Physical Computing

Designing Physical Interactions for a Digital World

DESN 265
Fall 2021
Thursday, 2PM – 5:50PM
Online and QC Makerspace

Professor Danne Woo
pcomp.dannewoo.com
danne.woo@qc.cuny.edu

What I do

- Graphic Designer
- UX and UI Designer
- Product Designer
- Game Designer
- Woodworker
- Musician
- Programmer
- Engineer
- Hacker
- Maker
- Tinkerer
- Entrepreneur

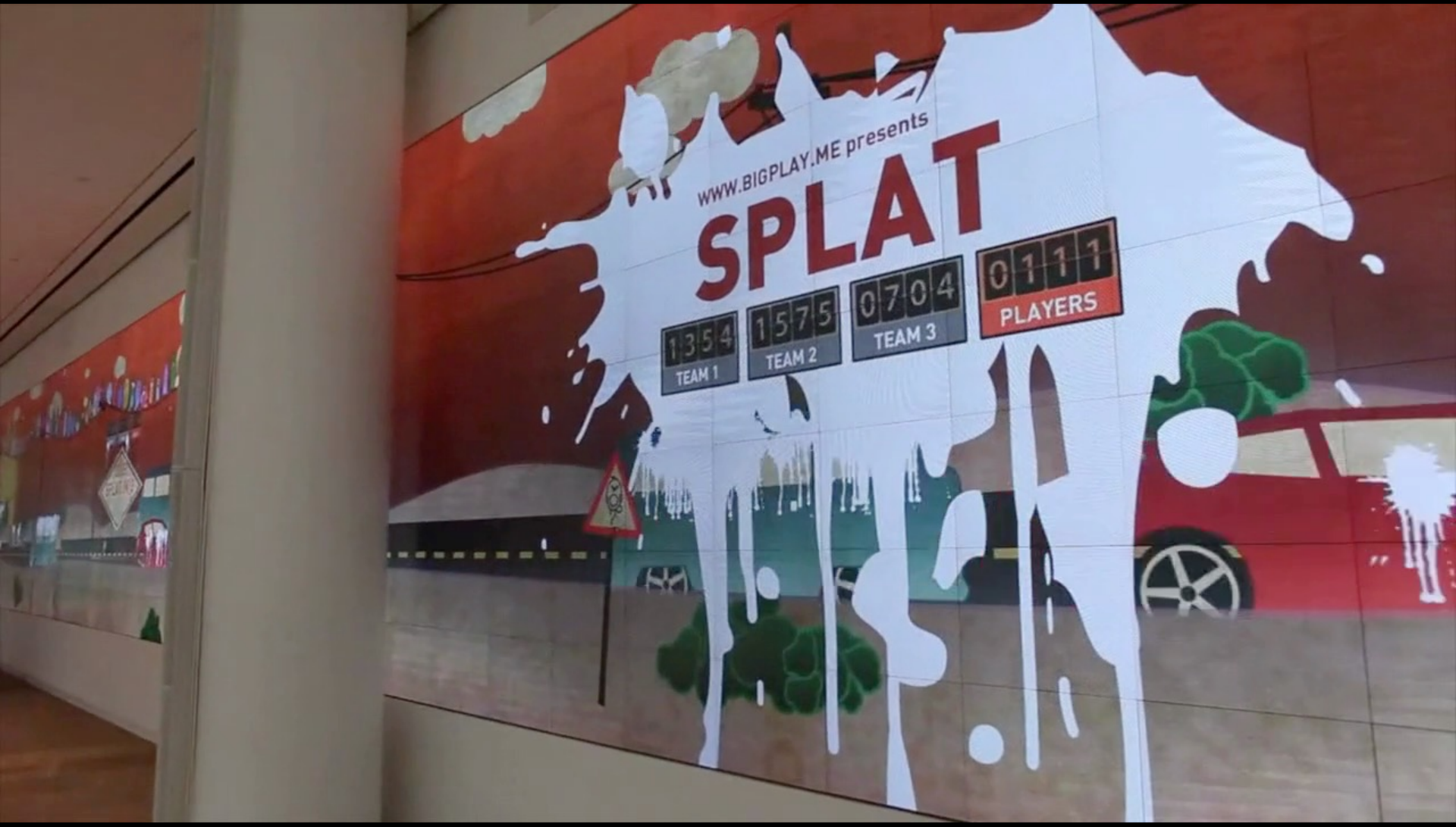
Design Technologist

How I got here

- Designer parents
- Youngest AIGA member
- First typeface at 10
- Named after designer
- 10 year design career
- Studied design and technology at NYU


datavisu.al
datavisu.al/beta/home.html
datavisual
Data Designer
Community Gallery
About Us
Hey danne, Log Out
Visualizing your data your way
Design
Data
Output
What is datavisual?
datavisual is a web-based tool for creating data visualizations. Perfect for designers and creatives with limited programming skills but a need to make beautiful charts and graphs. Once you design your chart style you can upload multiple data sets and output them as vector PDFs or SVGs as well as websafe PNGs.
MacBook Pro


SPLAT
Join team two at splat.in/2
POOP


WWW.BIGPLAY.ME presents
SPLAT
1354
TEAM 1
1575
TEAM 2
0704
TEAM 3
0111
PLAYERS

RFID Beat Box

Created by Danne Woo & Stefanie Kleinman

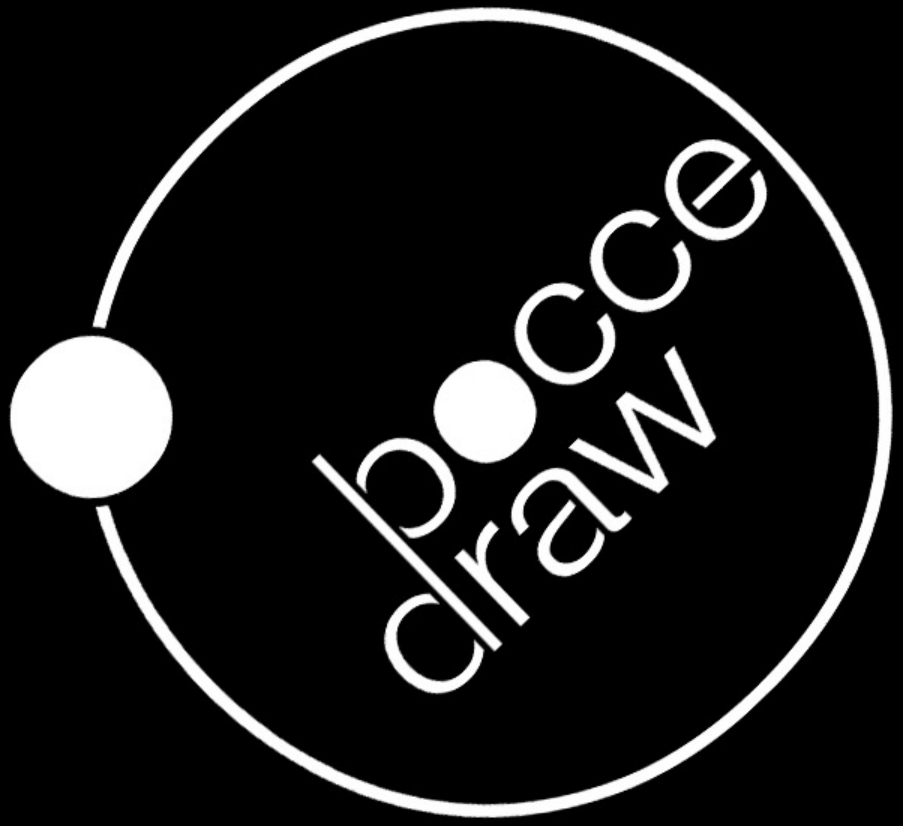
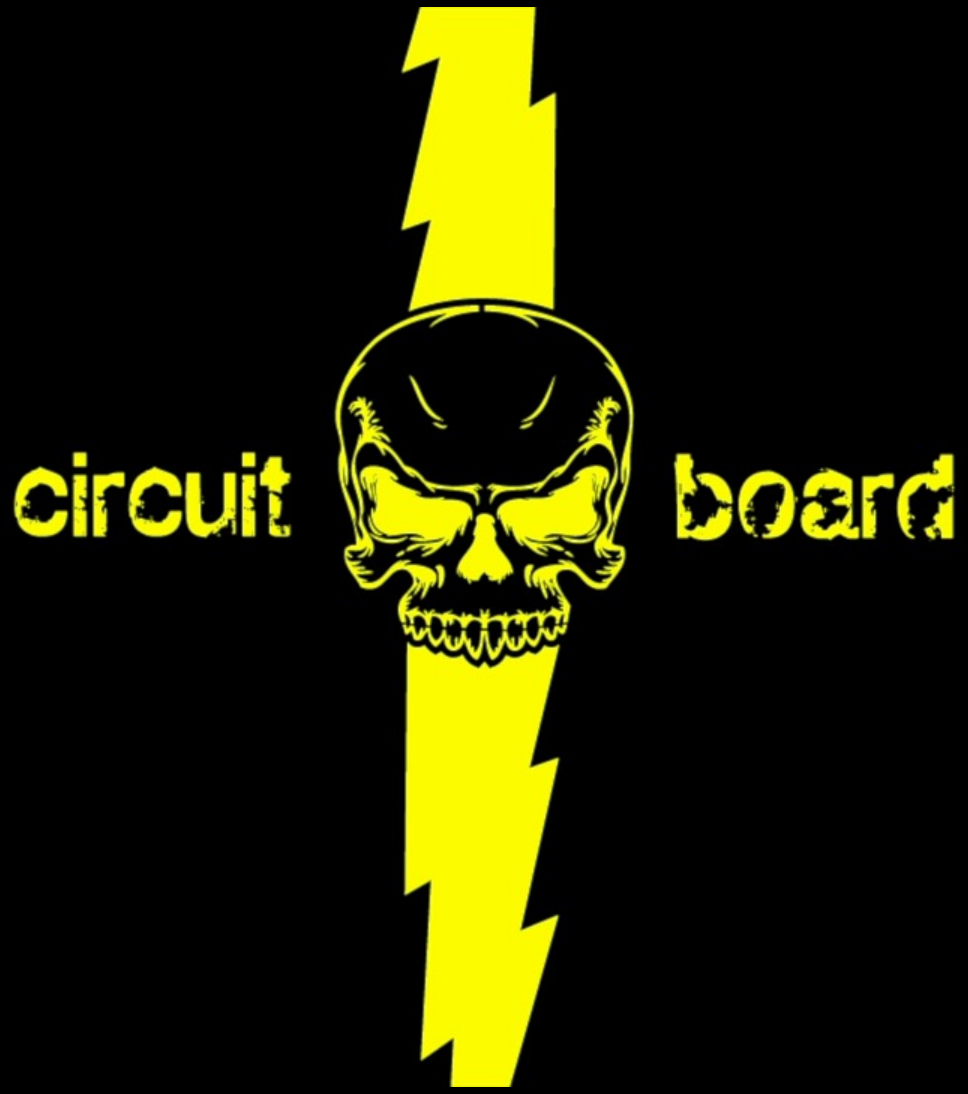

