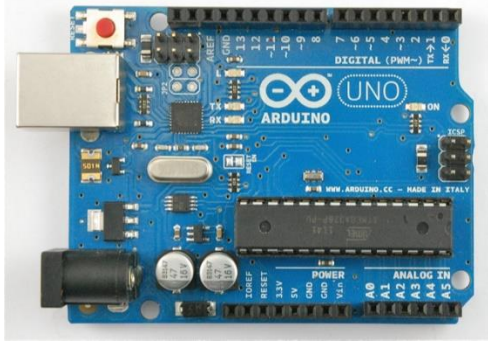
1 K ohm resistor (brown, black, black, brown, brown) - 1



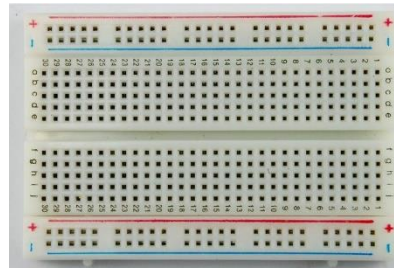
74HC595 Shift Register - 1



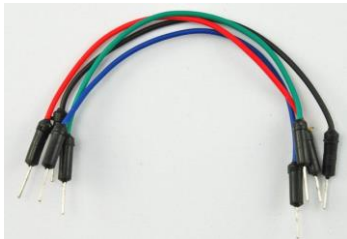
Photocell (Light Dependent Resistor) 1



Arduino UNO R3 - 1



breadboard - 1

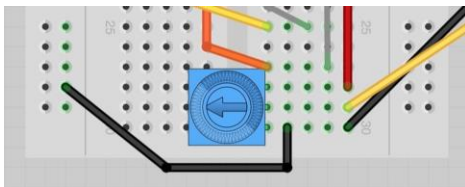


Jumper wires - 14

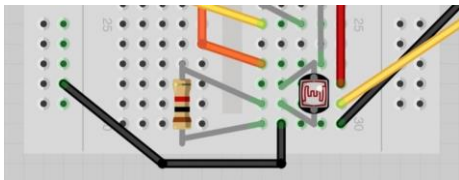
Breadboard Layout

The breadboard layout for this lesson is the same as for lesson 6, except that the pot is replaced by an LDR and a 1 k Ω resistor.

Here is the layout for lesson 6, near the pot.



Simply remove the pot and replace it with the photocell and resistor as shown below:

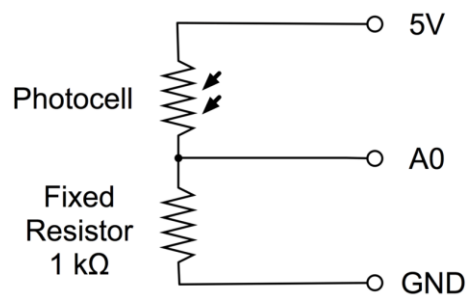


Photocells

The photocell used is of a type called a light dependent resistor, sometimes called an LDR. As the name suggests, these components act just like a resistor, except that the resistance changes in response to how much light is falling on them.

This one has a resistance of about 50 k Ω in near darkness and 500 Ω in bright light. To convert this varying value of resistance into something we can measure on an Arduino's analog input, it need to be converted into a voltage.

The simplest way to do that is to combine it with a fixed resistor.



The resistor and photocell together behave rather like a pot. When the light is very bright, then the resistance of the photocell is very low compared with the fixed value resistor, and so it is as if the pot were turned to maximum.

When the photocell is in dull light the resistance becomes greater than the fixed 1k Ω resistor and it is as if the pot were being turned towards GND.

Load up the sketch given in the next section and try covering the photocell with your finger, and holding it near a light source.

Arduino Code

Get the sketch from your teacher and load it onto your Arduino board.

The first thing to note is that we have changed the name of the analog pin to be 'lightPin' rather than 'potPin' since we no longer have a pot connected.

The only other substantial change to the sketch is the line that calculate how many of the LEDs to light.

This time we divide the raw reading by 57 rather than 114 from lesson 6. 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 $1\text{ k}\Omega$ (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 9).