

# Synesthesia Glove Tutorial

*Goal:* To build a synesthesia glove that takes in inputs from the visible spectrum (RGB inputs) as well as infrared and ultraviolet light inputs, and outputs pitches based on the light wavelengths and intensities. In other words, the glove converts light into sound.

## *What is Arduino?*

Arduino is a hardware and software platform used for building DIY electronics projects. Arduino boards can be programmed through the Arduino IDE (download here: <https://www.arduino.cc/en/Main/Software>). Arduino boards can be programmed to take various real-world inputs (like sensing light and/or color) and create outputs (like turning on an LED or playing sounds).

Optional Links to Learn More:

Introduction: <https://www.arduino.cc/en/Guide/Introduction>

Arduino Programming Language: <http://www.arduino.org/learning/reference>

Arduino IDE examples: <http://www.arduino.org/learning/tutorials/ide-examples>

## **Steps for building the Synesthesia Glove**

1. Test and connect the color sensor and test the neoPixel.
2. Test audio driver with the color sensor
3. Test the color sensor and the IR/UV sensor (optional)
4. Attach all the components to the glove.

## **Test and connect the color sensor**

1. Install the necessary drivers for the arduino sensors. Go to the “Synesthesia Libraries” folder:

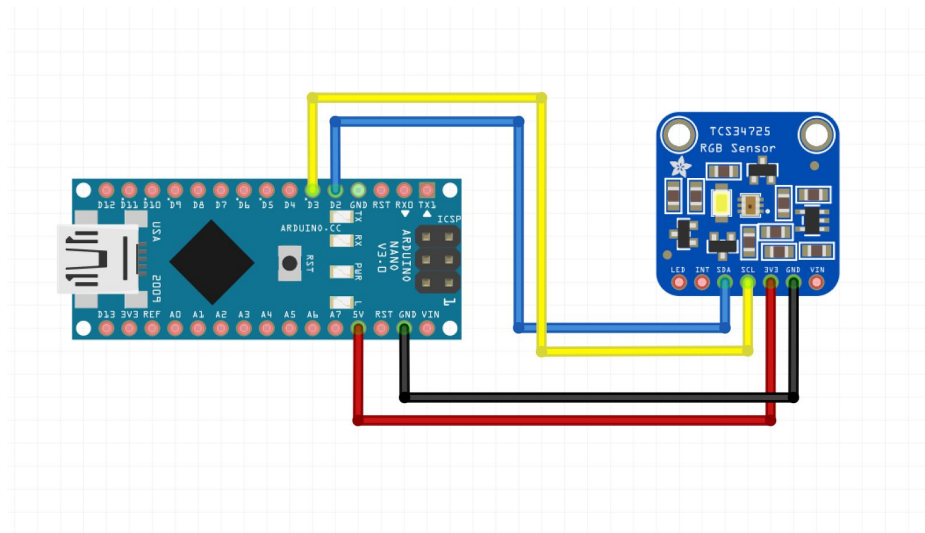
(Dropbox → ASU Course → Hardware → Glove → Arduino → Synesthesia Libraries)