bocce
draw

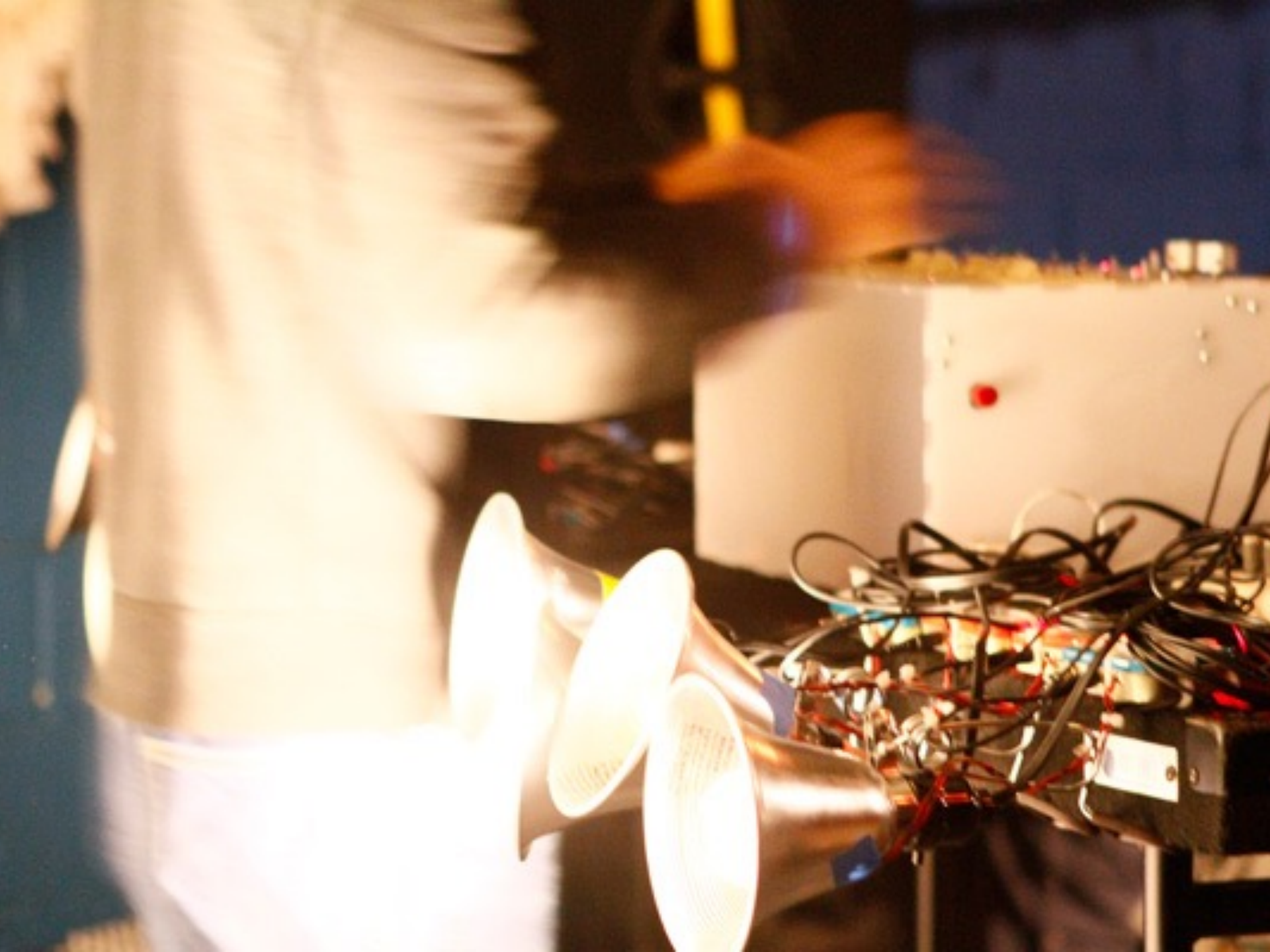
table setting

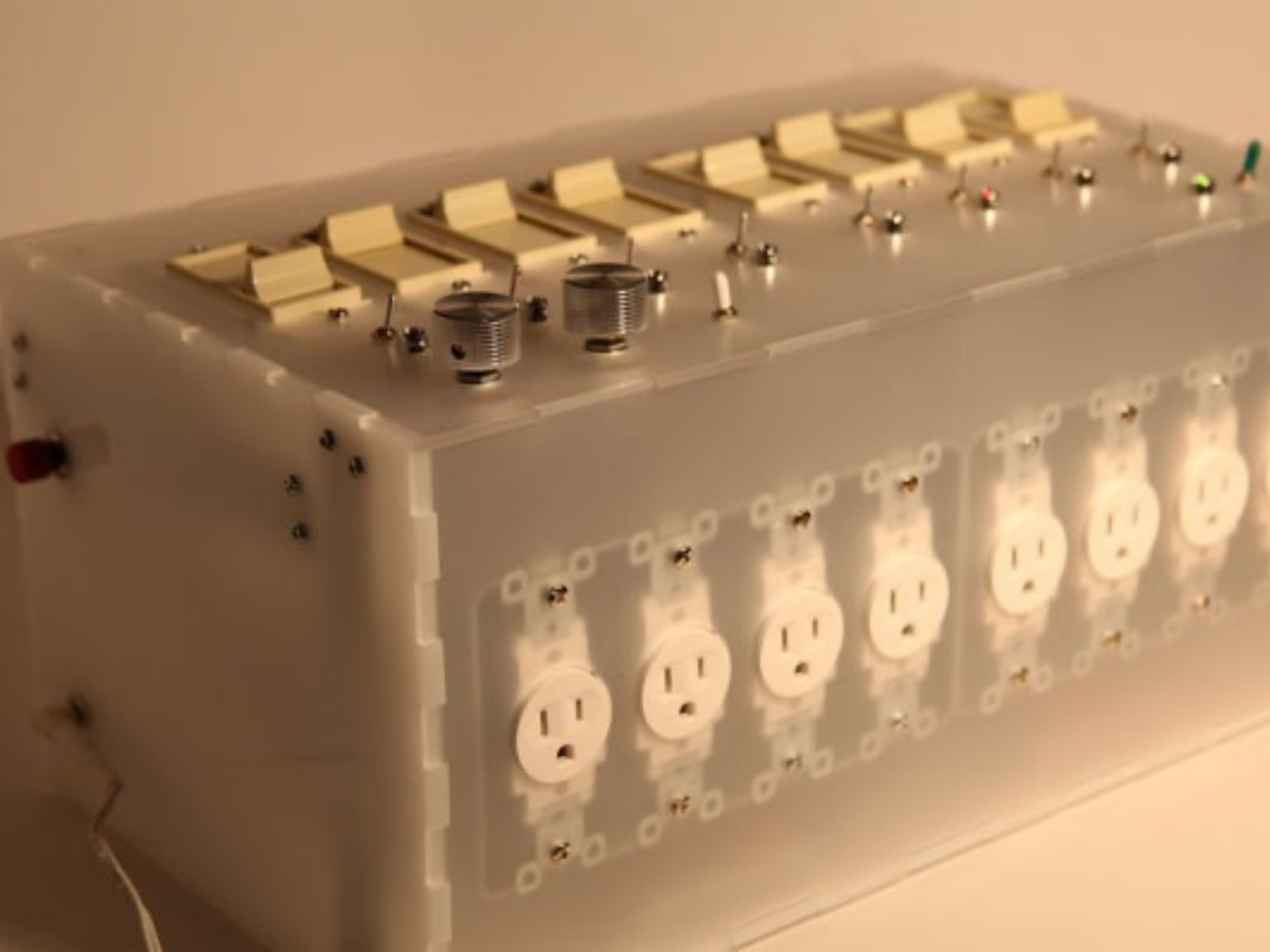
at The Tenement

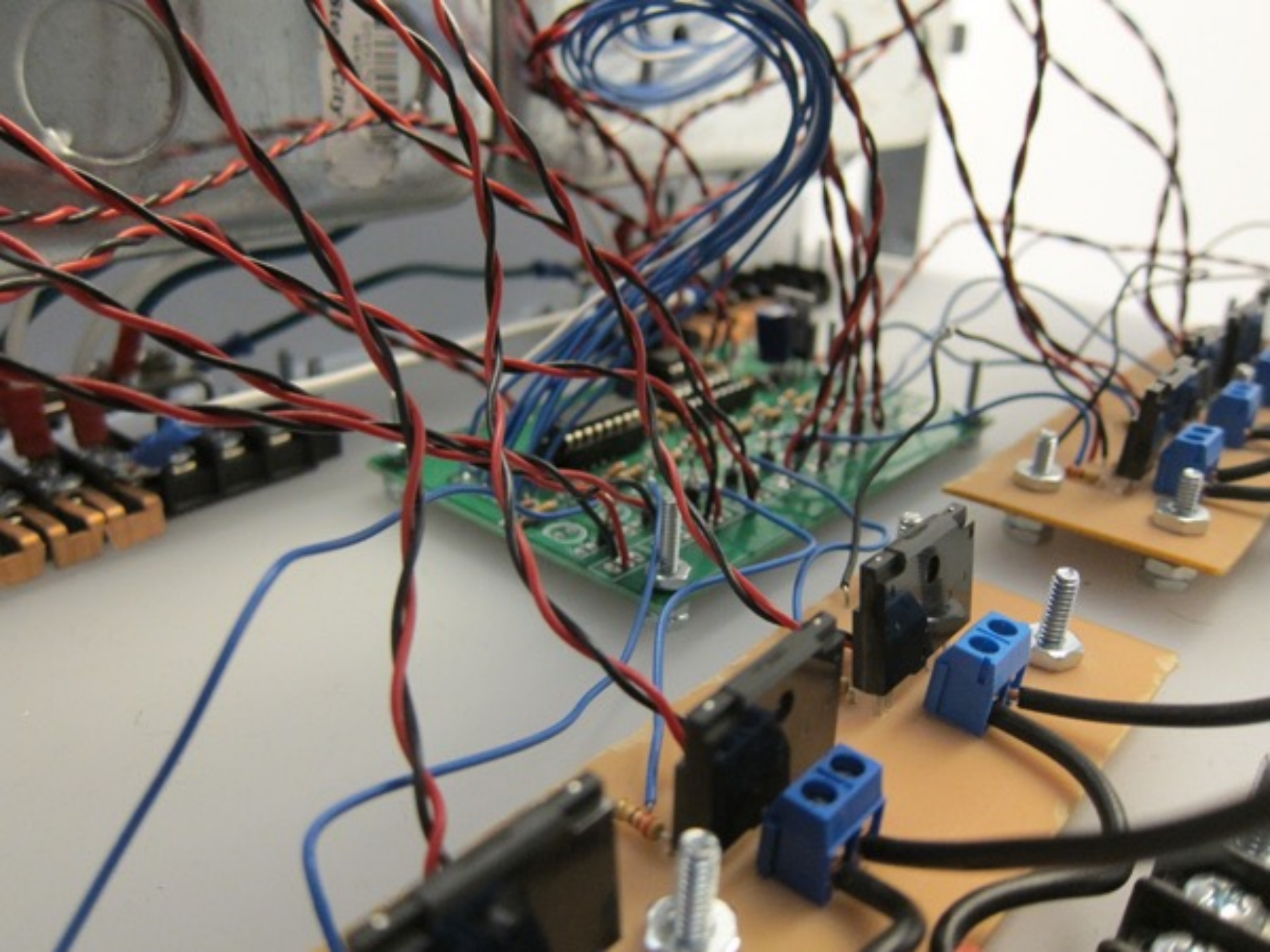

circuit
board

Light Hum

Danne Woo








AC Symphony
Danne Woo

Your turn.

Who are you?

Where are you from?

Why did this class interest you?

Week 1-9

Week 1: What is Physical Computing?

Week 2: Introduction to Electronics

Week 3: Arduino, Hello World

Week 4: Analog Output

Week 5: Digital and Analog Review

Week 6: Enclosures

Week 7: Serial Communication, Processing and p5.js

Week 8: Soldiering Workshop

Week 9: Midterm Presentation

Week 10-15

Week 10: Final Project Ideas and Planning

Week 11: Designing, Prototyping and User Testing

Week 12: In Class Work Session

Week 13: Playtesting and Progress Report

Week 14: Final Presentations

Class Objectives

All Semester

Lectures, labs and guest speakers to better understand physical interaction design and computing as well as prototyping, user-testing and project planning.

Midterm

Take what we covered thus far in the class and come up with a simple project to apply these technical skills.

Final

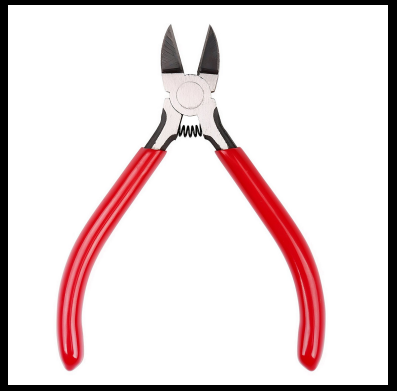
Spend more type focusing on the concept, design, prototyping and user-testing for this project. The concept again is entirely up to you.

