

Print Screen Festival

Pop-up School:

DIY Wearable Tech

Kaho Abe

May 17th, 2016
Holon Mediatheque

Introductions

I am Kaho.

- Media Artist, Game Designer
- Former Fashion Designer
- Teacher at New York University and local high school







Schedule

17:00 Start & Introductions

17:30 Gloves Controller

18:30 Trinket & Interaction

19:30 Neopixels

20:00 Code

20:30 Free Making Time

21:45 Final Thoughts

- conductive fabric
- alligator clips

Kaho Abe at Print Screen Festival Pop-Up Workshop for Women
May 17th, 2016

* Clapping Gloves * Game Controller

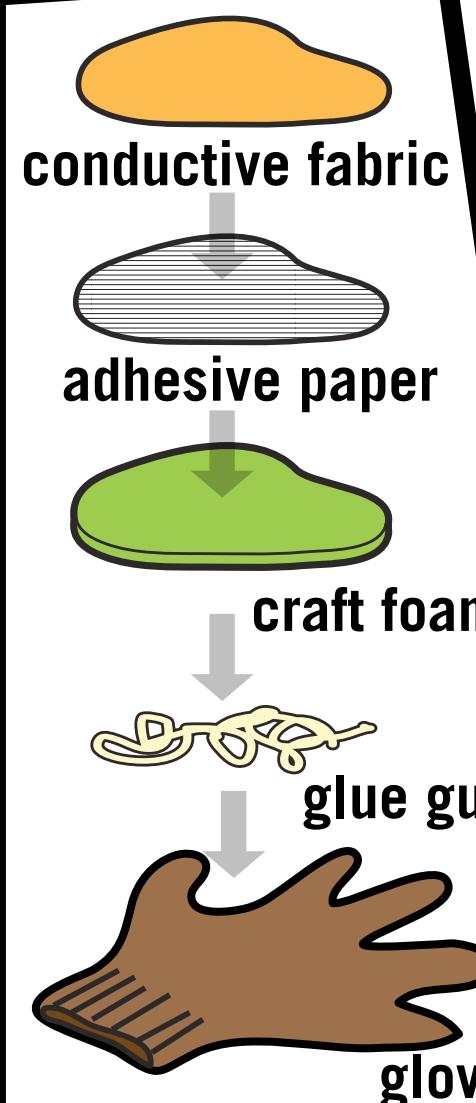
TOOLS

- glue gun & glue sticks
- iron & ironing table
- muslin cotton fabric

MATERIALS

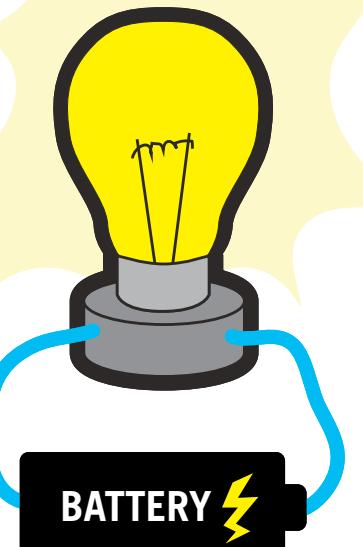
- 1 pair gloves
- adhesive paper
- craft foam
- conductive fabric
- alligator clips

LAYERS



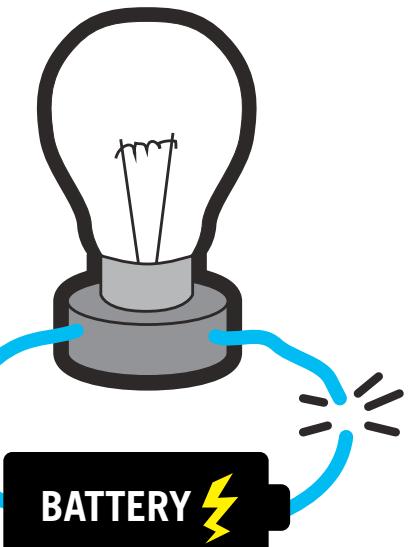
WHAT IS A CIRCUIT??

ON!



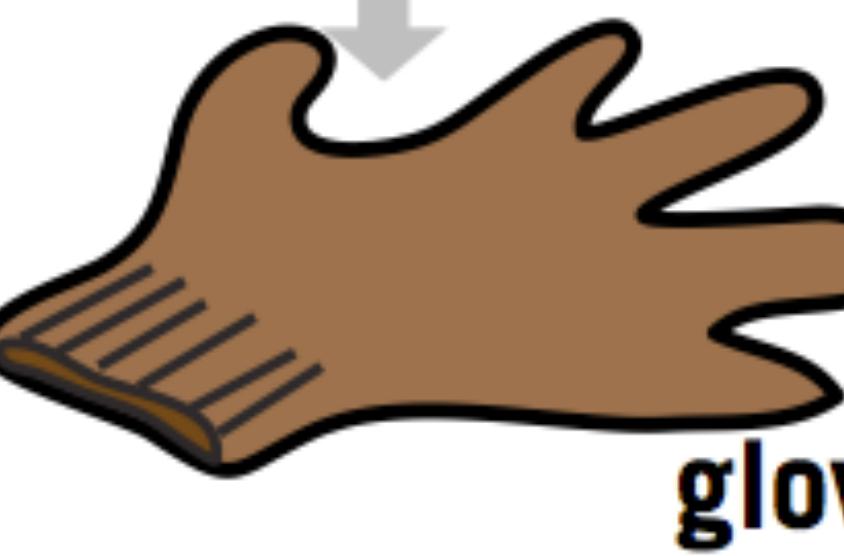
Circuit is made.

OFF.



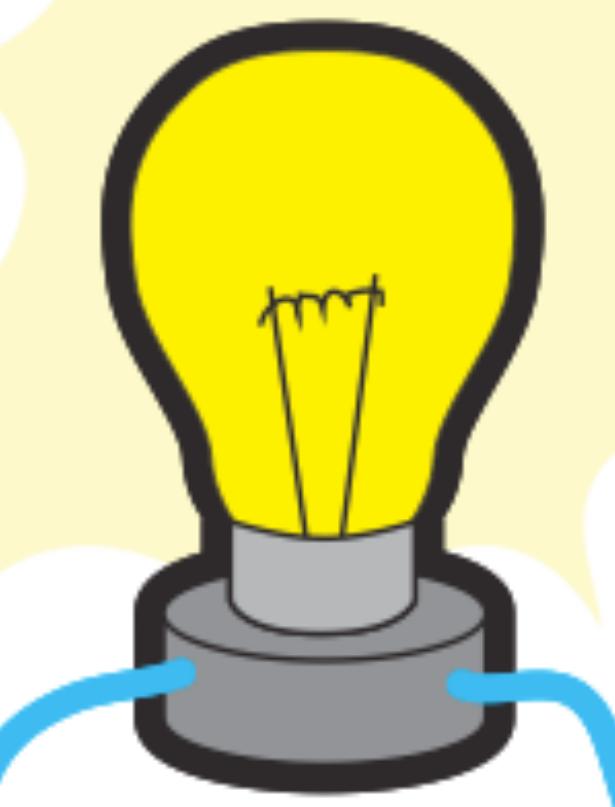
Circuit is broken.

LAYERS



WHAT IS A CIRCUIT??

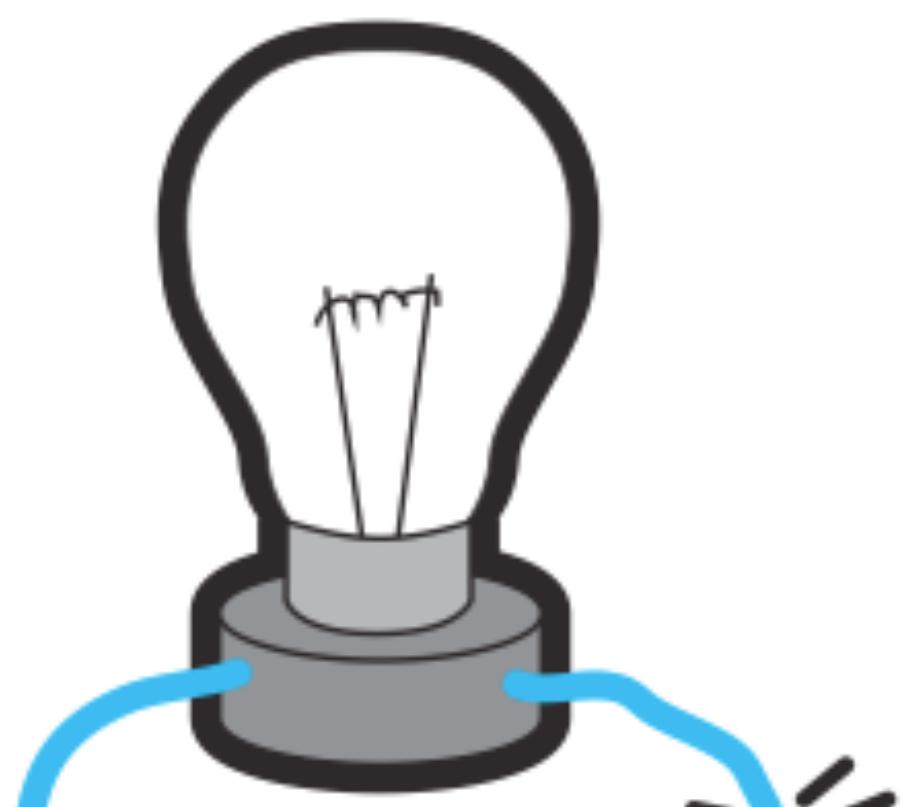
ON!