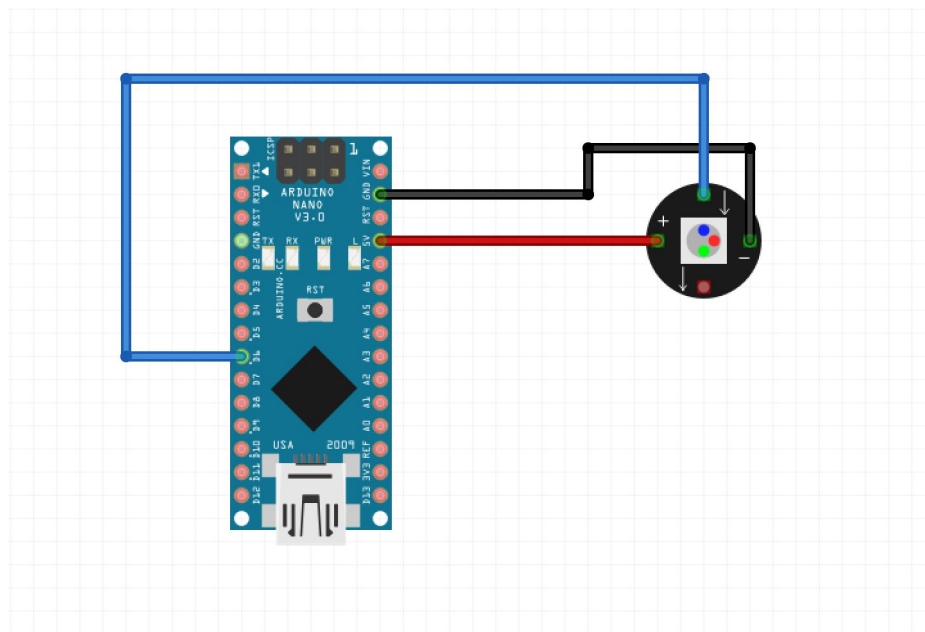
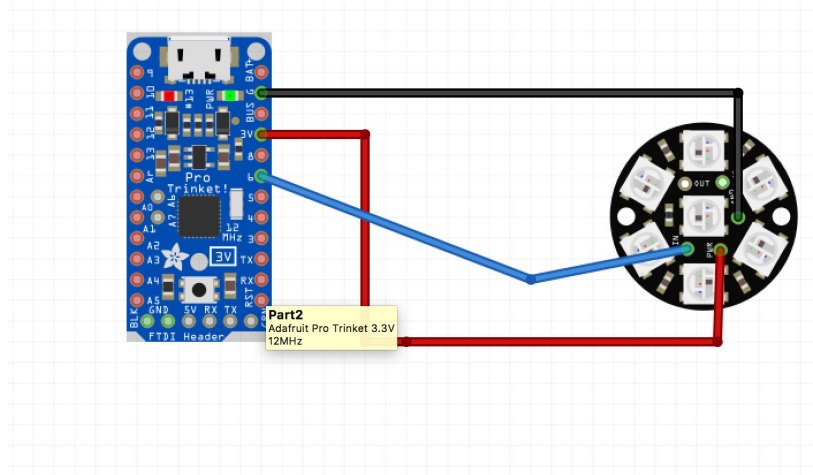
Copy all the subfolders into your own ‘libraries’ folder within your ‘Arduino’ folder.

2. Solder each arduino, following the guidelines and safety tips taught:

- Take the line of solder in one hand and the hot wand in the other
- Touch the tip of the solder and the tip of the hot wand onto each pin on the arduino. The solder should melt onto the tip.