Arduino Kits

Suggested Equipment Purchases

Digital Multimeter
(AstroAI or other brand)
$12 on Amazon

22 Gauge Solid Wire
$16 on Amazon



Wire Cutters
$10 on Amazon

Wire Strippers
$7 on Amazon

Suggested Equipment Purchases

Tool Box

$10 at Home Depot

Soldering Iron

$35 on Amazon

Sensors and Other Equipment

Maker Shed

SparkFun Electronics

Adafruit Industries

Jameco Electronics

Mouser Electronics

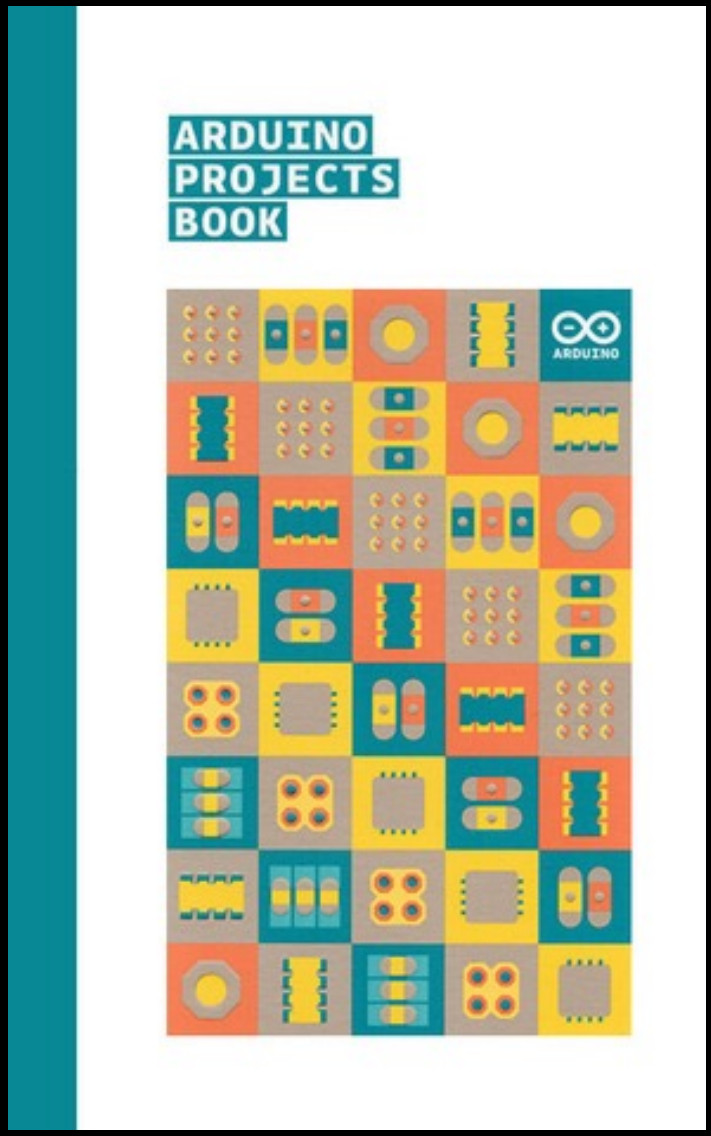
Digi-Key Electronics

Micro Center

Amazon

Required Reading

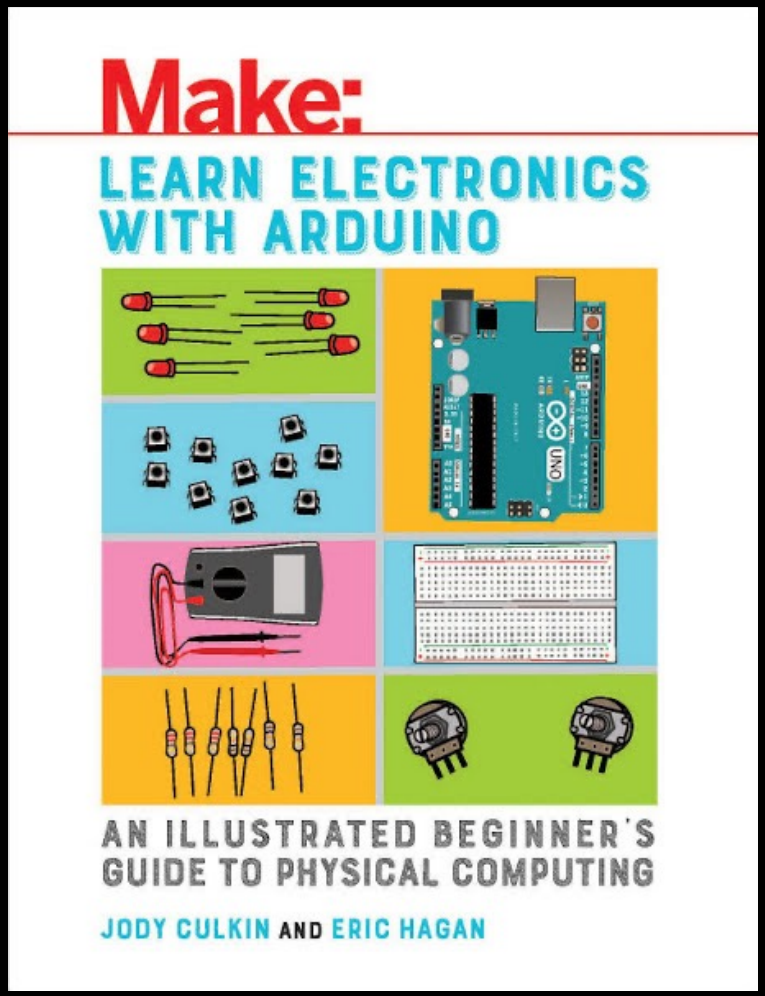
Arduino Projects Book



Suggested Reading

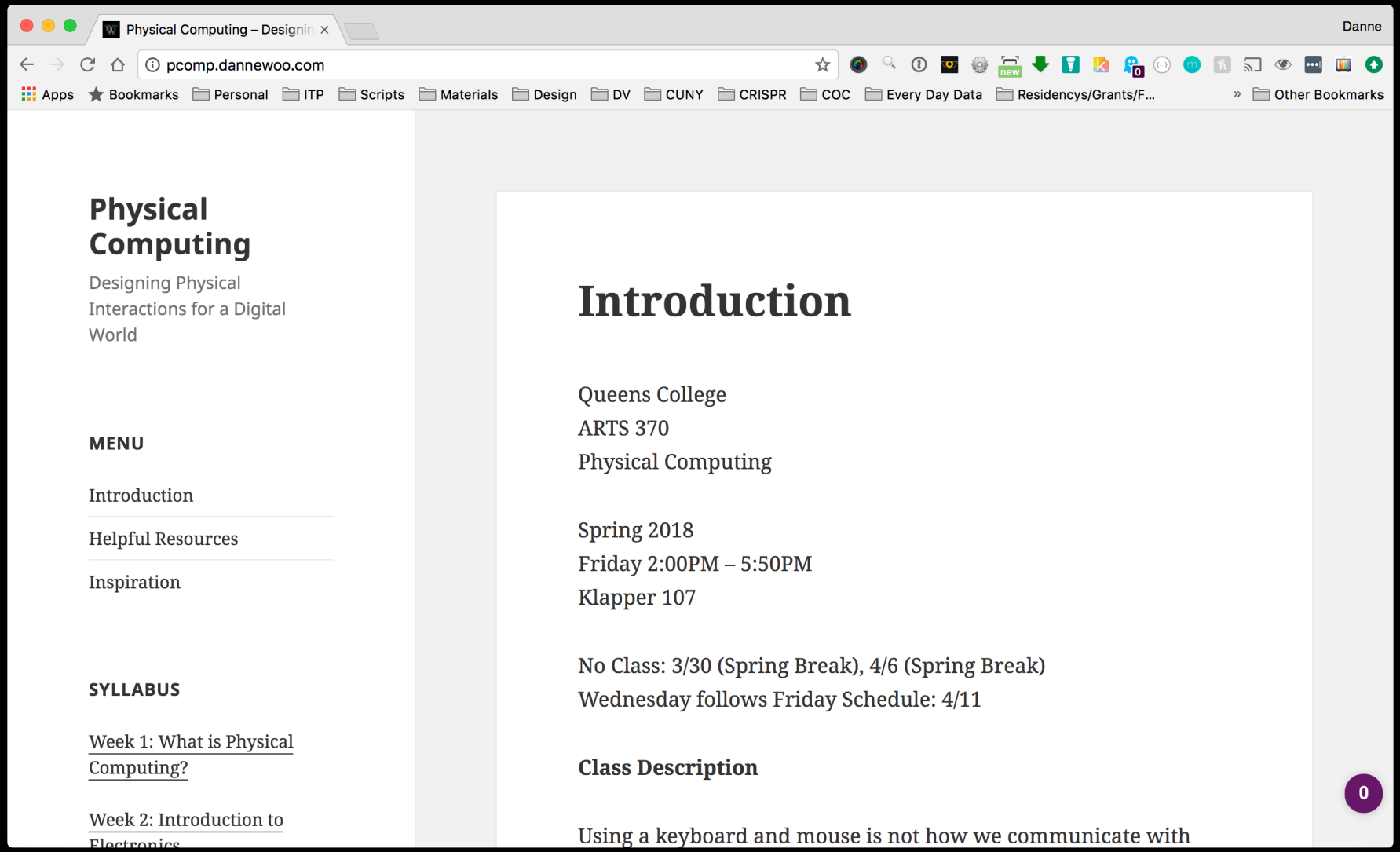
Learning Electronics with Arduino

By Jody Culkin and Eric Hagan



Class Website

pcomp.dannewoo.com



Blog

You will be required to keep a blog to post your projects and progress throughout the entire semester. Use either Medium, Wordpress or Tumblr to setup your blog. See the links below for examples of good blogging habits. Makes sure to include images, videos and detailed descriptions.

Examples:

- itp.dannewoo.com
- medium.com/@venegu.design
- electrosquirrel.wordpress.com
- aepeng.tumblr.com

For Class

1. Sketchbook (Moleskin or similar)
2. Laptop or Thumb Drive
3. Arduino Kit and Supplies
4. Be prepared to talk about your work and blog posts

Grading

80% Assignments
20% Class Participation

Check the class website for a detailed description on how to achieve each grade.

Attendance

BE HERE AND DON’T BE LATE!