BATTERY ⚡

Circuit is made.

OFF.



BATTERY ⚡

Circuit is broken.

STEP 1: CUT TEMPLATE & MATERIALS



X2

conductive fabric

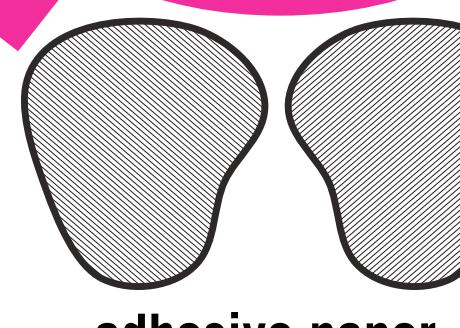


X2

craft foam



* MIRRORED!
ONE FOR LEFT
ONE FOR RIGHT



adhesive paper

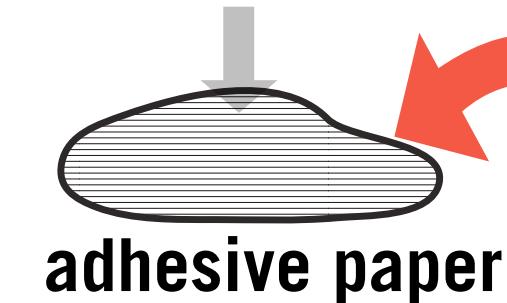
STEP 2: IRON ADHESIVE PAPER TO CONDUCTIVE FABRIC



* DRY
IRON
ONLY

* TO
PROTECT