- Hold the hot wand on each tip so that the melted solder lowers on each pin and is neatly wrapped around.

3. Follow the circuit diagram to connect and complete the components:





4. Open colorview code on arduino:

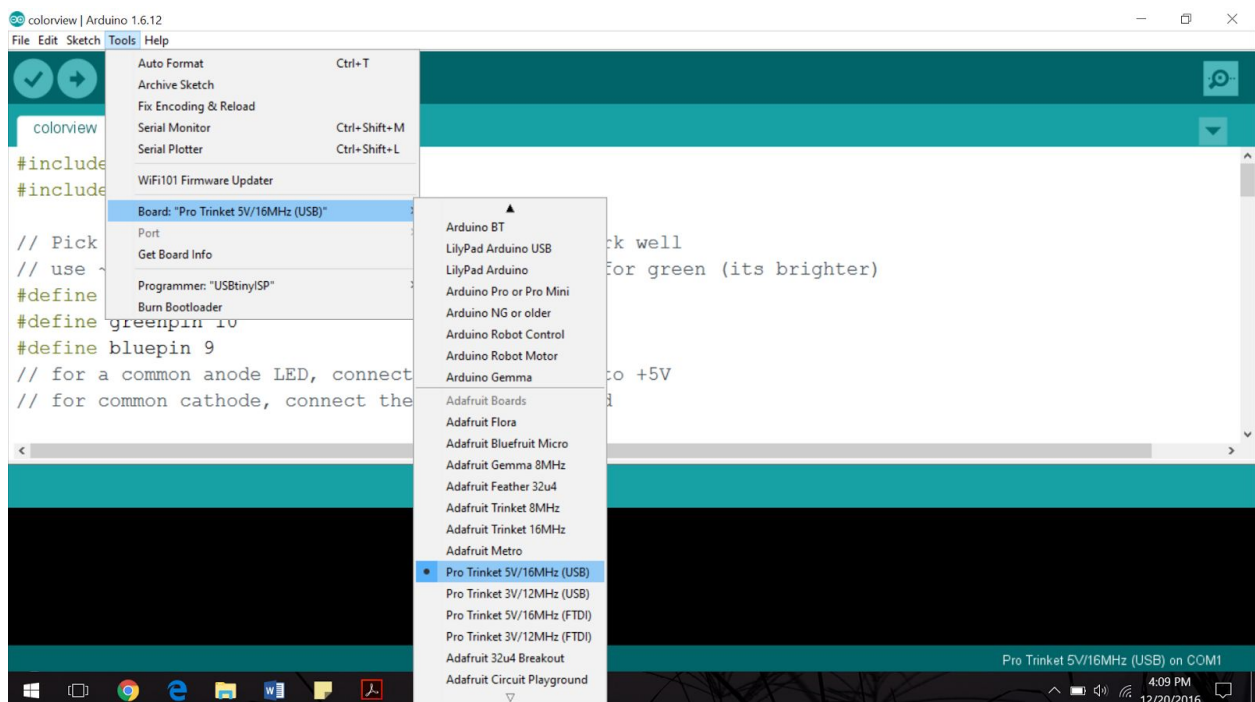
(Dropbox → ASU Course → Hardware → Glove → Arduino → RGBsensorsTest → RGBsensorsTest.ino)