2 unexcused absences will mean a drop in your grade

3 will drop again

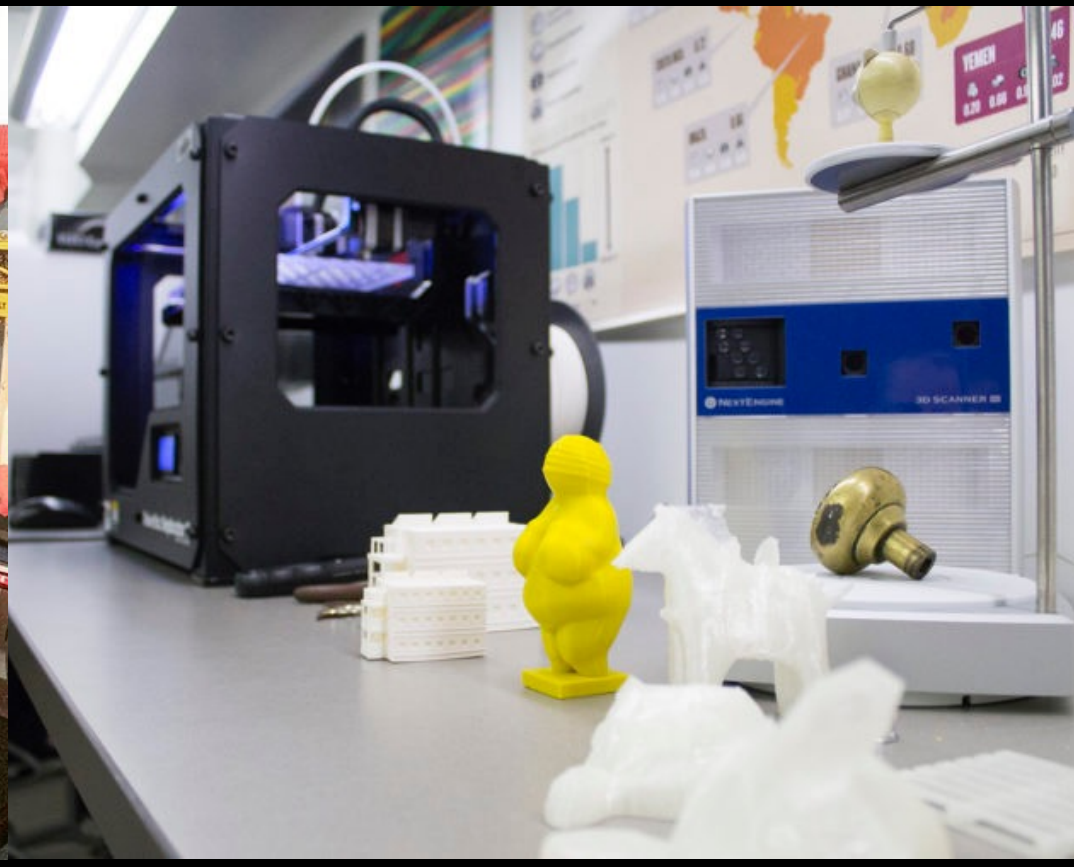
4 will be an F

Queens College Makerspace

Rosenthal Library, Floor 1, Room 101

library.qc.cuny.edu/makerspace

Head of Makerspace: Nick Normal



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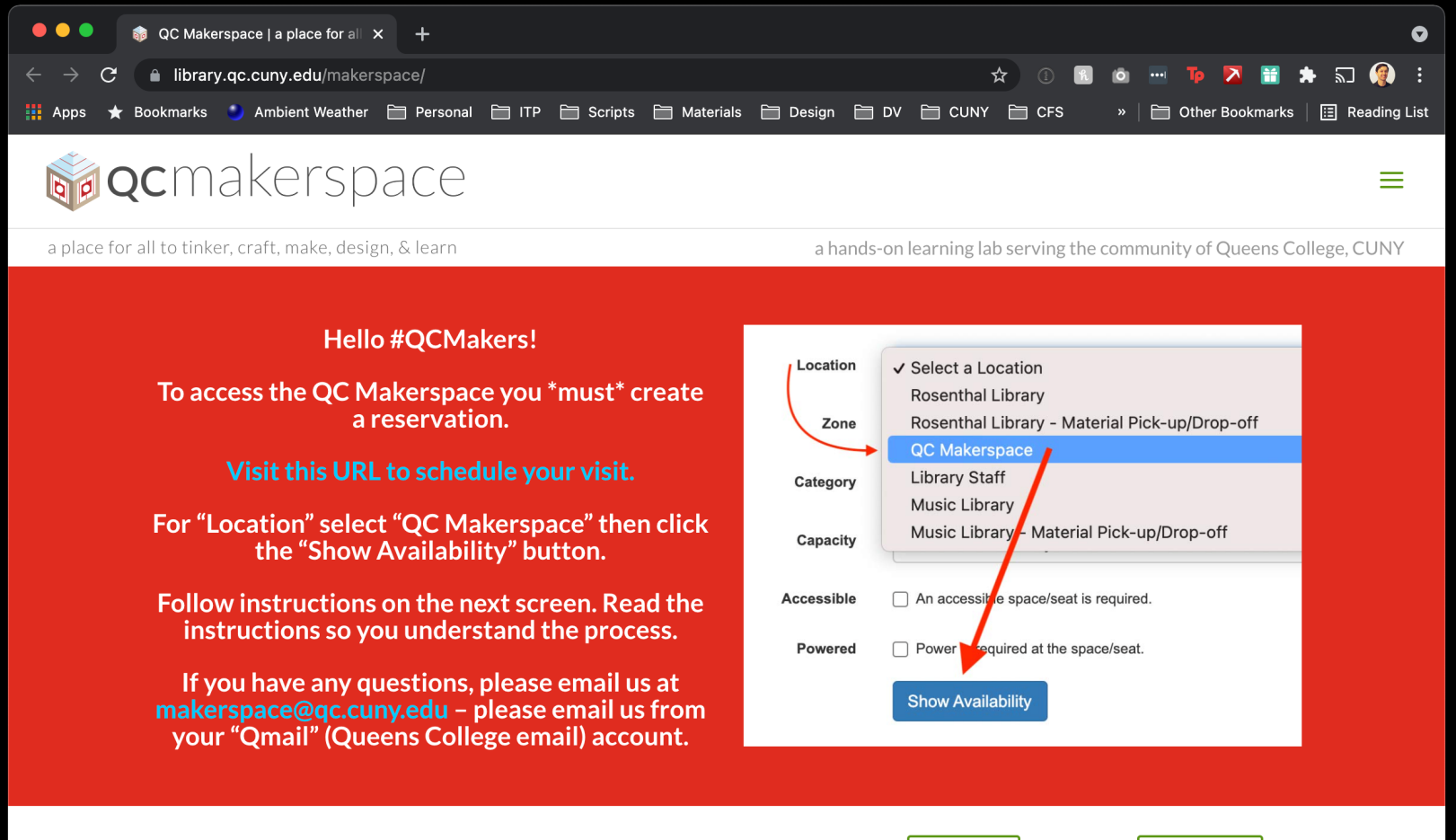
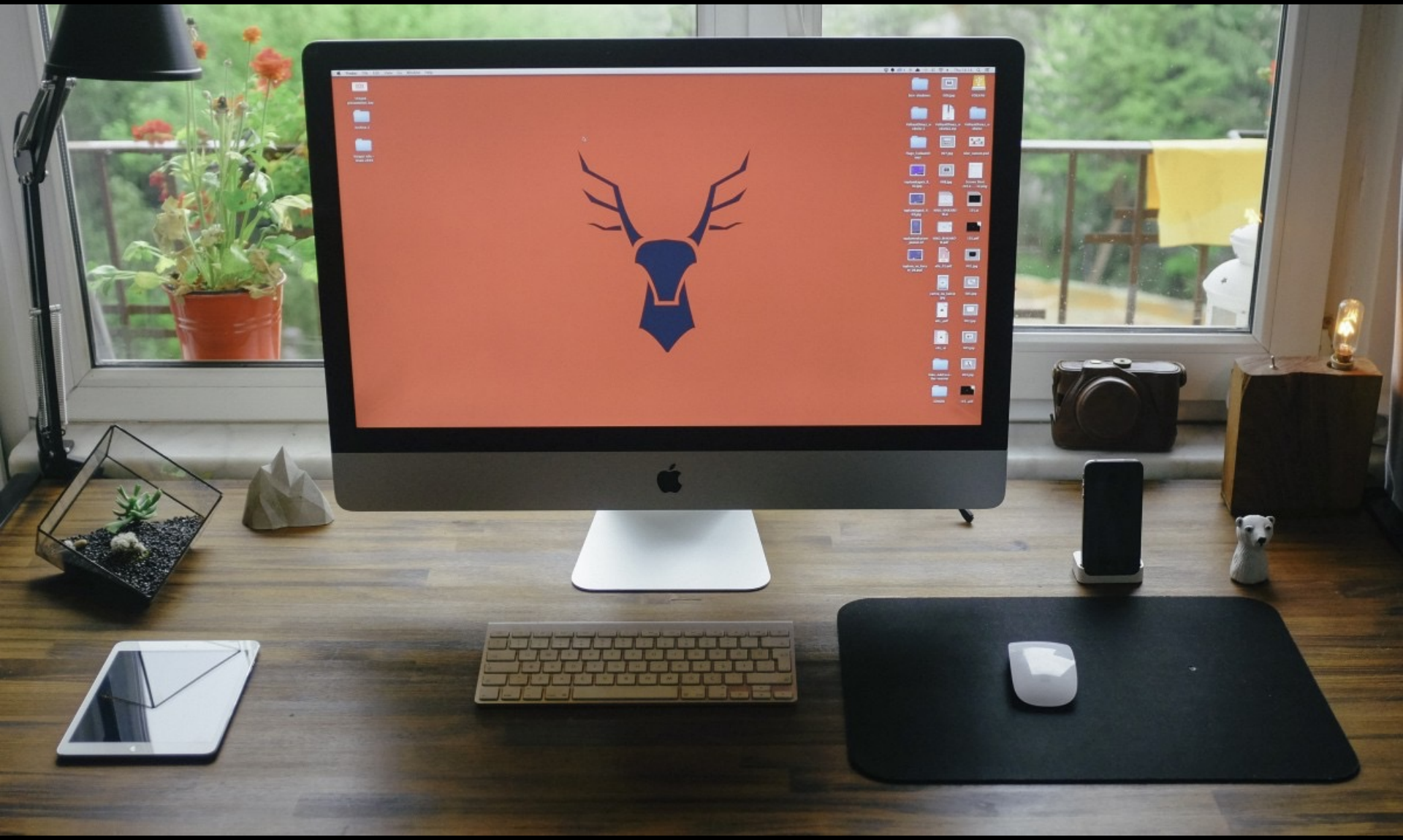