IRON

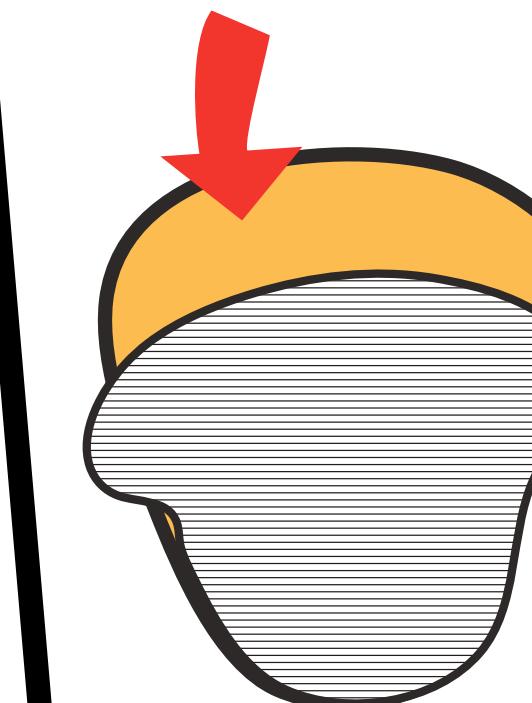
cotton fabric



adhesive paper

conductive fabric

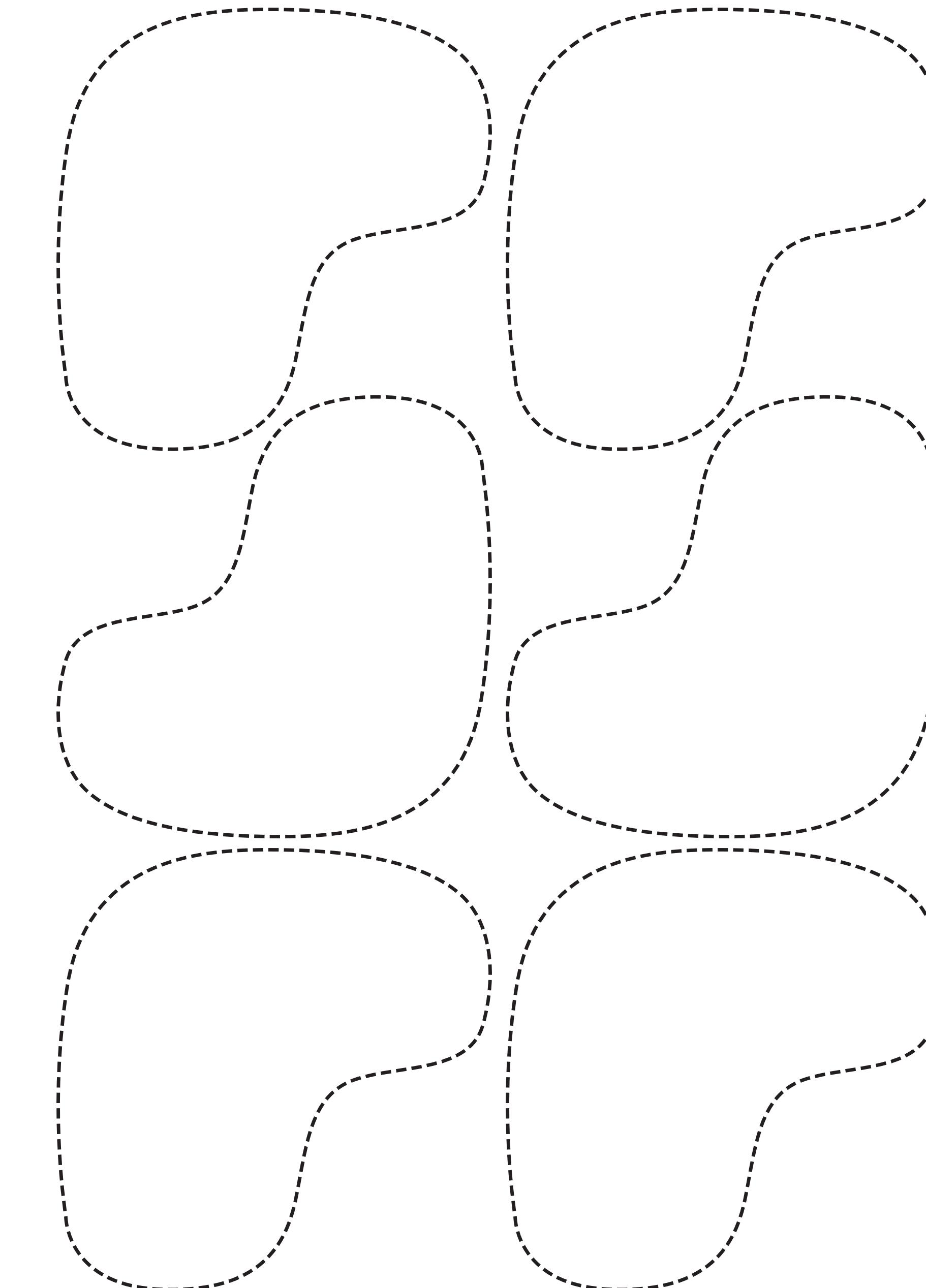
ADHESIVE LAYER



STEP 3:
PEEL PAPER OFF
LEAVING ADHESIVE
LAYER ON
CONDUCTIVE
FABRIC

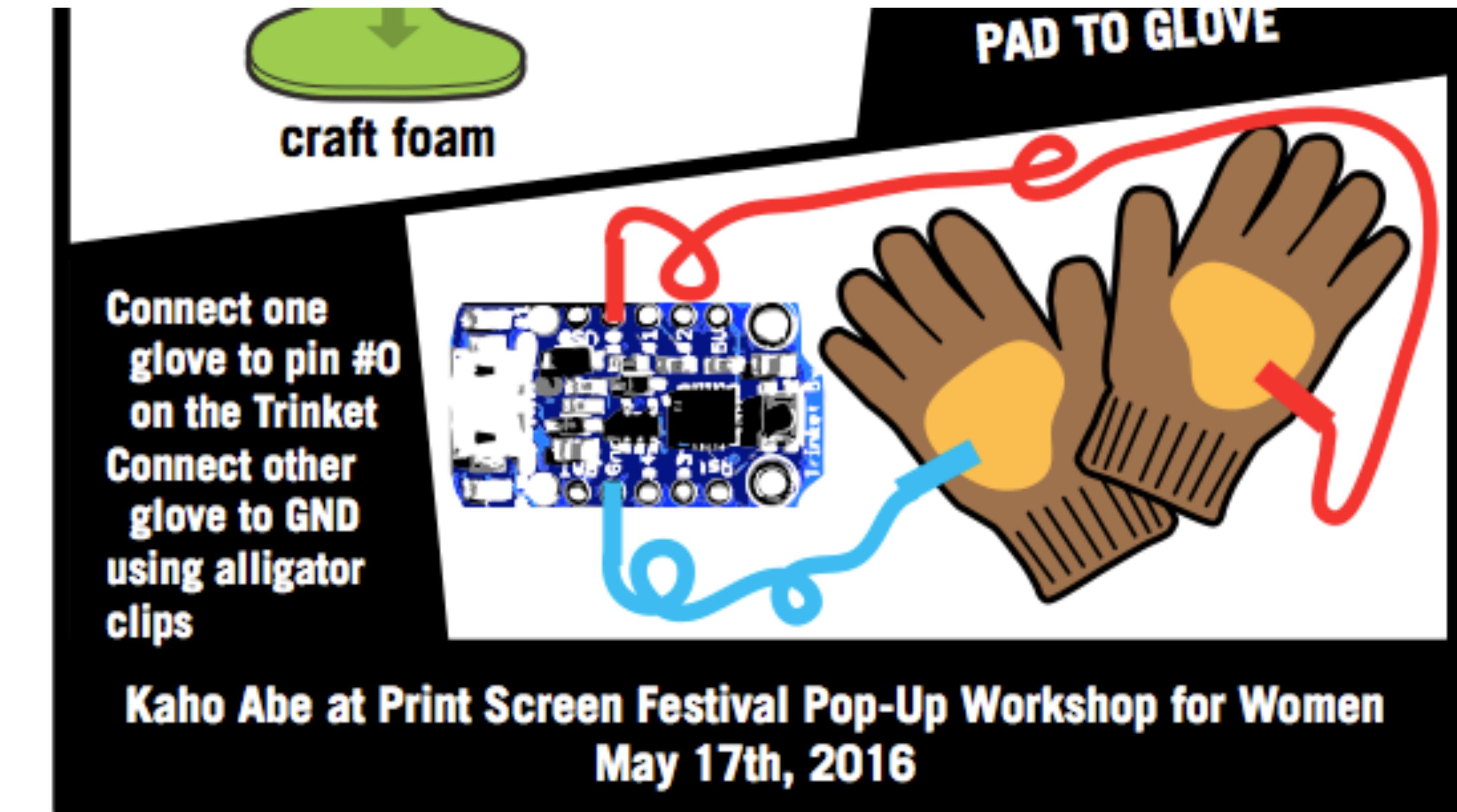
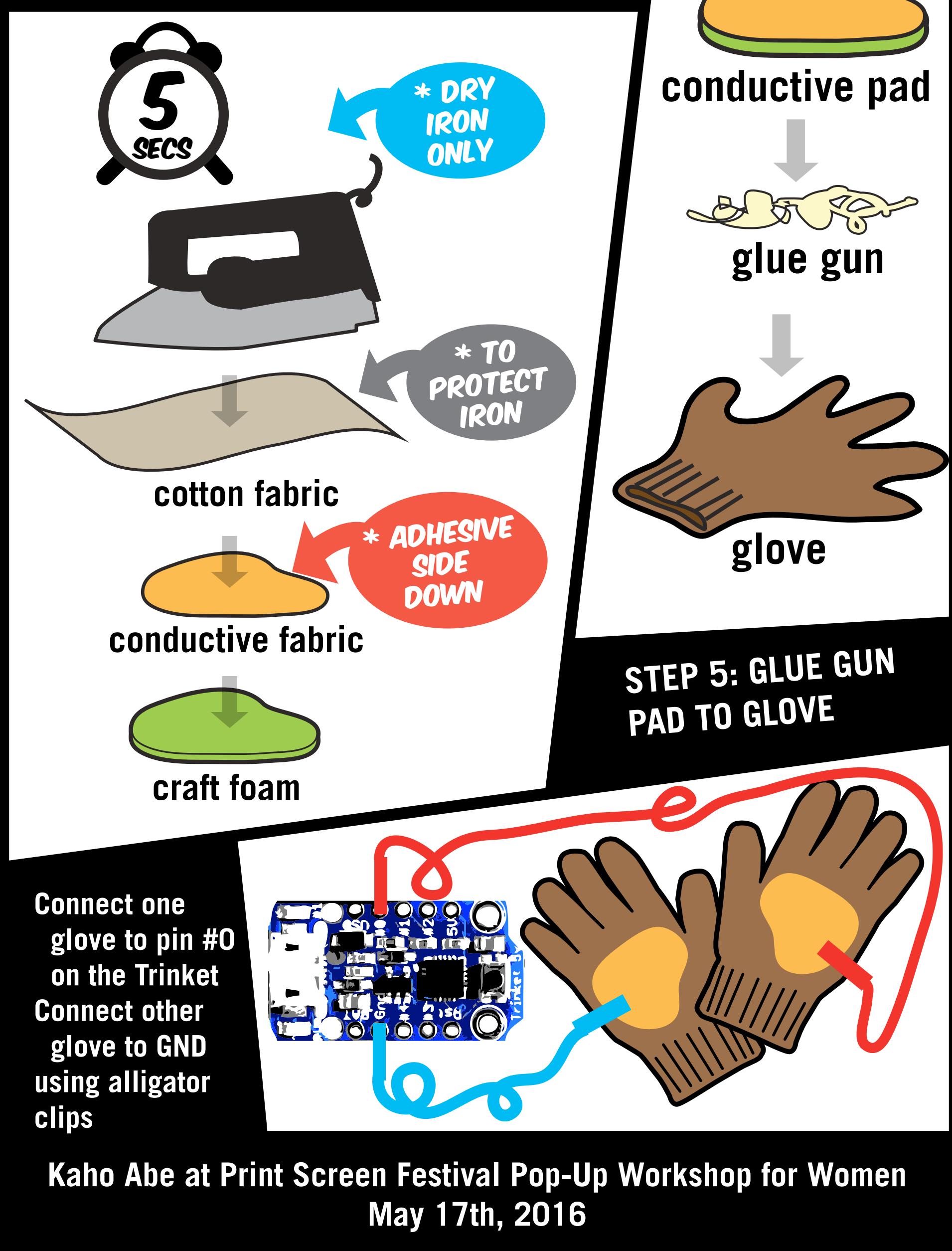
Kaho Abe at Print Screen Festival Pop-Up Workshop for Women

