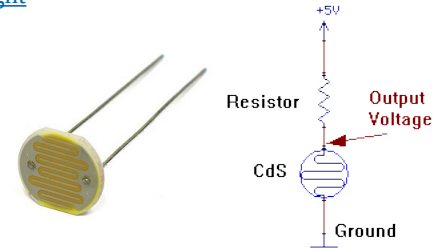


Playing Music With Light!

From https://github.com/LetsCodeBlacksburg/arduino_music-w-light

What:

A light sensing cell or photo-resistor or Cadmium Sulfide (CdS) cell turns light into a variable resistance. Usually dark = high resistance and high light = low resistance. In simple terms it is a bit like a volume knob for light!

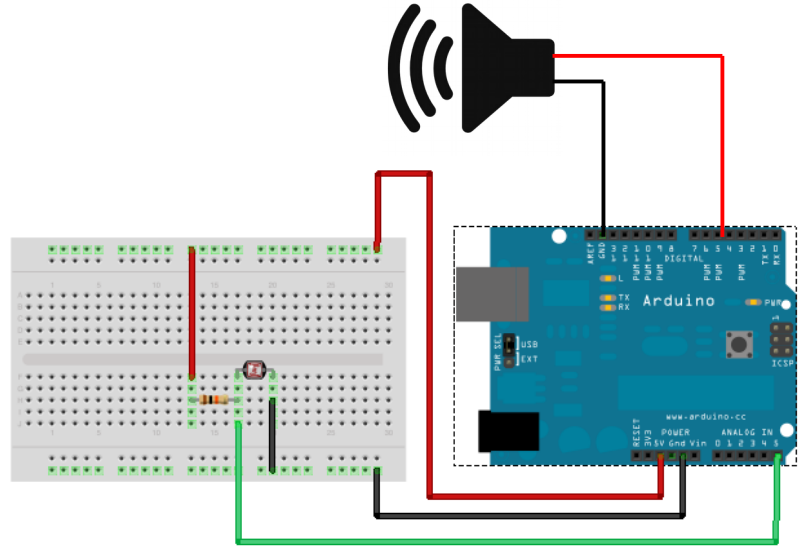


Just like a volume knob, a light sensor can be used as an input to change programming values for time delays, controlling a motor or even making sounds!

How:

This circuit is pretty straight forward. It is a light sensor and a 1k ohm resistor wired in series (between +5V and GND on the breadboard), and you take the voltage measurement from where the sensor and resistor meet on the breadboard.

This will give you a roughly 0.5v (value in the arduino with a light shining on it) to 3.5v (value in the arduino in ambient light) range read in from the arduino.



Here's the code:

Wiring diagram for the 1k resistor and light sensor.

```
// This program reads in light from the A5 (analog in pin #5) and converts
// it to a number from 0 - 1023. Then we can tell the speaker, using the
// command "tone(pin,freq,duration)", what tone to play! This makes a
// touch-less musical instrument called a Theremin! Cool!

int lsInPin = A5;      // the analog input pin we're reading the light values from
int ls_value = 0;      // the light sensor value to record the light level (value of 0-1023)
int soundOutPin = 5;   // the sound output pin assignment (where to send the sound variable)

void setup()
{
    Serial.begin(9600);
    pinMode(lsInPin, INPUT);      // configures the lsInPin as an INPUT
    pinMode(soundOutPin, OUTPUT); // configures the soundOutPin as an OUTPUT pin
}

void loop()
{
    ls_value = analogRead(lsInPin); // reads the light sensor values from the "ls" pin (A5)
    Serial.println(ls_value);        // prints light sensor (ls_value) to serial monitor


    // 1) Click compile/upload (upper left two icons)
    // 2) Click the Serial Monitor (upper right) to watch incoming data (ls_value)
    // 3) Fill in the tone() command below with pin & light value data to "play" the light.


    //tone(pin#,frequency); // Step3, uncomment and fill in pin# and frequency
    delay(250);             // optional delay (in milliseconds) to slow things down.
}
```

Activity Instructions:

Follow the activity instructions below to learn how to talk to the arduino and make it do your bidding!

- 1) Try running the program first and see if you can get any light readings out of the arduino. Lots of light will make small numbers, and darkness will make large values.

NOTE: You will need to click the  button to compile and upload your program from the laptop to the arduino each time you make a change to the program.

Q1: Did the program appear to upload and start running? A1: Y / N Inst: _____
(click the serial monitor button  (upper right) to see the light values)

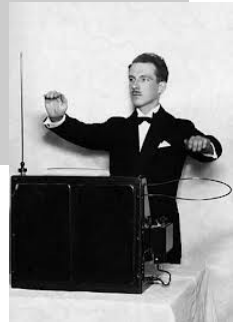
Q2: What did the serial monitor show you? What were the max and min values? Inst: _____
A2: _____

Info:

Ever hear of a Theremin? It's a musical instrument you can play by holding your hand over it! You can make one by combining filling the the variables in the tone() command below.

```
tone(<?soundpin>, <?freq>, <?time>); //The sound making line
```

Follow the directions below to complete this activity!



- 2) Type the tone command above into the arduino programming interface, except:
- Use the variable or pin number that the light sensor is hooked to.
 - Now plug in a frequency. Try 1000 Hz and a duration or time to play it. (1000 Hz is the “beep” frequency used to bleep out bad words in music on the radio)
 - Now compile and upload your new program and record what it does below:

Q3) Did your program play any sounds? What? Inst: _____

- 3) Now figure out how to get the tone command to play your light data. Inst: _____
Q4) What did you do to get it to play the light as sound?

Here's a video of the real Mr. Theremin playing the instrument that he created a long time ago!
<http://www.youtube.com/watch?v=w5qf9O6c20o>

You can get your own Arduino and parts for this project at Amazon.com!

Here's tons more information on the Arduino: <http://learn.adafruit.com/lesson-0-getting-started/the-lessons>