What is Physical Computing?



What is Physical Computing?

Body as a Controller

- **Gestures/Movement**
- **Touch**
- **Speech**
- **Strength/Pressure**
- **Biometrics**

What is Physical Computing?

Sensing the Environment

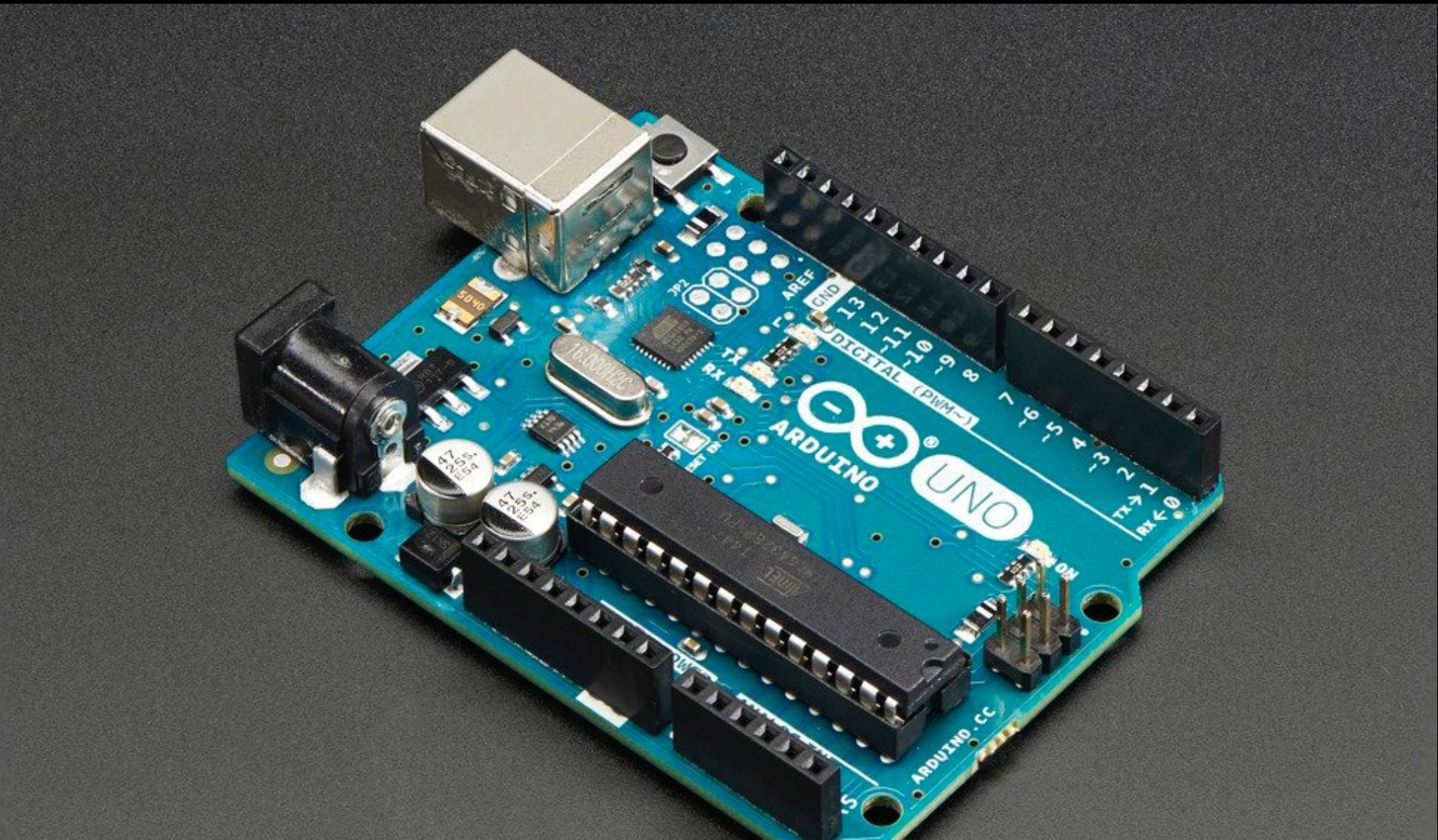
- **Moisture**
- **Temperature**
- **Weight**
- **Motion**
- **Wind**
- **Light**
- **Sound**
- **Color**
- **Distance**
- **Digital Inputs**

What is Physical Computing?

Microprocessors

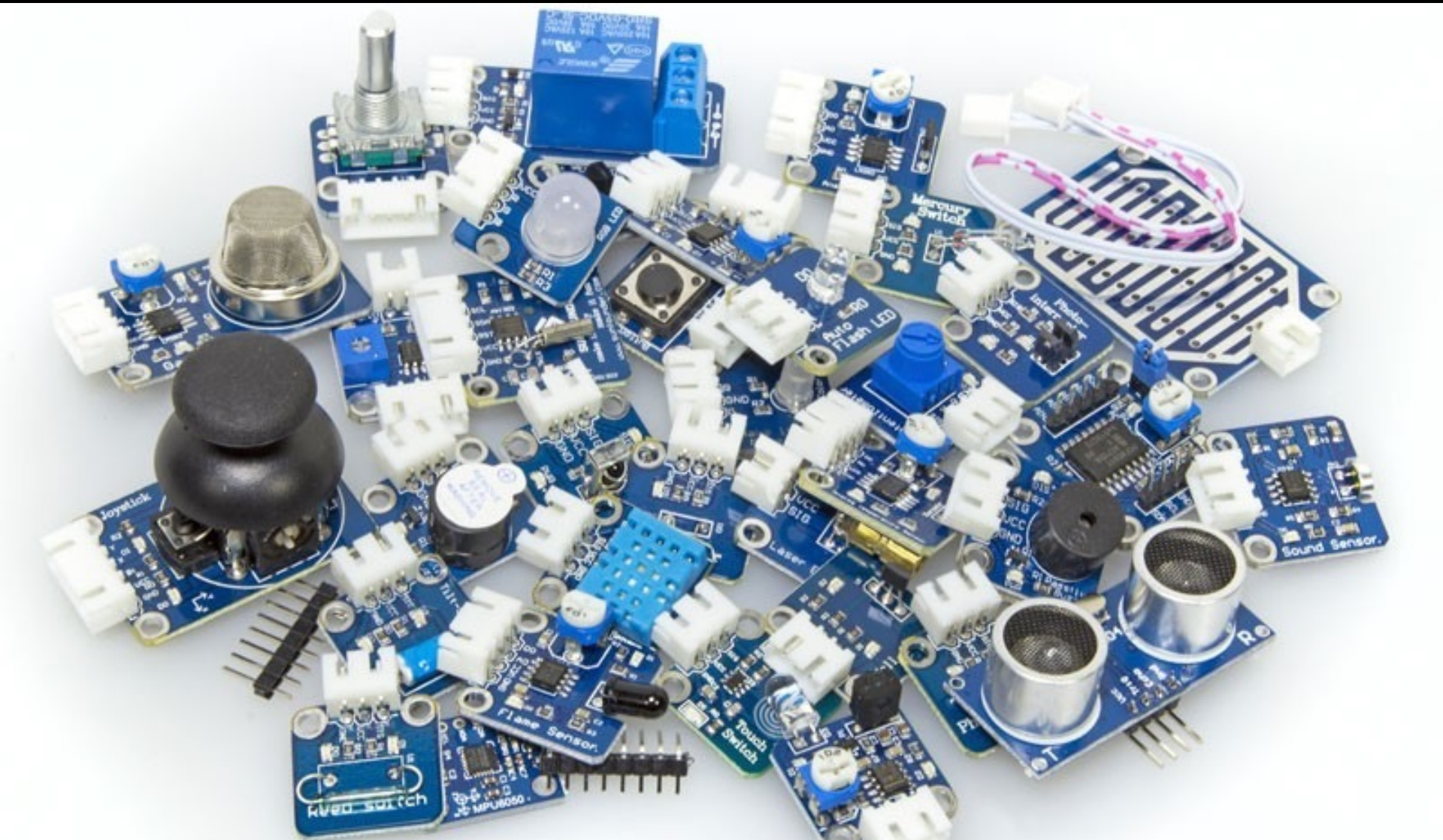
What is Physical Computing?

Arduino



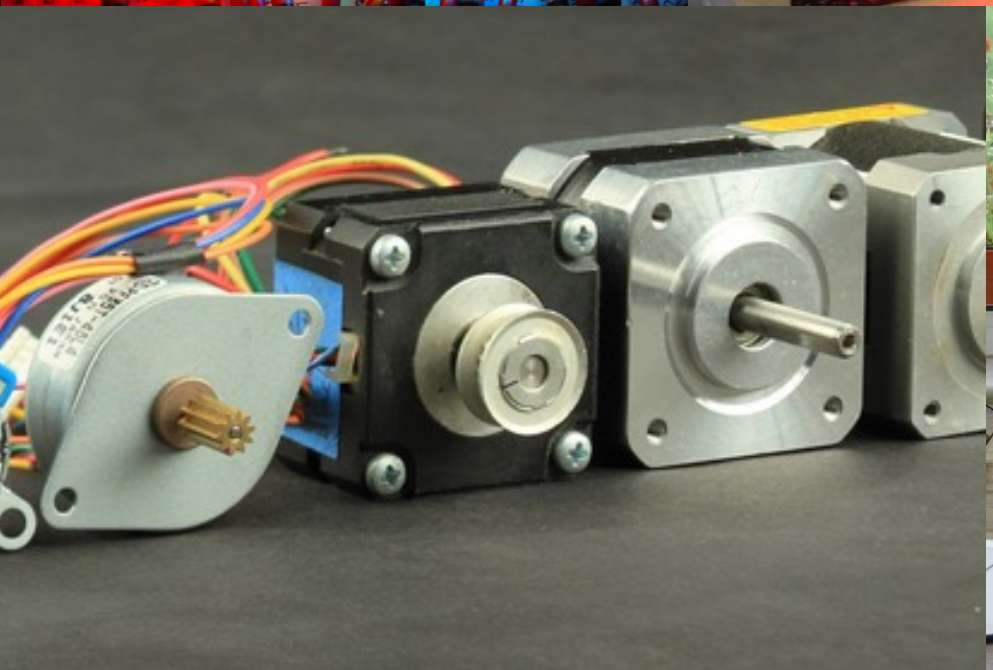
What is Physical Computing?

Input - Sensors



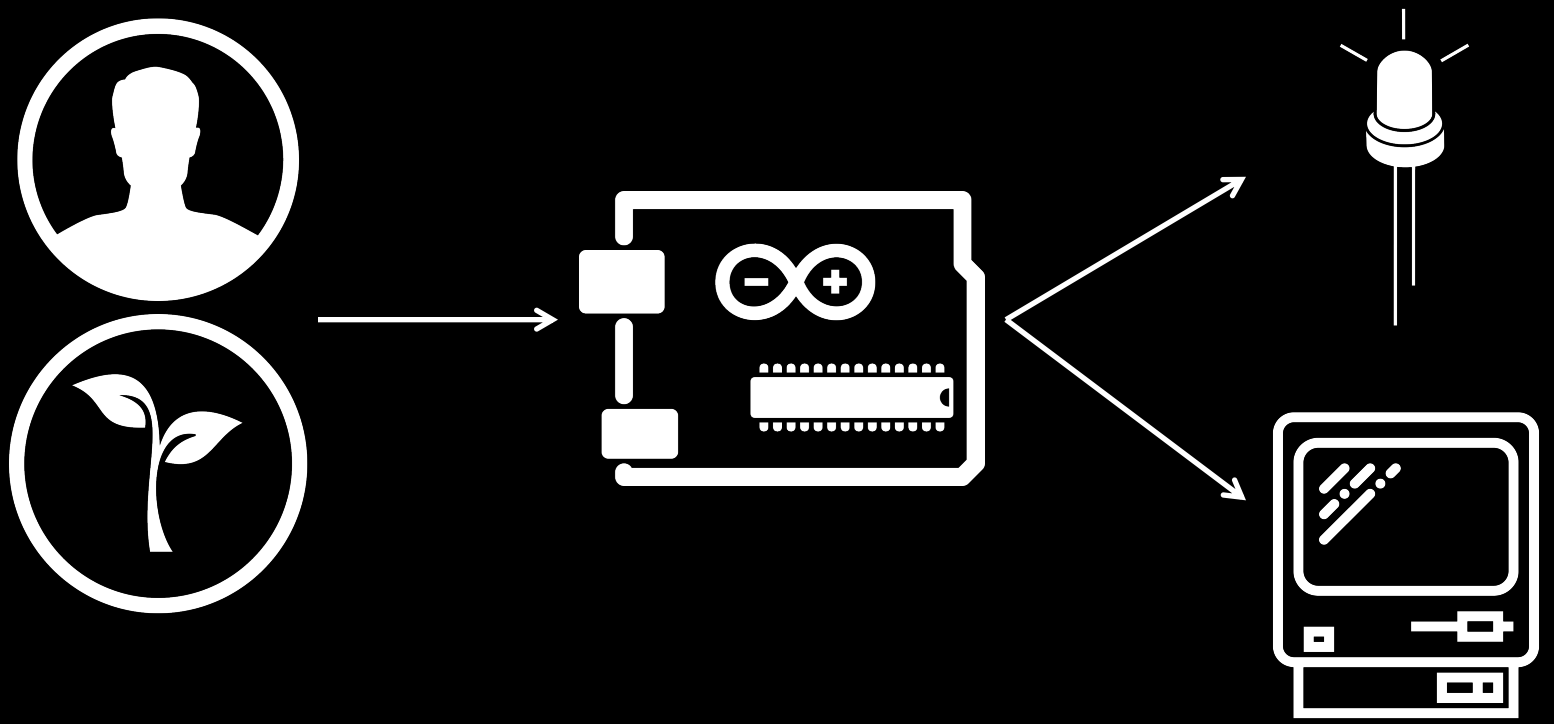
What is Physical Computing?

Output



What is Physical Computing?

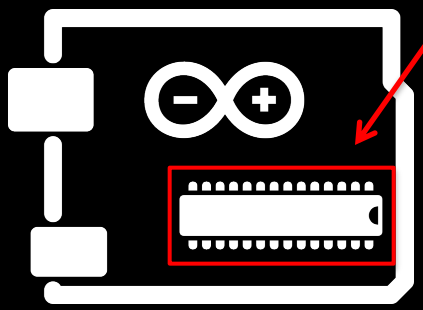
Flow



Input Processing Output

What is Physical Computing?