The code The code should look like this:

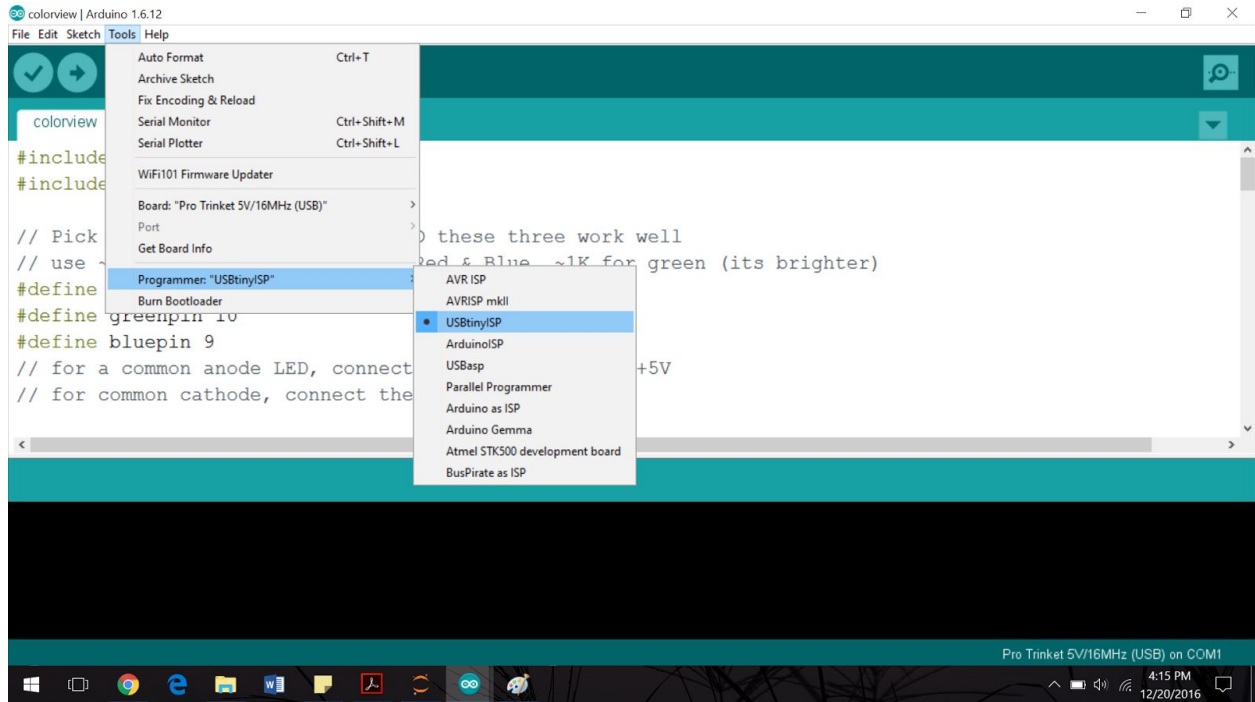


5. Upload the code onto the arduino:

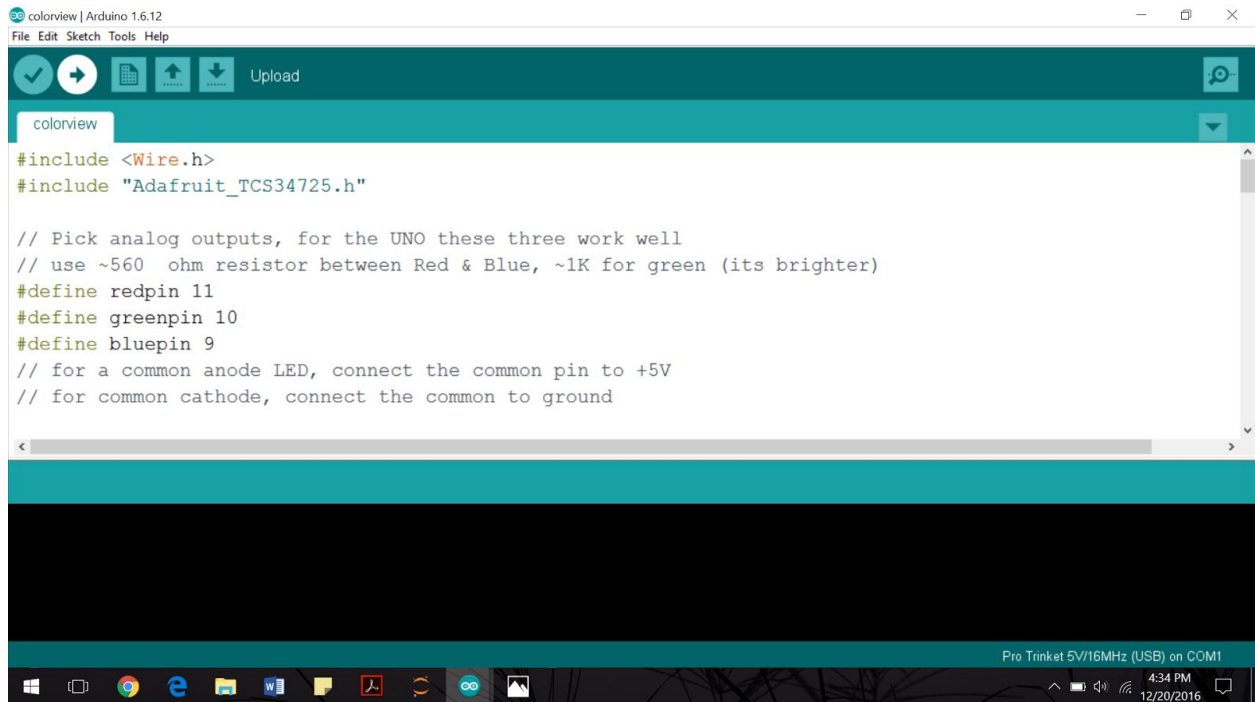
- Plug the USB wire connecting the arduino to your computer
- In the arduino console, go to Tools, then change the board to the **“Pro Trinket 5V/16MHz (USB)”** o to **Arduino/Genuino Micro**



- Also under Tools, Change the Programmer selection to **“USBtinyISP”**



- Press the upload button (a right-arrow that's the 2nd button from the left at the top bar)