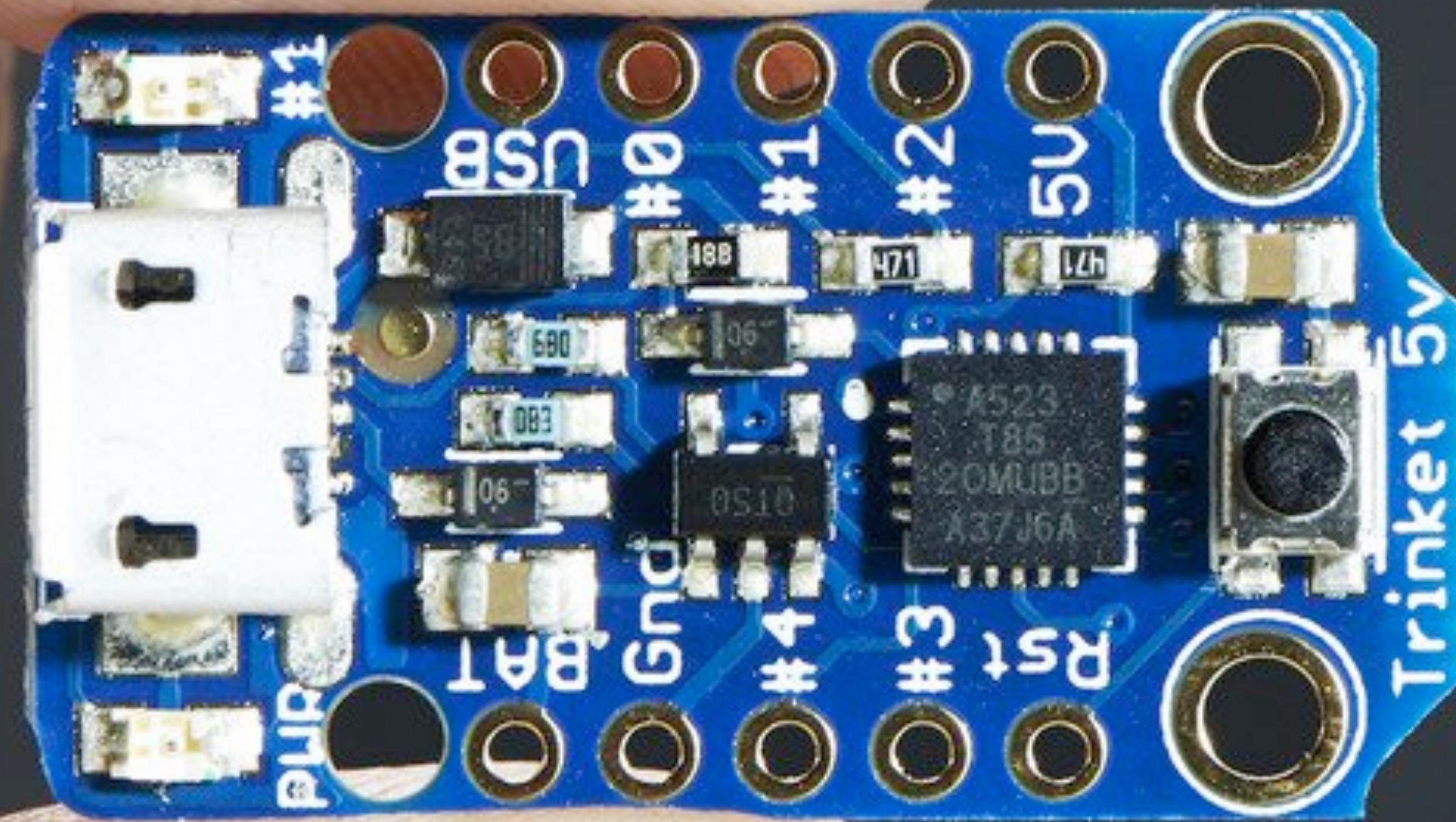
May 17th, 2016



TEMPLATE FOR WORKSHOP: PRINT AT 100% SCALE

STEP 4: IRON CONDUCTIVE FABRIC TO CRAFT FOAM



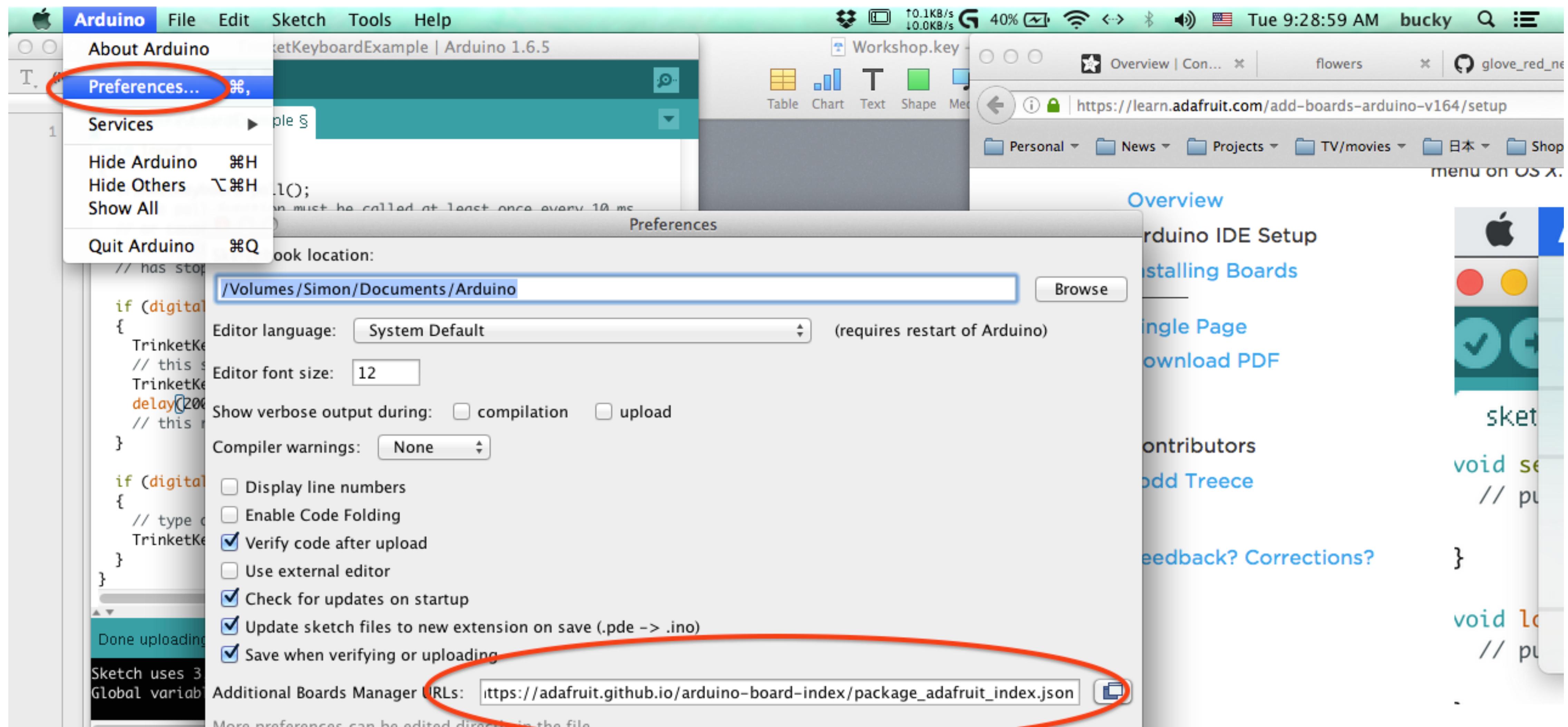


Adafruit Trinket

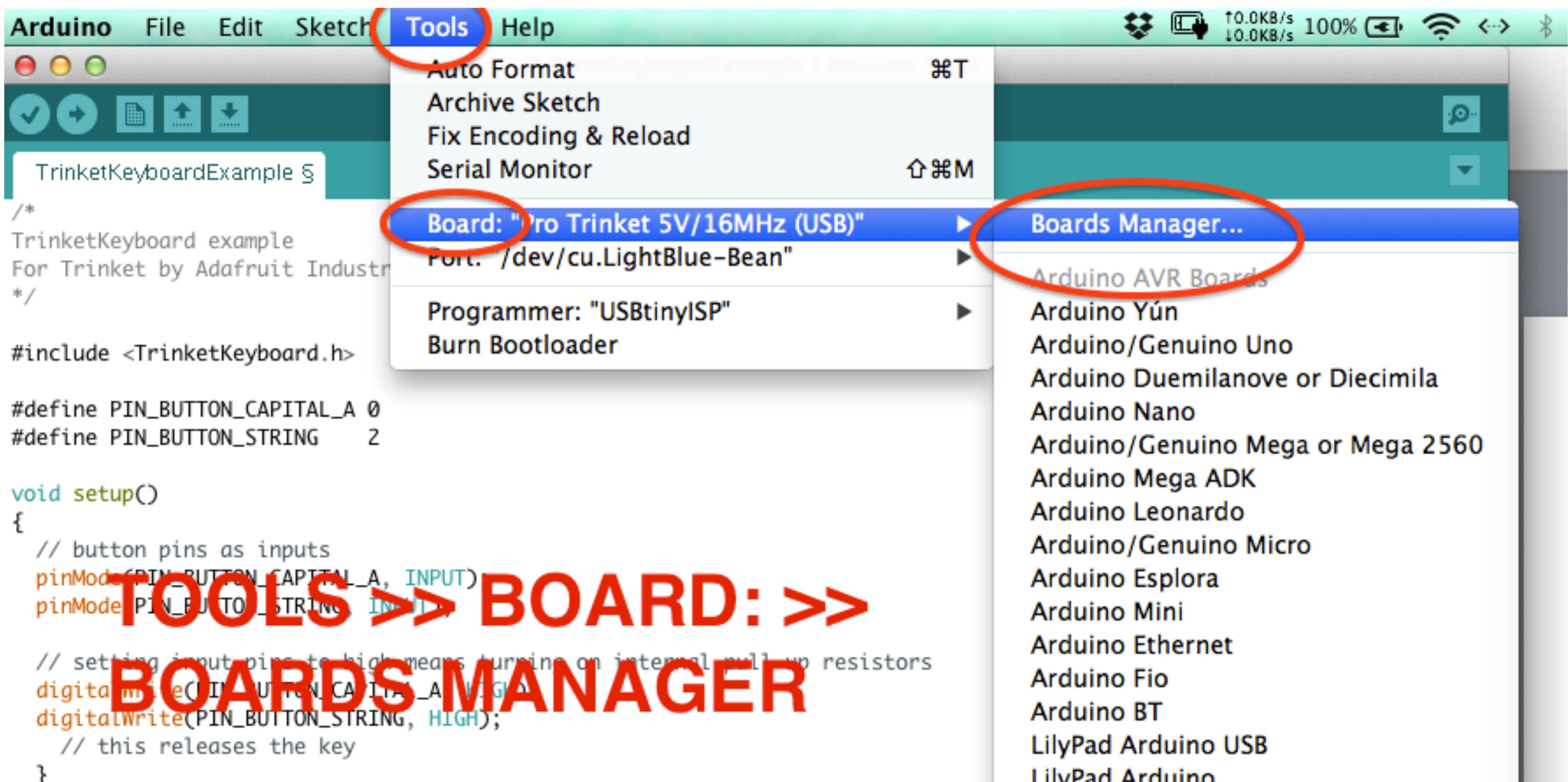
<https://www.adafruit.com/products/1501>

Install “Adafruit AVR Boards”

<https://learn.adafruit.com/add-boards-arduino-v164/setup>



Installing Trinket Board



Install “Adafruit AVR Boards”

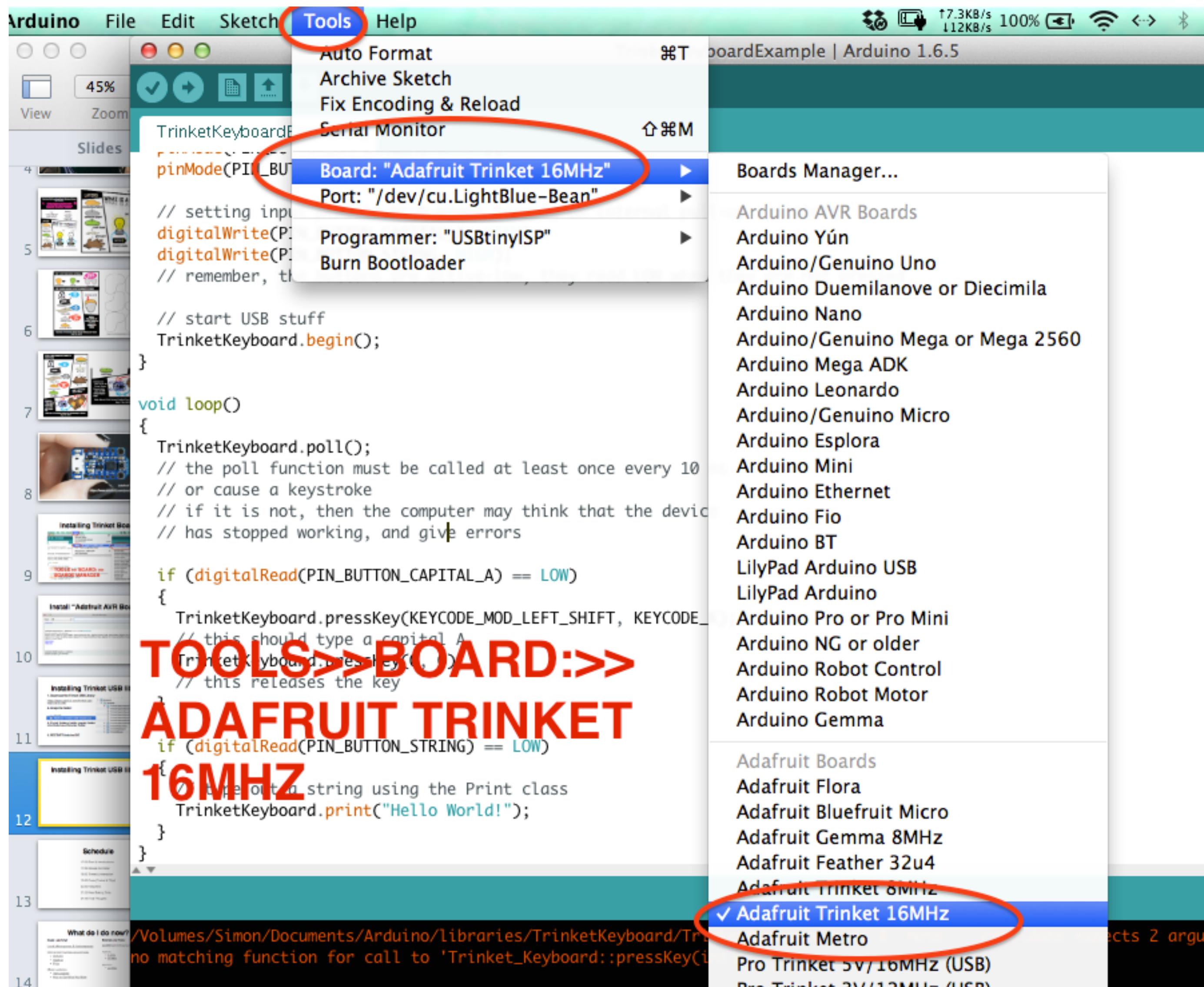
The screenshot shows the Arduino Boards Manager interface. At the top, there are three colored buttons (red, grey, green) and the title "Boards Manager". Below the title is a dropdown menu labeled "Type" with "All" selected. A search bar is positioned next to the dropdown. The main content area displays the installed packages:

Adafruit AVR Boards by Adafruit version 1.4.0 INSTALLED
Boards included in this package:
Adafruit Flora, Adafruit Gemma 8MHz, Adafruit Bluefruit Micro, Adafruit Feather 32u4, Adafruit Metro, Adafruit Pro Trinket 5V/16MHz (USB), Adafruit Pro Trinket 3V/12MHz (USB), Adafruit Pro Trinket 5V/16MHz (FTDI), Adafruit Pro Trinket 3V/12MHz (FTDI), Adafruit Trinket 8MHz, Adafruit Trinket 16MHz.

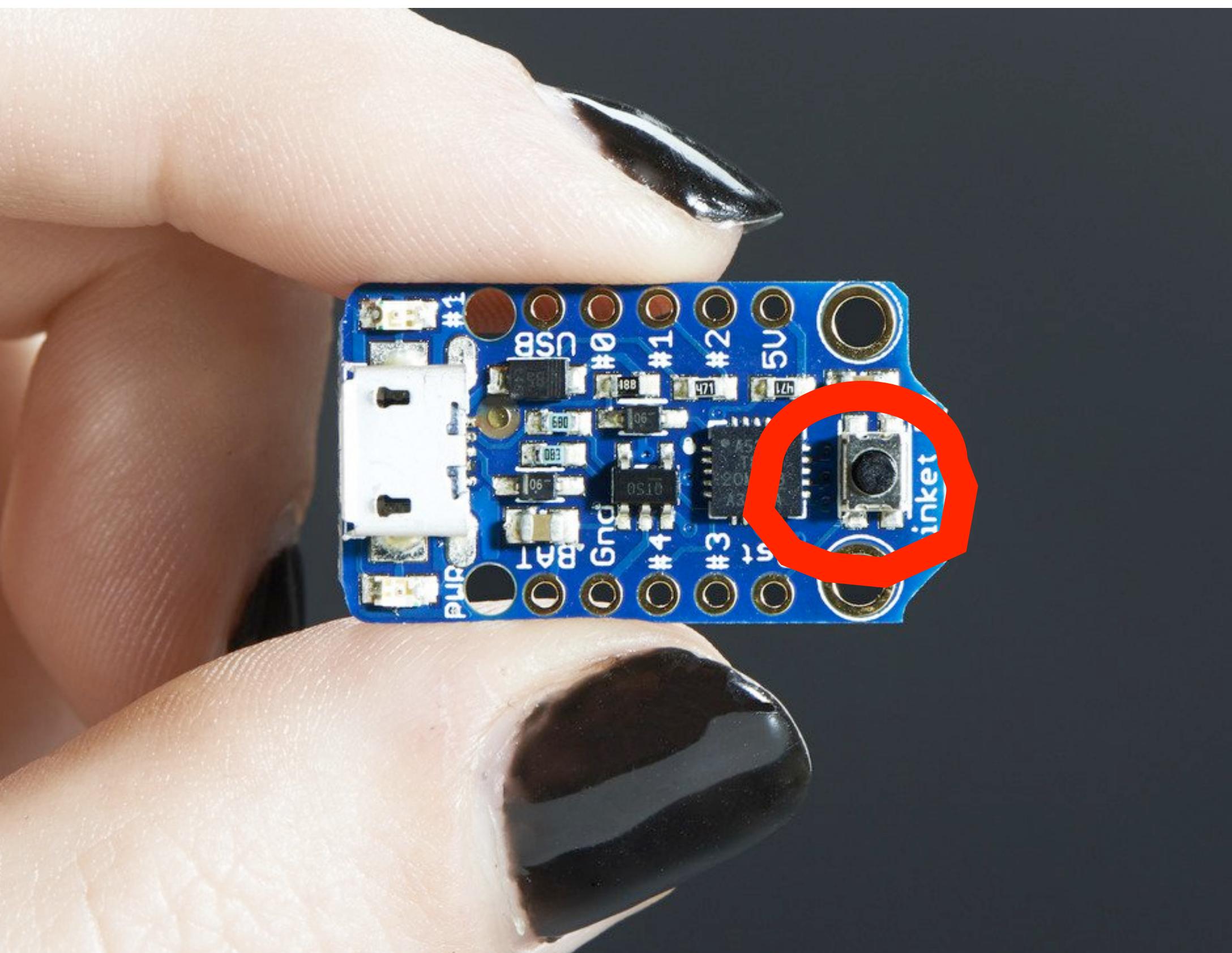
[Online help](#)
[More info](#)

Adafruit SAMD Boards by Adafruit
Boards included in this package:
Adafruit Feather M0

Selecting Adafruit Trinket 16Mhz



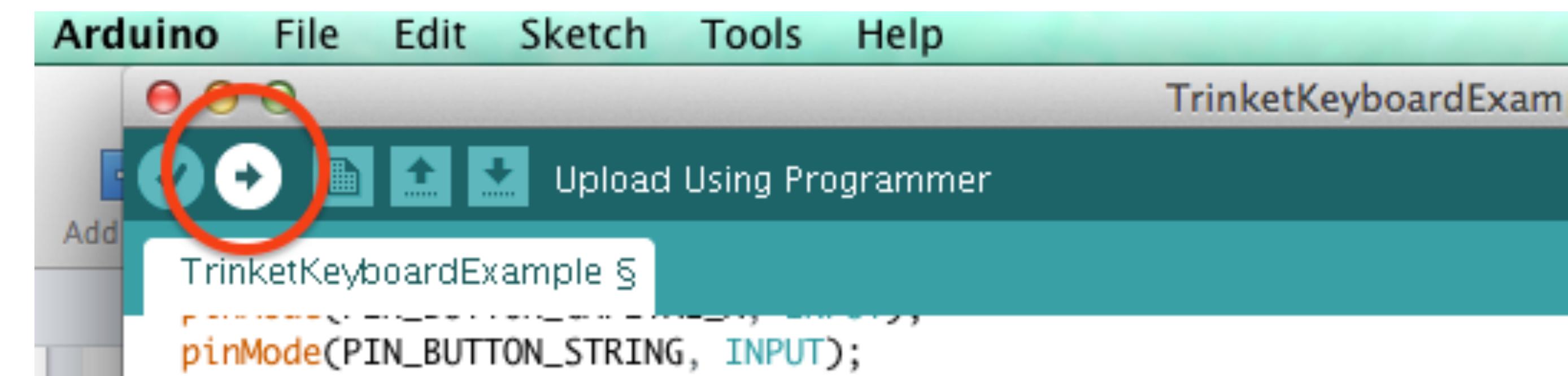
Uploading Code to Trinket



1. Press RESET button on Trinket first

2. You should see a RED light

**3. press UPLOAD button
on Arduino IDE**



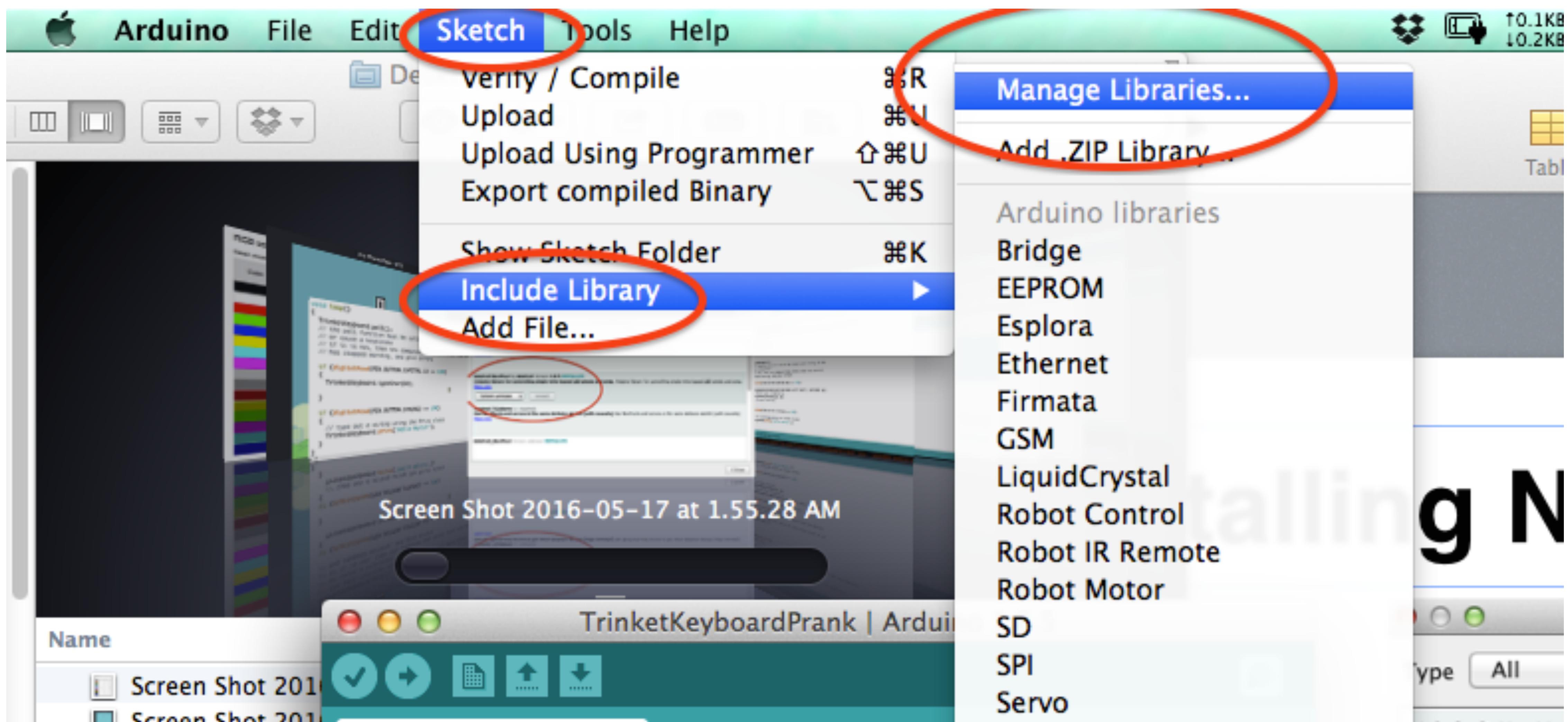
Neopixels: RGB LED's

RGB color table

Basic colors:

Color	HTML / CSS Name	Hex Code #RRGGBB	Decimal Code (R,G,B)
Black	Black	#000000	(0,0,0)
White	White	#FFFFFF	(255,255,255)
Red	Red	#FF0000	(255,0,0)
Lime	Lime	#00FF00	(0,255,0)
Blue	Blue	#0000FF	(0,0,255)
Yellow	Yellow	#FFFF00	(255,255,0)
Cyan / Aqua	Cyan / Aqua	#00FFFF	(0,255,255)
Magenta / Fuchsia	Magenta / Fuchsia	#FF00FF	(255,0,255)
Silver	Silver	#C0C0C0	(192,192,192)
Gray	Gray	#808080	(128,128,128)
Maroon	Maroon	#800000	(128,0,0)

Installing Neopixel Library



Library Manager

Type All

Topic All

neopixel

Adafruit NeoMatrix by Adafruit

Adafruit_GFX-compatible library for NeoPixel grids Adafruit_GFX-compatible library for NeoPixel grids

[More info](#)

Adafruit NeoPixel by Adafruit Version 1.0.5 **INSTALLED**

Arduino library for controlling single-wire-based LED pixels and strip. Arduino library for controlling single-wire-based LED pixels and strip.

[More info](#)

Select version

Install

Adafruit TICoServo by Adafruit

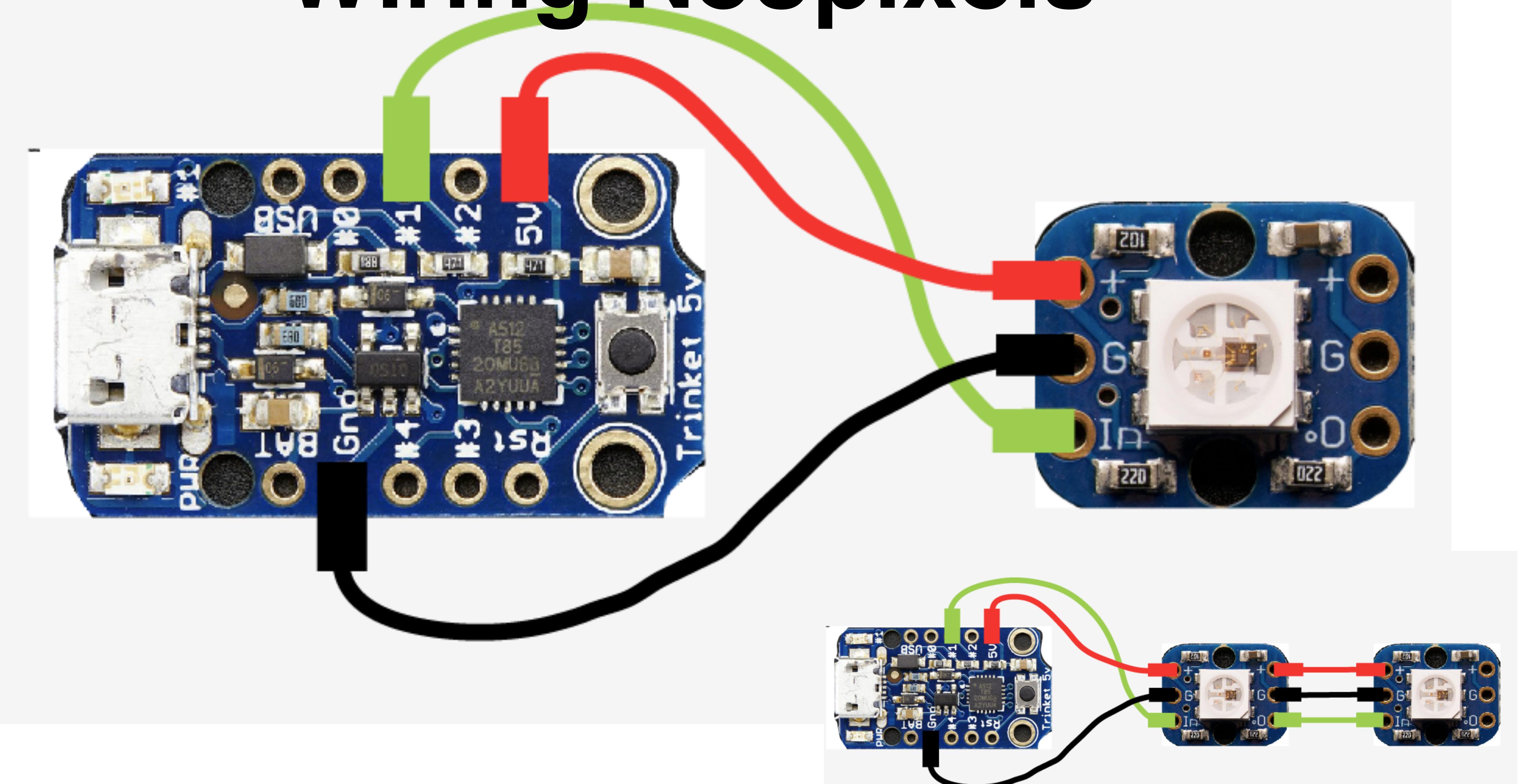
Use NeoPixels and servos in the same Arduino sketch (with caveats) Use NeoPixels and servos in the same Arduino sketch (with caveats)

[More info](#)

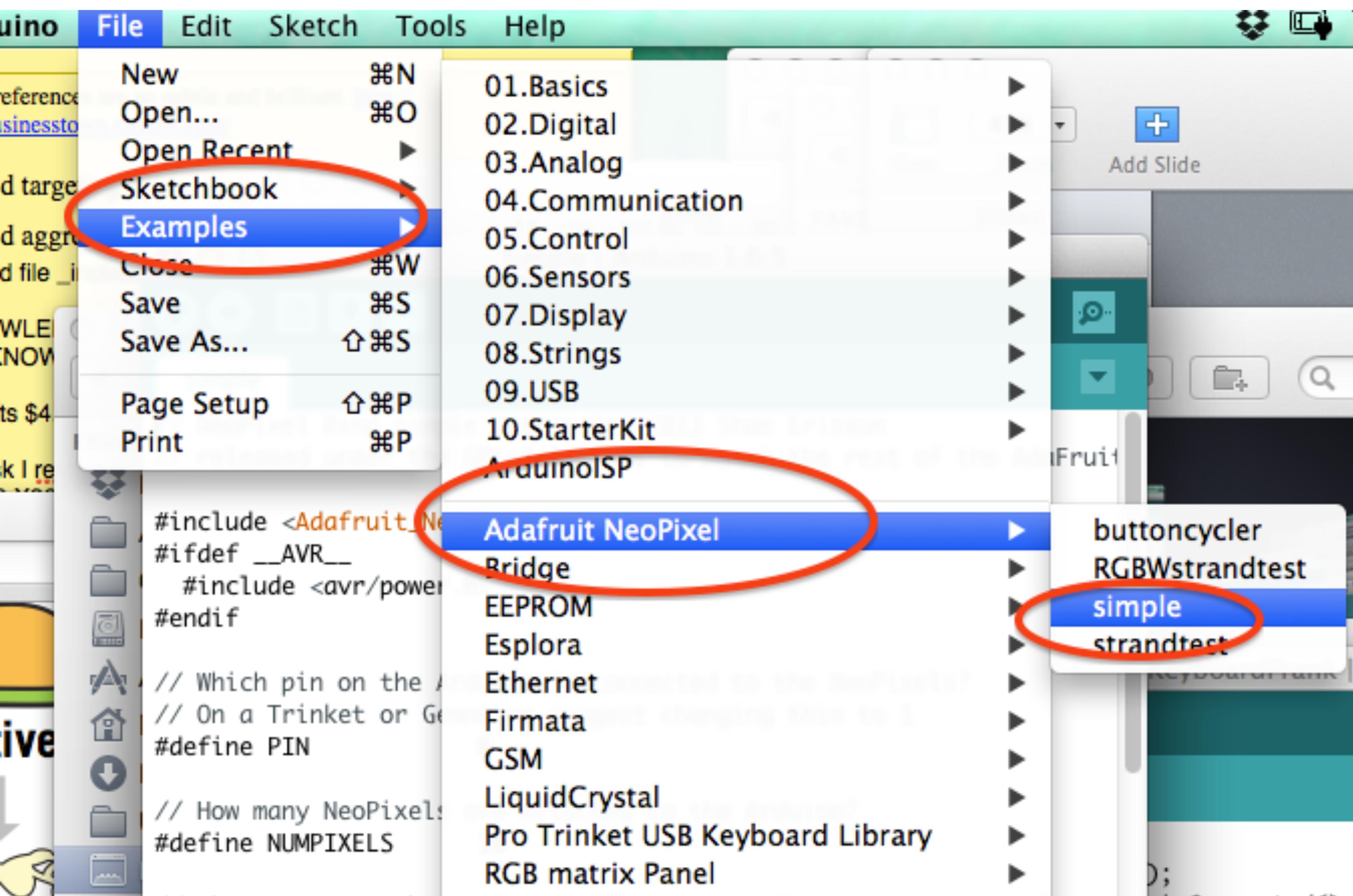
Adafruit_NeoPixel Version unknown **INSTALLED**

Close

Wiring Neopixels



Using Simple Neopixel Example



```
simple S
// NeoPixel Ring simple sketch (c) 2013 Shae Erisson
// released under the GPLv3 license to match the rest of Adafruit's examples
// Which pin on the Arduino is connected to the NeoPixels?
// On a Trinket or Gemma we suggest changing this to 1
#define PIN 1
// How many NeoPixels are attached to the Arduino?
#define NUMPIXELS 1
// When we setup the NeoPixel library, we tell it how many pixels there are
// Note that for older NeoPixel strips you might need to change the pixel count
Adafruit_NeoPixel pixels = Adafruit_NeoPixel(NUMPIXELS, PIN, WS2811_STRIP_RGB);

int delayval = 500; // delay for half a second

void setup() {
    // This is for Trinket 5V 16MHz, you can remove these
    #if defined (__AVR_ATtiny85__)
        if (F_CPU == 16000000) clock_prescale_set(clock_div_1);
    #endif
    // End of trinket special code

    pixels.begin(); // This initializes the NeoPixel library
}

void loop() {
```

Changing Neopixel Color

```
// End of trinket special code  
  
pixels.begin(); // This initializes the NeoPixel library.  
}  
  
void loop() {  
  
    // For a set of NeoPixels the first NeoPixel is 0, second is 1, all the way up  
  
    for(int i=0;i<NUMPIXELS;i++){  
  
        // pixels.Color takes RGB values, from 0,0,0 up to 255,255,255  
        pixels.setPixelColor(i, pixels.Color(0,150,0)); // Moderately bright green  
  
        pixels.show(); // This sends the updated pixel color to the hardware.  
  
        delay(delayval); // Delay for a period of time (in milliseconds).  
    }  
}
```

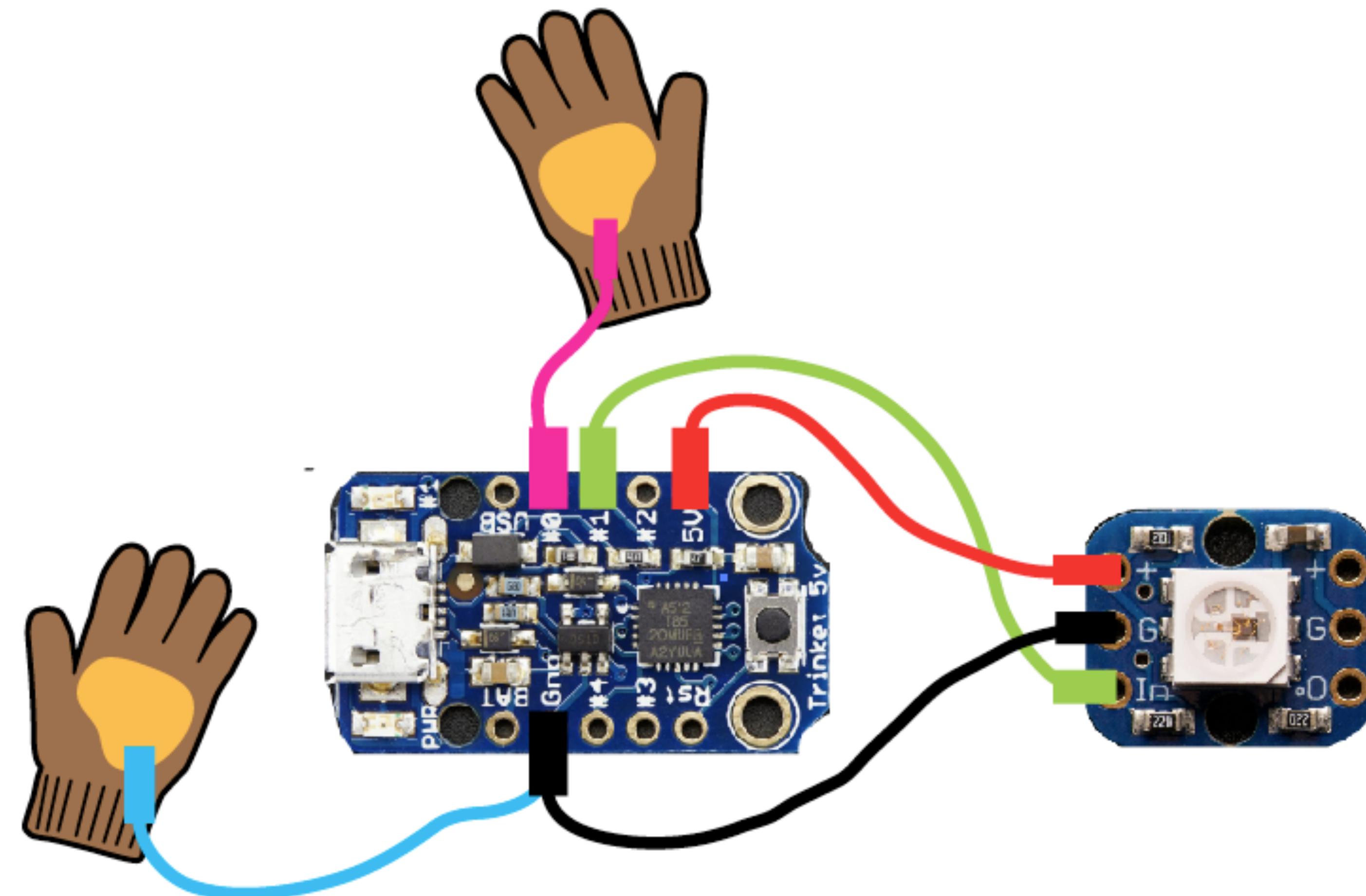
RGB color table

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Black	Black	#000000	(0,0,0)
White	White	#FFFFFF	(255,255,255)
Red	Red	#FF0000	(255,0,0)
Lime	Lime	#00FF00	(0,255,0)
Blue	Blue	#0000FF	(0,0,255)
Yellow	Yellow	#FFFF00	(255,255,0)
Cyan / Aqua	Cyan / Aqua	#00FFFF	(0,255,255)
Magenta / Fuchsia	Magenta / Fuchsia	#FF00FF	(255,0,255)
Silver	Silver	#C0C0C0	(192,192,192)
Gray	Gray	#808080	(128,128,128)
Maroon	Maroon	#800000	(128,0,0)
Olive	Olive	#808000	(128,128,0)
Green	Green	#008000	(0,128,0)
Purple	Purple	#800080	(128,0,128)
Teal	Teal	#008080	(0,128,128)
Navy	Navy	#000080	(0,0,128)

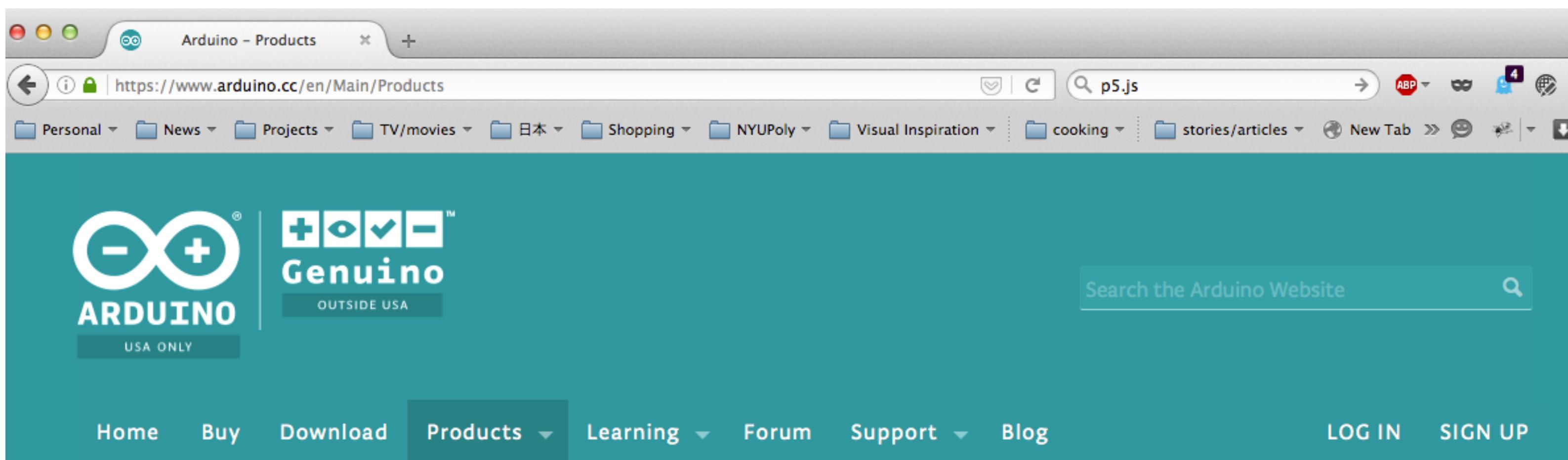
Combining Glove & Neopixel Code

https://github.com/kahodesu/glove_red_neopixels_trinket



Arduino

<https://www.arduino.cc/>



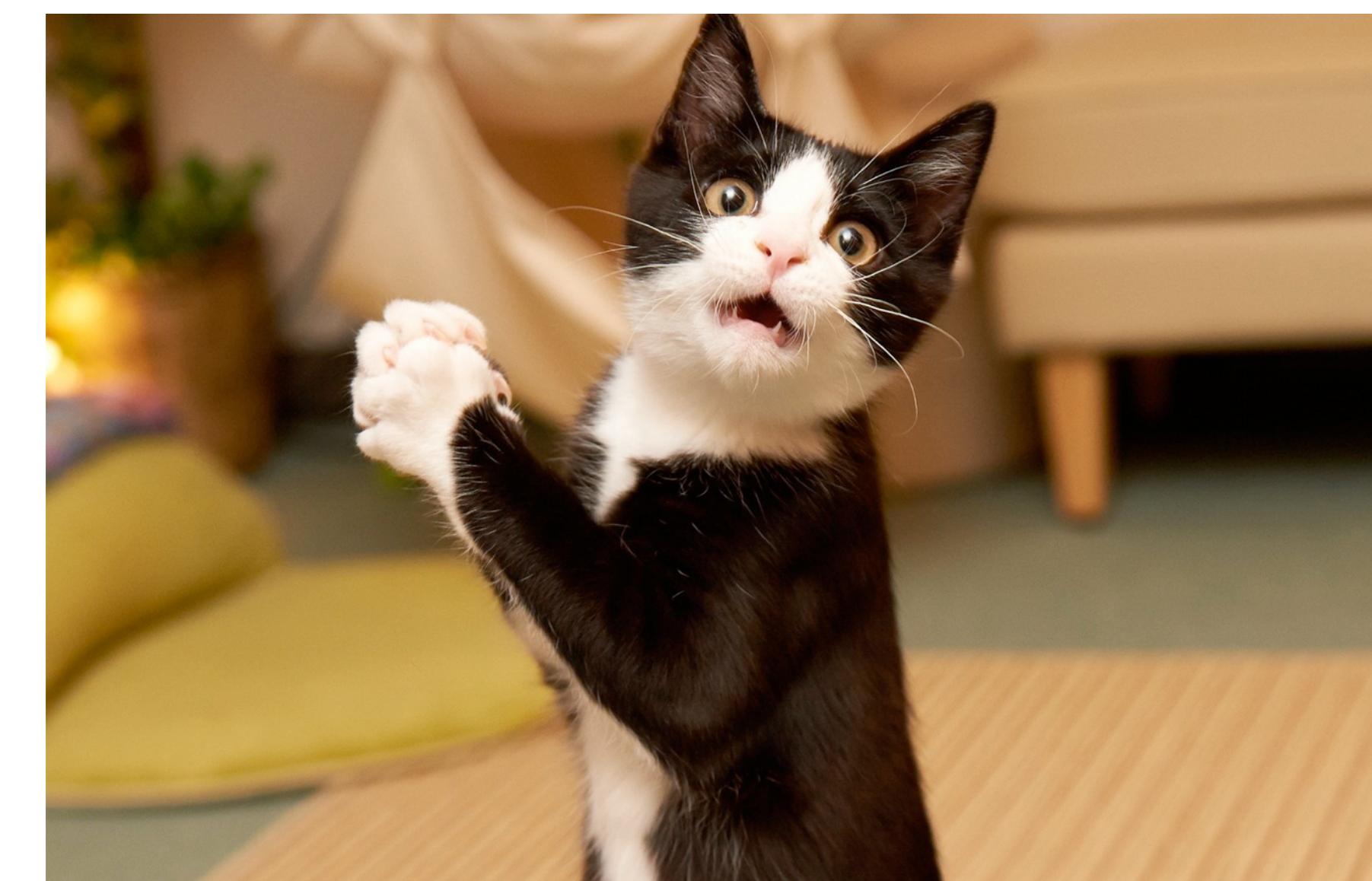
Arduino Products

Browse the full range of official Arduino products, including Boards, Modules (a smaller form-factor of classic boards), Shields (elements that can be plugged onto a board to give it extra features), and Kits.

If you need more info you can [compare the specs of each board here](#).

If you are wondering if your Arduino board is authentic you can [learn how to spot a counterfeit board](#)

Interaction with Hands



What do I do now?

Keep Learning!

Local Makerspaces & Hackerspaces

Online Communities around tools

- Arduino
- Adafruit
- P5.js

Maker websites

- Instructables
- How to Get What You Want

Materials and Tools:

lessEMF.com for buying conductive fabric

Adafruit:

- FLORA
- GEMMA

Sparkfun:

- LILYPAD