Code



sketch_jan17a | Arduino 1.0.4

sketch_jan17a §

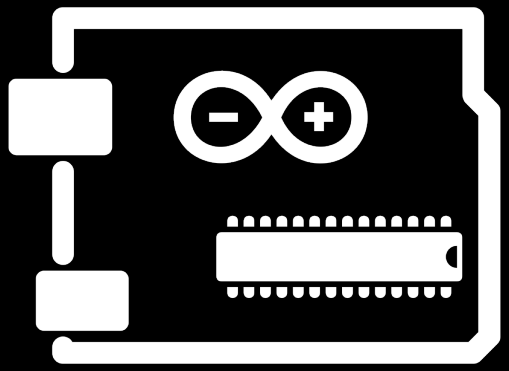
```
void setup() {
  pinMode(2, INPUT);     // set the switch pin to be an input
  pinMode(3, OUTPUT);    // set the yellow LED pin to be an output
  pinMode(4, OUTPUT);    // set the red LED pin to be an output
}
In the main loop, first you need an if-then-else statement to read th

void loop() {
   // read the switch input:
   if (digitalRead(2) == HIGH) {
     // if the switch is closed:
     digitalWrite(3, HIGH);    // turn on the yellow LED
     digitalWrite(4, LOW);     // turn off the red LED
   }
   else {
     // if the switch is open:
     digitalWrite(3, LOW);     // turn off the yellow LED
     digitalWrite(4, HIGH);    // turn on the red LED
   }
}
```

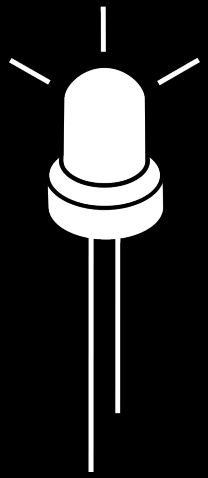
```
)
        at
java.awt.EventDispatchThread.run(EventDispatchThread.java:122)
```

20 Arduino Mega 2560 or Mega ADK on /dev/tty.usbmodem1411

What is Physical Computing?

Pseudocode – Blink LED every 3 seconds





Turn on LED

Delay 1 second

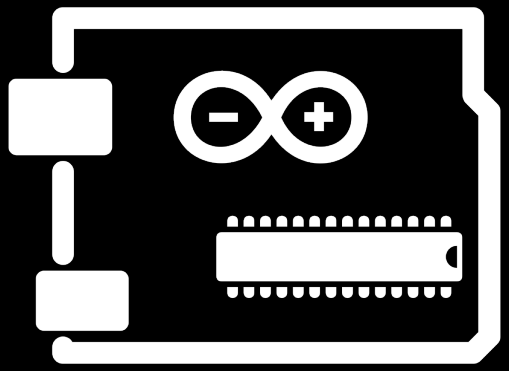
Turn off LED

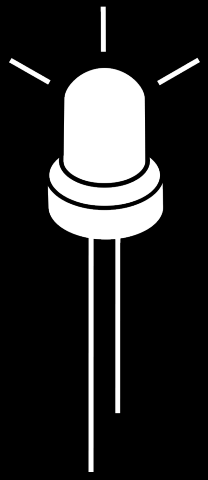
Delay 3 seconds

Repeat

What is Physical Computing?

Code – Blink LED every 3 seconds





```
void loop() {
    digitalWrite(3, HIGH);
    delay(1000);
    digitalWrite(3, LOW);
    delay(3000);
}
```

What is Physical Computing?

Nerd Door Bell – Danne Woo

What is Physical Computing?

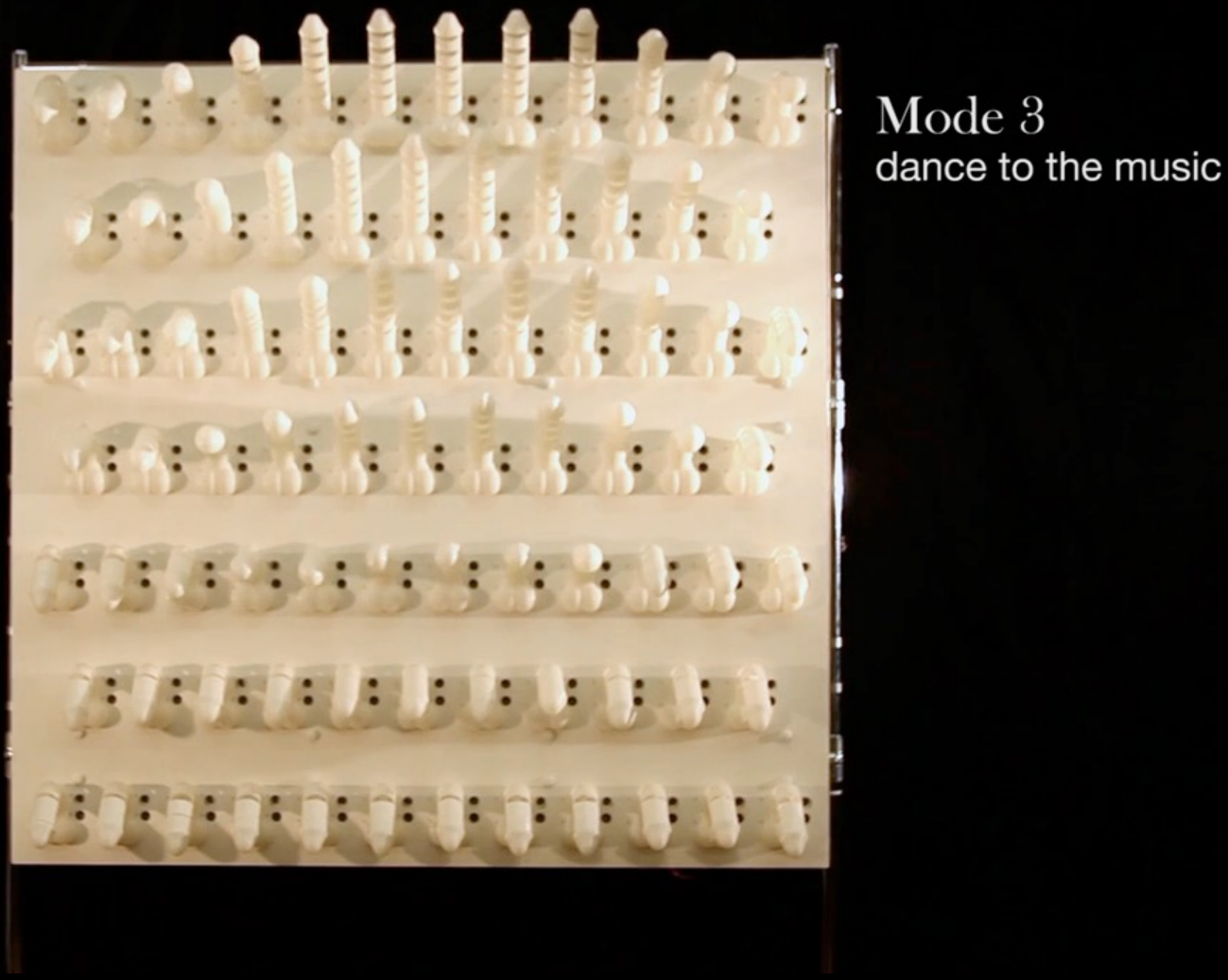
Matt Richardson – The Descriptive Camera

What is Physical Computing?

Daniel Rozin – Wooden Mirror

What is Physical Computing?

Peiqi Su – The Penis Wall



What is Physical Computing?

Nick Yulman – Bricolo

What is Physical Computing?

Scott Garner – BeetBox

What is Physical Computing?

Scott Garner – Still Life

What is Physical Computing?

Rafael Lozano-Hemmer – Pulse Park

What is Physical Computing?

Mark Kleback and Others – DBA Arcade and Wonderville Bar

What is Physical Computing?

Simone Giertz / Queen of the Sh*tty Robots

What is Physical Computing?

Fantasy Device

What device is missing from your life?

Fantasy Device Prototype

Choose one device on this list and design a prototype out of paper, cardboard and anything else you can find laying around your house.

In Class Assignments

1. Choose a fantasy device that does not exist yet and design a prototype out of paper, cardboard and anything else you can find.
2. Sign up for Slack and send an email using the email address you use for Slack to danne.woo@qc.cuny.edu so I can add you to the class Slack channel.
3. Setup your blog (use either Medium, Wordpress or Tumblr) and add the link to the Slack channel. Check out Danne's ITP Blog, Lisa Maldonado, Andy Poon and Anne Peng's blogs for good examples on how to document your assignments for this class.
4. Post pictures, videos and descriptions of your fantasy device you created in class to your blog.

Homework

1. Order your Arduino Starter Kit and familiarize yourself with the Arduino kit, the sensors, devices and book that come with it.
2. Other suggested (not required) tools and materials to purchase for this class. **If you go to the QC Makerspace you will have access to all of this for FREE**:
   Digital Multimeter, (~$10), 22 Gauge Solid Wire, (~$15), Wire Cutters, (~$10), Wire Strippers, (~$7), Tool Box (~$10) and Soldering Iron (~$35)
3. Find a physical computing project online that you find interesting and post it to your blog with a description as to why you like it and what makes it successful. Many can be found on the Arduino blog (blog.arduino.cc).
4. Sign up for a time to go to the QC Makerspace to get a tour and do safety training before we meet next week. Take pictures and post your experience to the blog.

Physical Computing

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