After uploading, your screen should look like:

```
colorview | Arduino 1.6.12
File Edit Sketch Tools Help

colorview

#include <Wire.h>
#include "Adafruit_TCS34725.h"

// Pick analog outputs, for the UNO these three work well
// use ~560 ohm resistor between Red & Blue, ~1K for green (its brighter)
#define redpin 11
#define greenpin 10
#define bluepin 9
// for a common anode LED, connect the common pin to +5V
// for common cathode, connect the common to ground

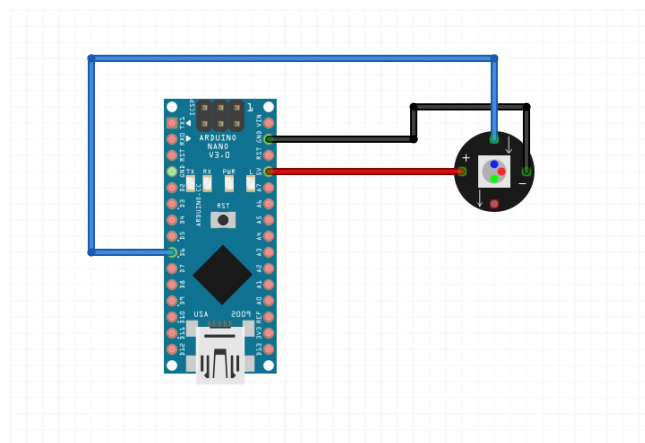
Done uploading

Sketch uses 6,826 bytes (23%) of program storage space. Maximum is 28,672 bytes.
Global variables use 749 bytes of dynamic memory.

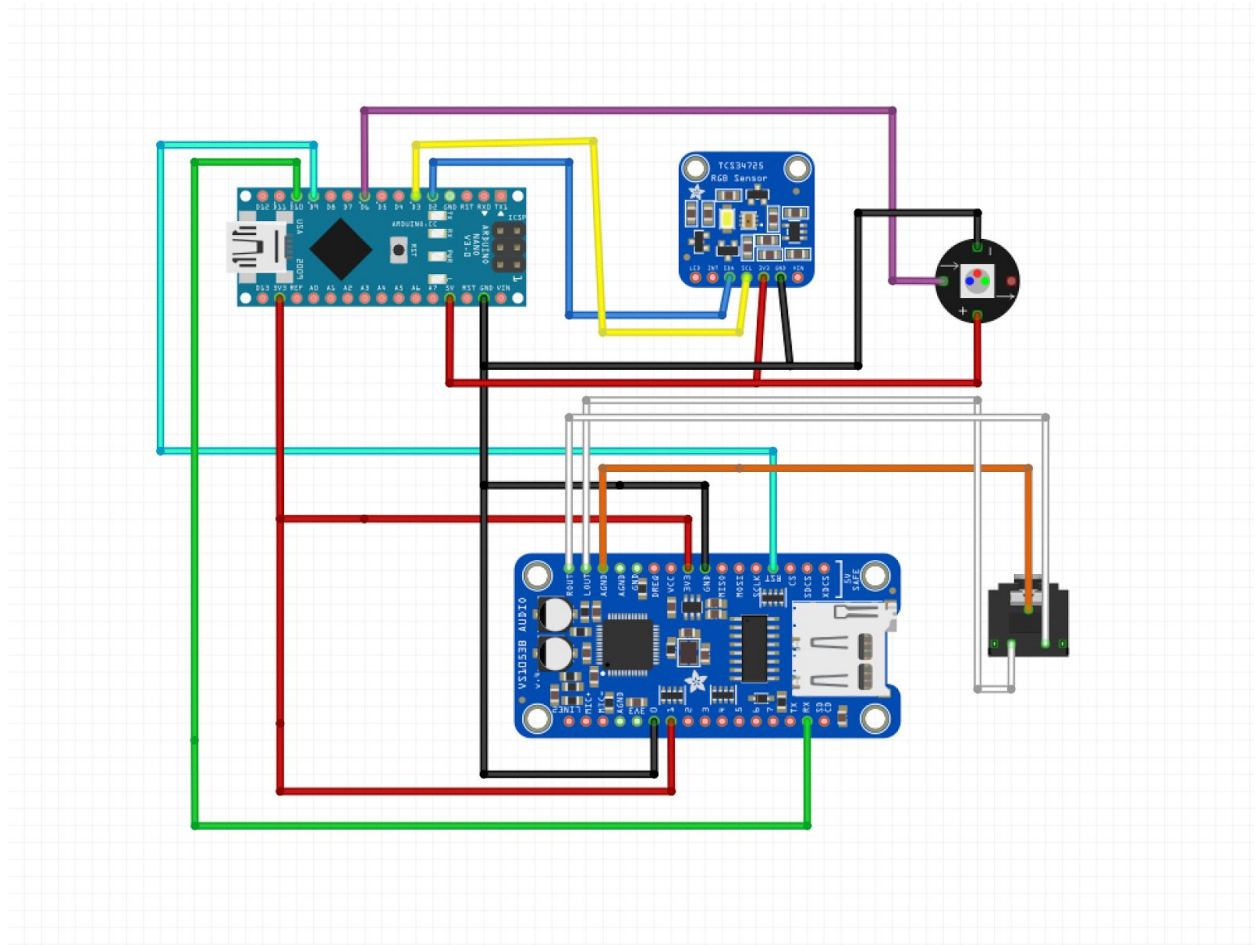
1 Pro Trinket 5V/16MHz (USB) on COM1
4:35 PM
12/20/2016
```

**Test the Neopixel LED** with the 'simplified' file from the library folder.

Upload it and watch the led turn on! You can play around with the code and change the color as well (look for the line `pixels.setPixelColor(i, pixels.Color(0,75,75))`)

