

_ INITIAL DRAFT _

SoftShop

Talking Lights and Stretching Sound

An Introduction to Physical Computing and SoftWear for Middle School Students

Shop Hours

Mondays from 3 - 5pm

Shop Location

2 West 13th Street, Rm 1006

Instructors

Liza Stark
TBD

Course Description and Objectives

In this course, middle school students will explore the possibilities of physical computing through soft components to offer students a large toolkit to draw from in implementing their designs. There will be a focus on interaction design, computational concepts, and craftsmanship. This course will be held largely in a workshop format with opportunities for group learning and individual work

Learning Outcomes

By the end of this course, students will:

1. Understand basic concepts of physical computing: electricity, basic circuitry, input/output, sensors, etc.;
2. Learn sewing fundamentals and how they can be applied to the creation of soft circuits and e-textiles;
3. Have a basic understanding of Arduino programming environment and basic computational logic;
4. Learn how to communicate between the microcontroller and external prototyping components (hard and soft);
5. Learn the fundamentals of the design process and how to design for interaction by constructing a final project incorporating the skills and concepts learned.

Evaluation

Students will be evaluated based on (1) their participation and collaboration with other students; (2) their understanding and application of basic computational concepts; (3) the craftsmanship and cleanliness of work; (4) their final project.

Course Outline

MODULE 1: Talking Lights

Week 1

Hello World!

Students will:

- Be introduced to the field of physical computing and different approaches to implementation.
- Be introduced to the concept of interaction and interaction design through various activities
- The main goal of this session is to prompt excitement and investment in workshop topics.

INITIAL DRAFT

Activity: Rapid Prototyping Scenario (RPS): Divide the students into groups and assign each group an “odd” piece of conductive material. Give the class a scenario, and have them prototype a user scenario with their object. The goal is to have students start thinking about the objects around them and different ways they can interact with them.

Week 2

Don't Short Your Circuit!

An Introduction to Circuits and Materials

Students will:

- Be introduced to the materials, components, and tools associated with hard and soft circuits
- Learn the fundamentals of circuitry and how to build circuits with LEDs in parallel and series
- Understand the role of electricity in constructing circuits
- Be introduced to basic schematics

Activity: Construct a circuit using either a bread board or alligator clips, an LED, and a resistor.

Week 3

Sew What?

Students will:

- Learn basic sewing skills: threading a needle, different stitches, closing a stitch, etc. And how to “debug” a stitch if they make a mistake.
- Construct a soft switch: break it to make it!

Activity: Make a soft switch to hook up at different output stations (light, sound, motion). Each student should come up with a story or user scenario for his/her switch (e.g. what is it controlling?) There will be a focus on craftsmanship and clean work, with an emphasis on design through pattern-making.

MODULE 2: Programming Noise

Week 4

Introduction to Programming

Students will:

- Begin class by playing a logic game that will introduce them to basic computational constructs and terms.
 - Variables, loops, etc.
- Receive a basic introduction to the LilyPad and Arduino IDE
- See examples of working projects

Activity:

Week 5

To be or not to be...Digital Pins

Students will:

- Be introduced to the Arduino board and environment.
- Understand the difference between digital and analog pins.
- Apply the logic they used in the exercise to write a short program for the circuit they constructed the previous week.

INITIAL DRAFT

Activity: RPS: A button to control the world! Construct a button from the materials supplied on the table. When you are finished, exchange with a partner and come up with a use for it.

Week 6

Join the Analog Resistance!

Students will:

- Revisit idea of resistance through a multimeter activity;
- Be introduced to resistive materials: Velostat, resistive thread, carbon paint, etc.
- Learn about different types of variable resistors;

Activity:

Students will create a variable resistor using the new materials. Students will plug in their resistors into Arduino to see whose potentiometer will produce the greatest range.

Week 7

Project 1

Students will:

- Design and prototype a toy for your younger sibling based on what you have learned so far.
 - You should think about how it will look, what it will do that your sibling will like so much (or not like at all!), and how you will build it.
 - You can use paper, fabric, etc., but we will not be building a circuit!
- Participate in class critiques

MODULE 3: Common Sense

Week 8

What is a sensor? Part 1

Students will:

- Revisit concepts of input and output;
- Learn about different types of sensors;
- Understand the importance of the `Serial.println` in action;
- Construct a circuit with a photocell;

Activity: Make light - photocell

Week 9

What is a sensor? Part 2

Students will:

- Learn how to make a tilt and stretch sensor using sound as an input.

Activity:

Half the class will construct a stretch sensor using black elastic and carbon paint and the other half will make a tilt sensor. Students from each group will then be paired together and explain the process of making their respective sensors.

Week 10

Catch Up and Documentation Workshop

Students will:

- Learn why it is important to document their work, both for their own learning process and others to learn by

MODULE 4: Make IT

Week 11

Final Project Introduction

Students will:

- Participate in group brainstorming;
- Rapid prototype different low-fi prototypes and design scenarios based on the theme chosen;
- Participate in student-driven critiques.

Activity:

RPS for final project. Students should have their final project chosen by the end of the workshop.

Week 12

Prototyping and Group Work

Students will:

- Create at least two prototypes for their projects: look/feel, role, implementation

Week 13/14

Construction + Documentation

Week 15

Final Presentations

Resources

List of websites, books, etc.

Materials List

List of websites, books, and materials