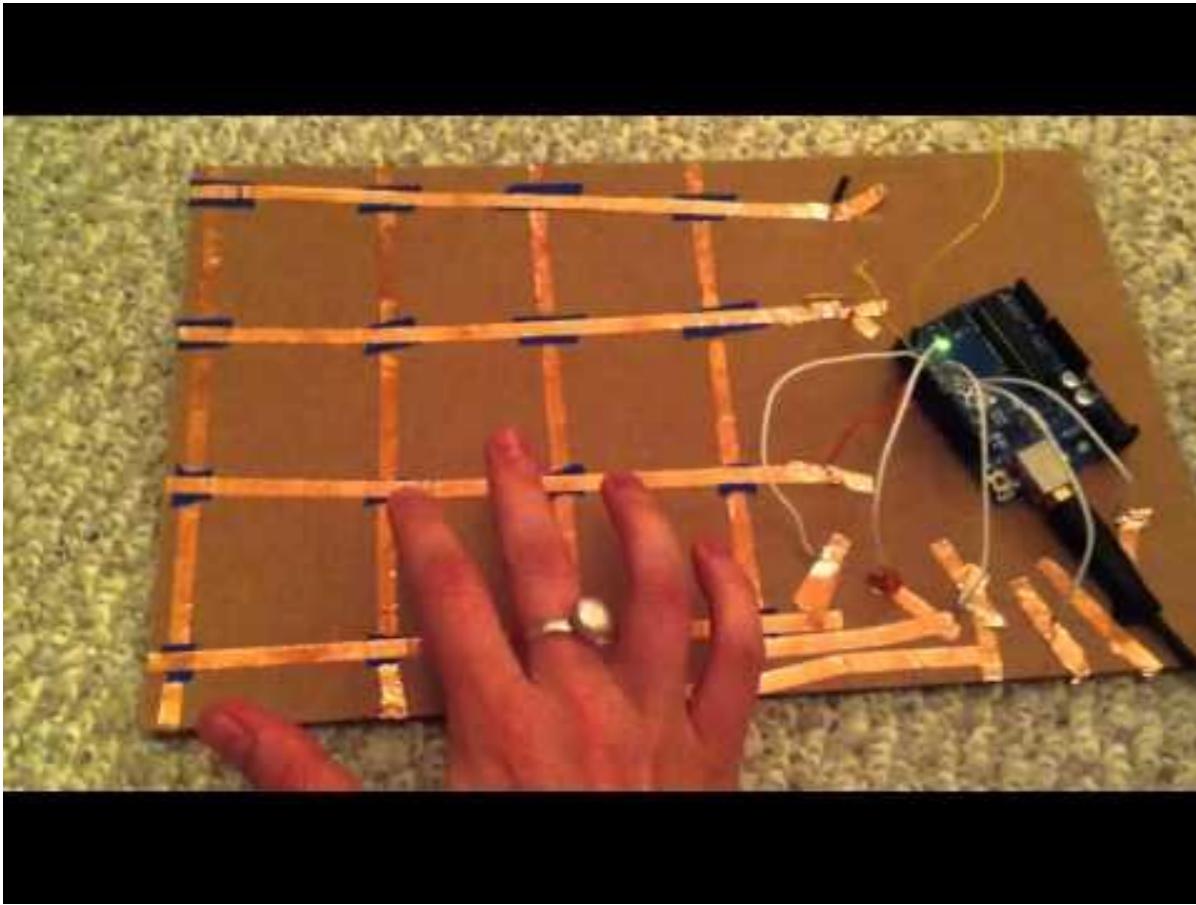

Arduino Music Sequencer

Jenna deBoisblanc
November 3rd, 2014







physical computing

**use programming to interact with
the physical world**

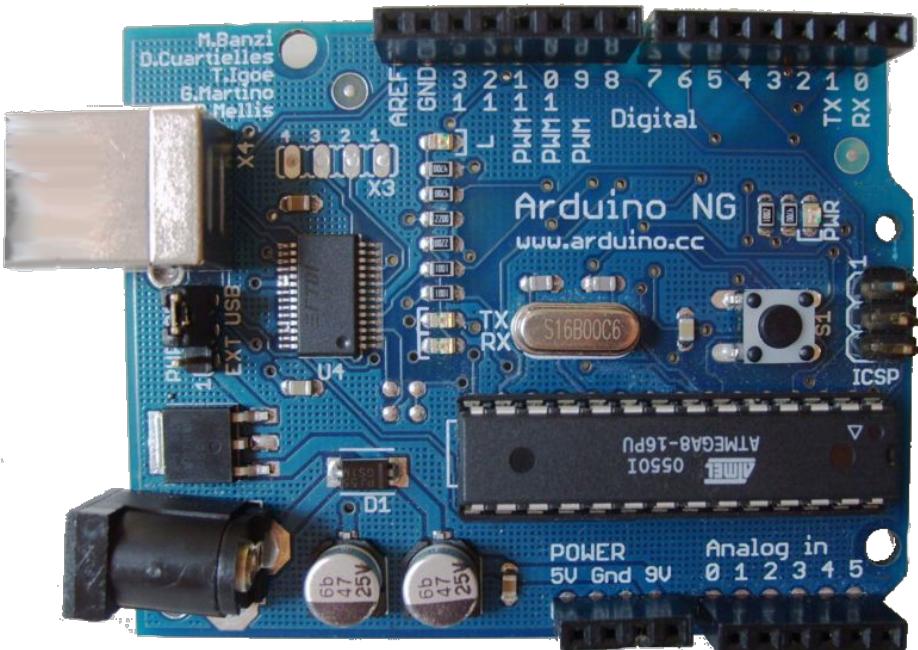
Overview

- What is an Arduino?
- Writing voltages
 - Blink
 - Fade
 - RGB LEDs
- Reading voltages
 - photoresistor
 - vibration sensor
 - button
- Neopixels
- Neopixels + Processing
- Monome

Arduino 101

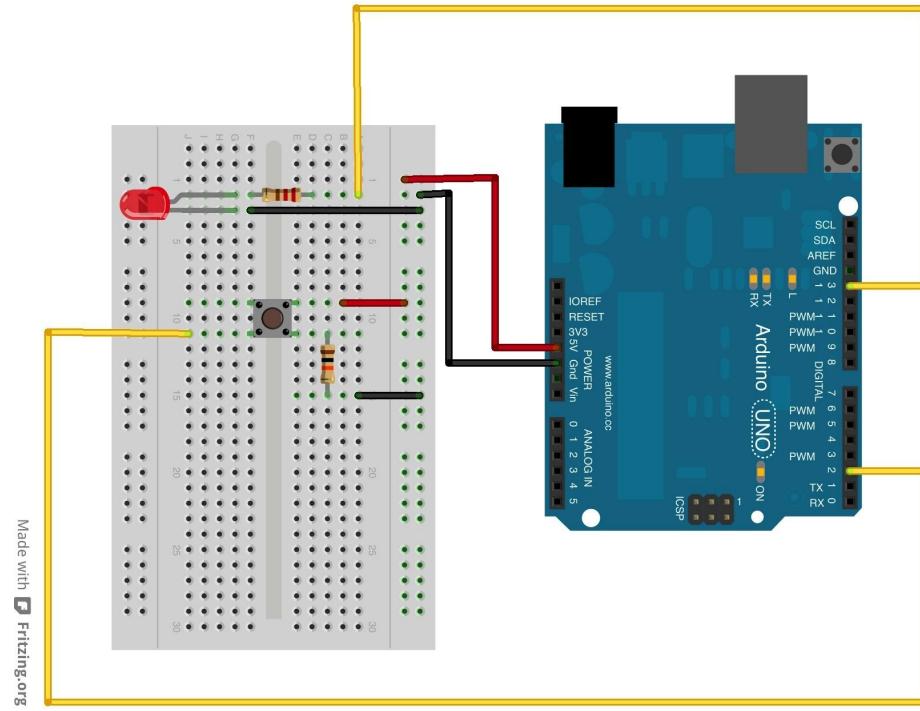
What is Arduino?

open-source
hardware+software
tool for building
interactive
electronics projects

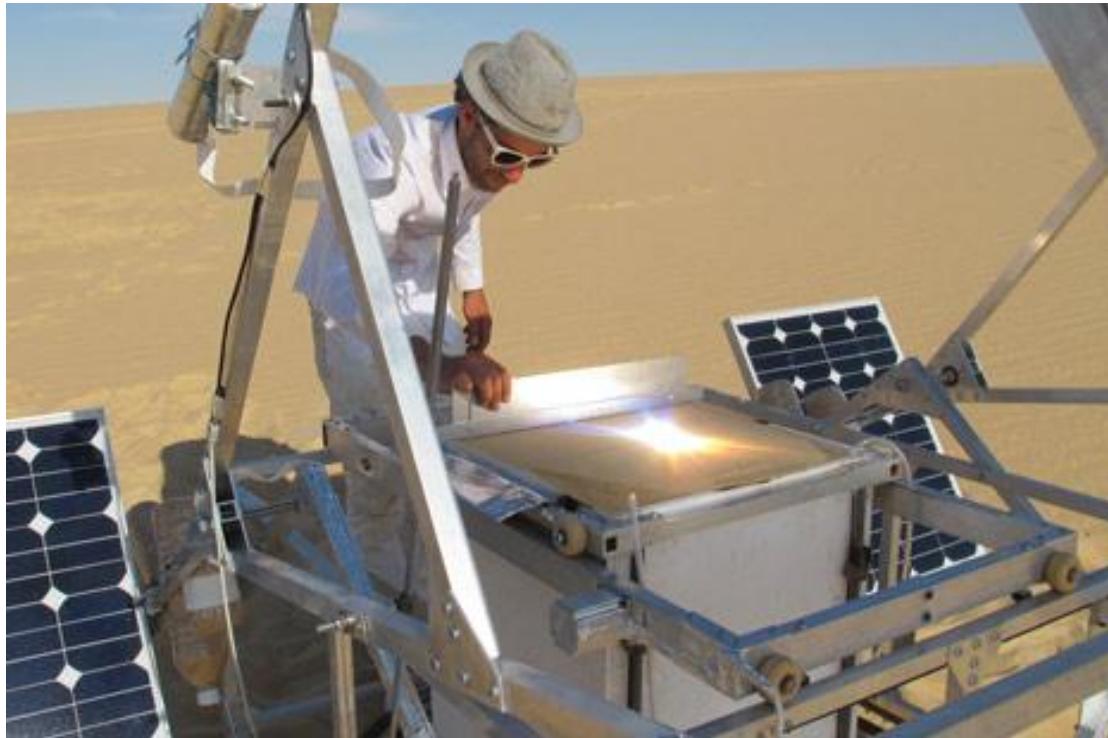


What can an Arduino do?

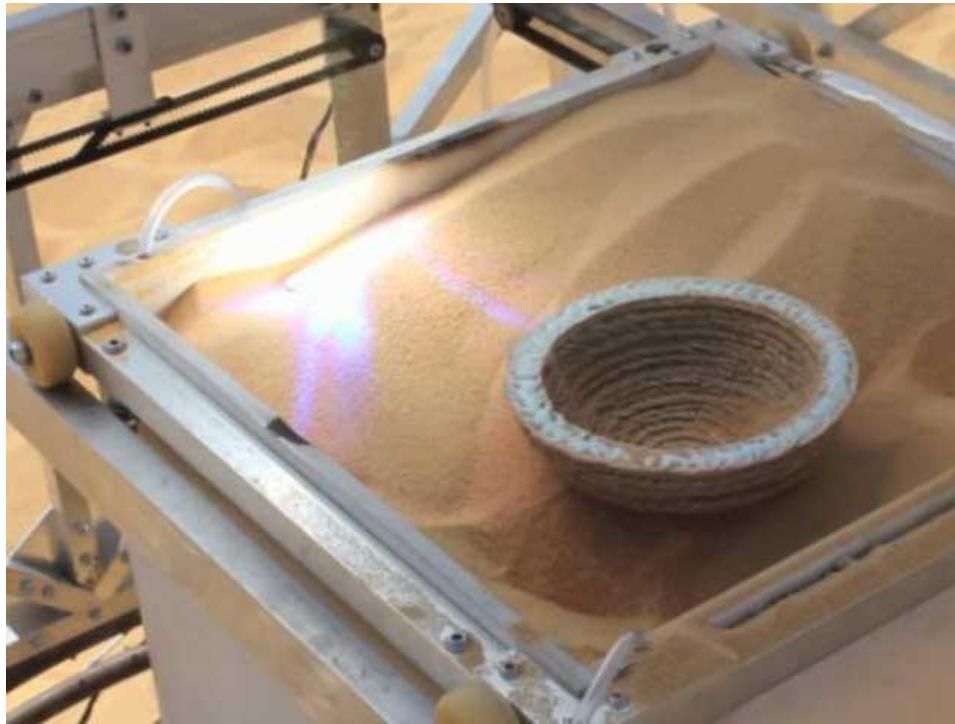
- write voltages
(control components)
- read voltages
(sense the world)



Examples: Solar Sinter



Examples: Solar Sinter



Examples: Cocktail Maker



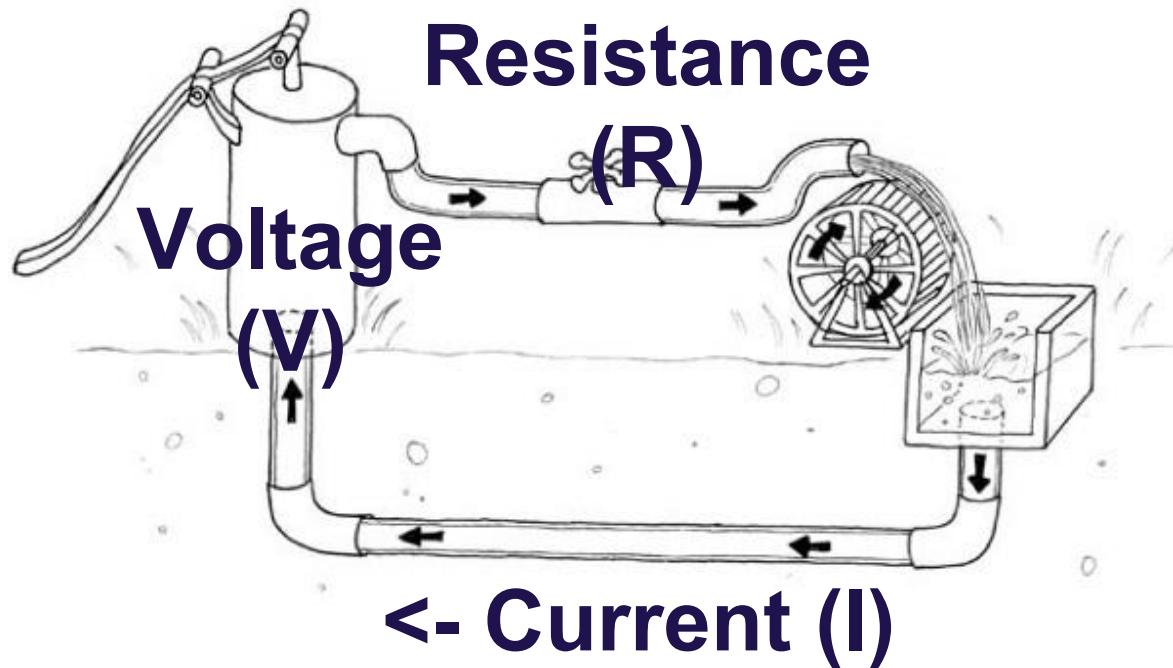


Examples: pimpMyBike



Simple Circuit

circuit water analogy



resistor calculator

What value are the resistors?

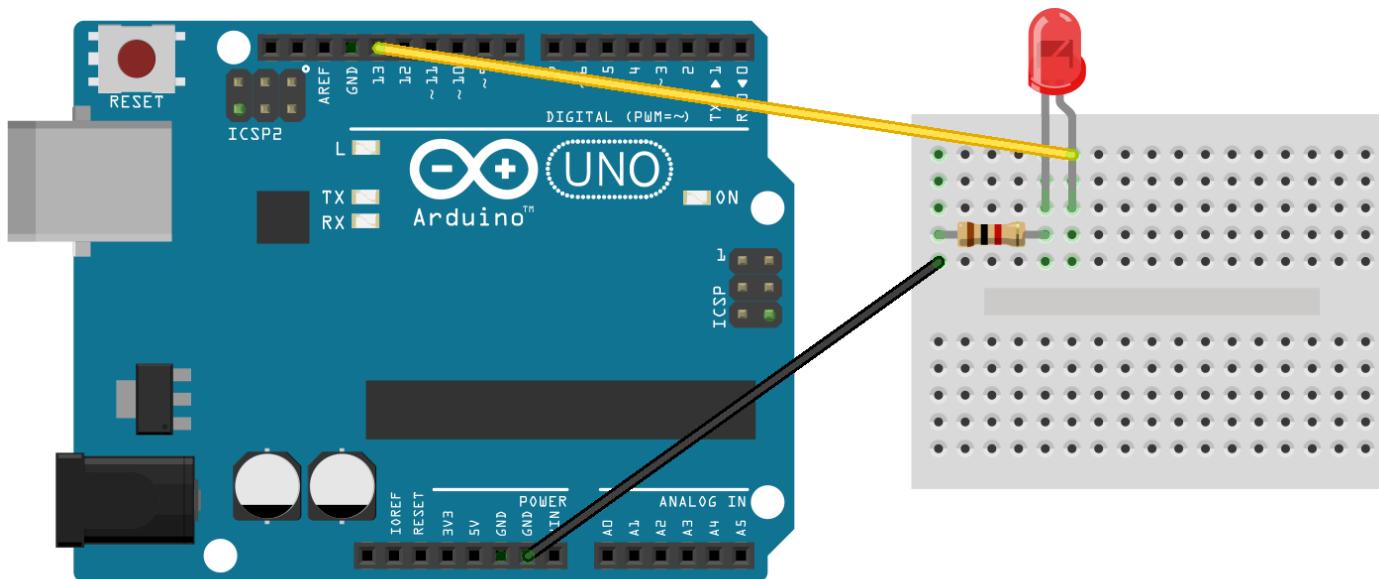
<http://www.digikey.com/en/resources/conversion-calculators/conversion-calculator-resistor-color-code-4-band>

Writing Voltages

(making things move, light up, beep, etc.)

Blink

file > examples > basic > blink



Blink

- can you make the LED
blink faster?
- **slower?**

Fading

file > examples > analog > fading

Fade

- What do you need to change about your circuit to make this sketch work?
- What function makes the LED “fade” rather than “blink”?

Writing Functions

`digitalWrite(pinNum, HIGH)`

`digitalWrite(pinNum, LOW)`

`analogWrite(pinNum, value)`

where value is 0-255

Blinking $\frac{1}{2}$ as bright

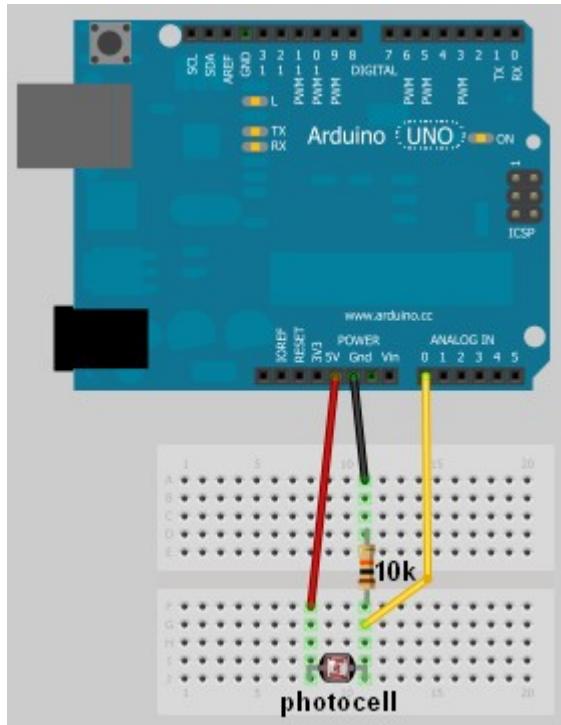
What do we need to change about the original Blink sketch to make the LED **blink half as bright**?

(hint: 2 changes)

Reading Voltages

(reading sensors: light, sound, temperature, ...)

Photoresistor Circuit

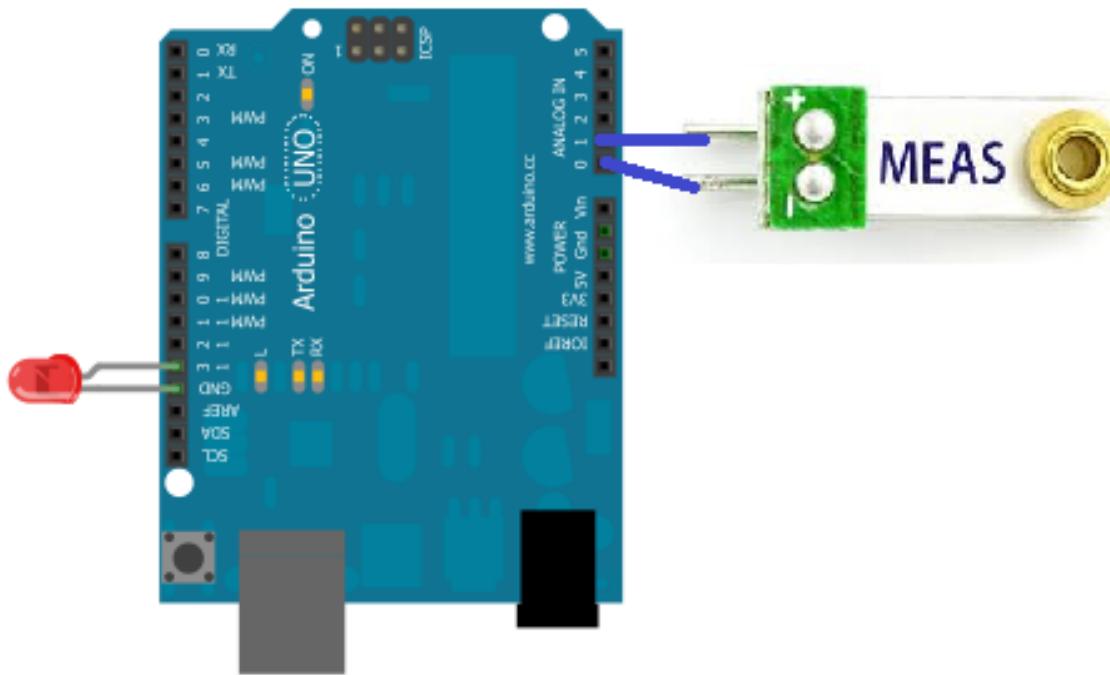


e3_Photoresistor

```
// define a pin for Photoresistor
int lightPin = 0;

void setup() {
    // Begin serial communication
    Serial.begin(9600);
}
void loop() {
    // Write the value of the photoresistor to the serial monitor.
    int reading = analogRead(lightPin);
    Serial.println(reading);
}
```

Vibration Sensor Circuit



e4_Vibration

```
int GroundPin= 0;  
int sensePin= 1;  
  
void setup() {  
    Serial.begin(9600);  
    pinMode(GroundPin, OUTPUT);  
    digitalWrite(GroundPin, LOW);  
}  
  
void loop() {  
    int reading = analogRead(sensePin);  
    Serial.println(reading);  
}
```

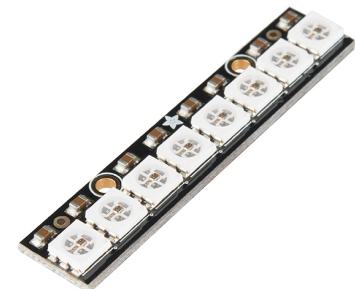
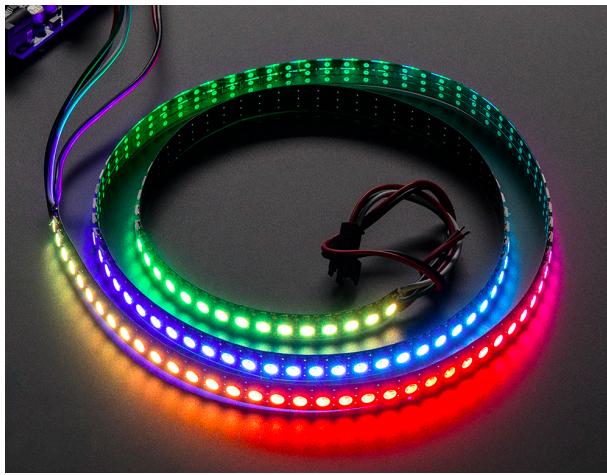
Vibration Sensor Code

Can we make an LED light up when the vibration sensor value is >500?

(hint: use an “if statement”)

file > examples > control > ifStatementConditional

Neopixels



Neopixels

What is a Neopixel?

What is a library?

Neopixel Library

Install Neopixel library & follow instructions

Move **Adafruit_Neopixel** to your libraries folder:

(home) > Documents > Arduino > Libraries

Strandtest

File > Examples > Adafruit_Neopixel > strandtest

e5_Neopixel

```
#include <Adafruit_NeoPixel.h>
#define PIN 2
Adafruit_NeoPixel strip = Adafruit_NeoPixel(5, PIN, NEO_GRB + NEO_KHZ800);

void setup() {
    strip.begin();
    strip.show();
}

void loop() {
    //functions go here
    strip.setPixelColor(0, 255, 0, 0);
    strip.show();
}
```

Useful Neopixel Functions

- strip.**begin()**
 - call once in the setup
- strip.**show()**
 - call everytime you want to refresh LEDs after pin colors have been set
- strip.**setPixelColor(pinNumber, redValue, greenValue, blueValue)**
 - color values are 0 to 255
- strip.**setBrightness(brightnessValue)**
 - brightness is between 0 (off) and 255 (brightest)

Neopixel Challenges

1. Make all of the LEDs Red
2. Make all of the LEDs Blue
3. Make the LEDs blink

Processing

Visual Programming Language

Check out the example files!

file > examples

Processing -> Arduino

Let's make an LED blink when we click the screen.

e6_Processing2Arduino

- > **e6_ArduinoLED** uploaded on Arduino
- > **e6_Processing** opened in Processing

Arduino -> Processing

Let's send "Hello World" from the Arduino to Processing and print it out on the screen.

e7_Arduino2Processing

- > **e7_Arduino** uploaded to the Arduino
- > **e7_Processing** opening in Processing

Monome

The Copper Tape Grid

1. **Lay 4 columns of copper tape**
(or however many columns you'd like to use; make sure to adjust the code accordingly)
2. **Lay clear tape over the columns** everywhere that the columns will intersect with rows
(rows and columns need to be electrically isolated)
3. **Attach a jumper to each row and each column** of copper tape (I just used copper tape to make the connection) and to the Arduino
4. **Stick an LED in pin #13** on the Arduino.

Code

open the Processing sketch:

monome > Processing_monom > Processing_monom.pde

upload the Arduino sketch:

monome > Arduino_monom > Arduino_monom.ino

Reference to Print

<http://tinyurl.com/arduinoRef>