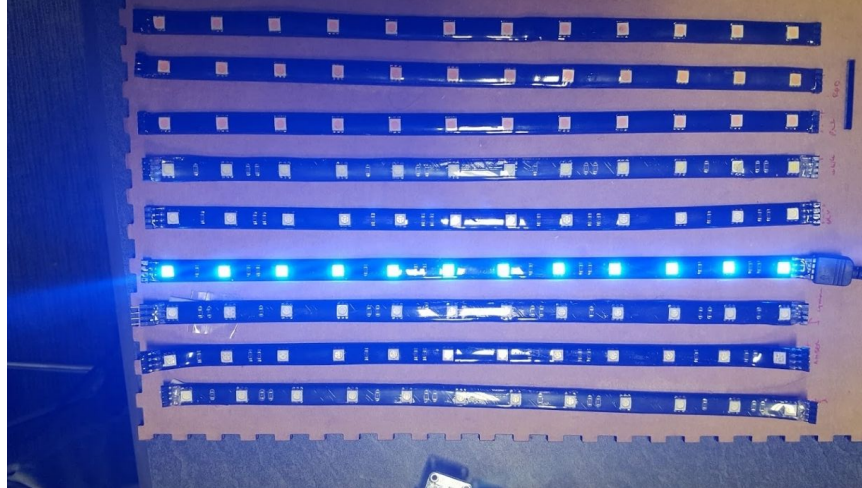


## Connected components



Use code **Sound\_Glove**

Upload **Sound\_Glove** onto the arduino board. Then, test out the software by placing various-colored objects on the sensor and listening for sounds.



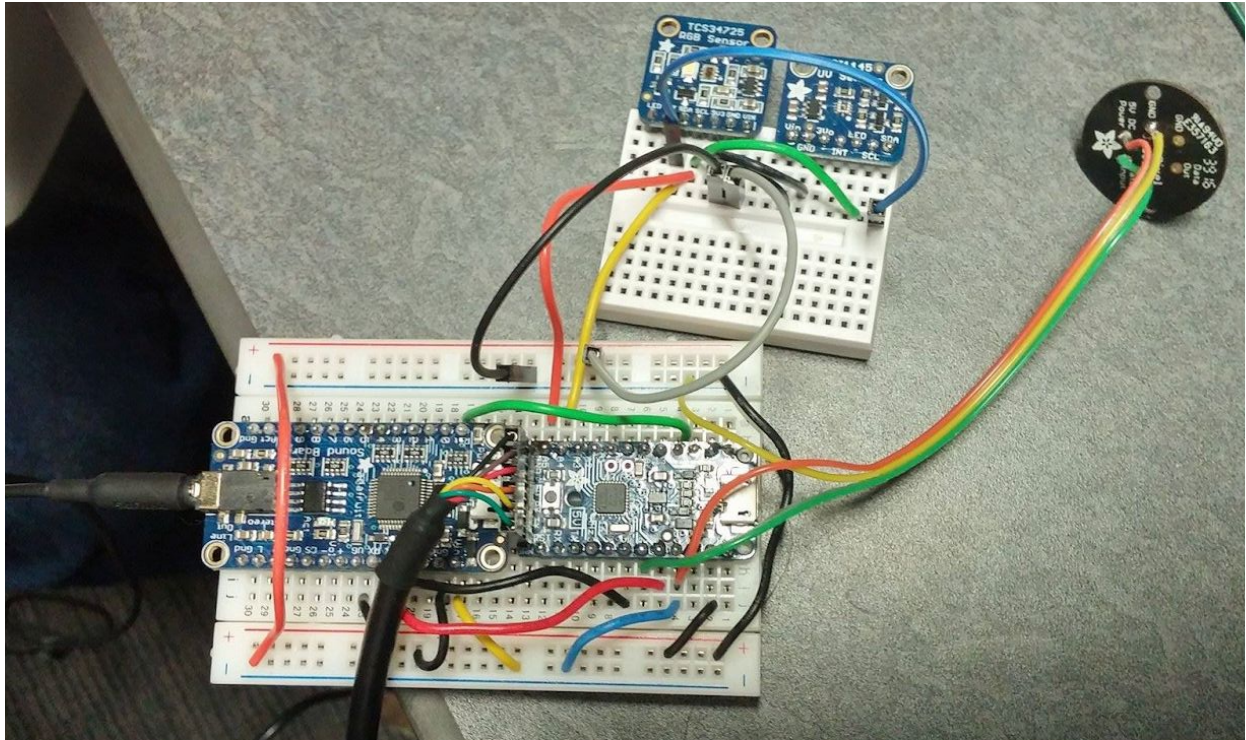
(UV Light Strips)

Then, upload the colorview file again and place various colored objects near the color sensor to watch the LED change color!



## Build the glove

All the components connected correctly.



Feel free to take a look at the PianoGlove, which has a similar design:  
<https://learn.adafruit.com/pianoglove/what-youll-need>. Here's a sample glove design as well:

