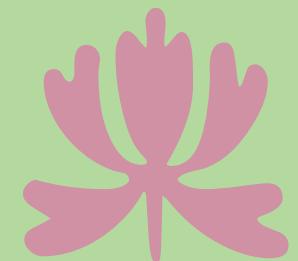


Sarah Massoudí

INTERACTION DESIGN
STUDIO
2025



Readings



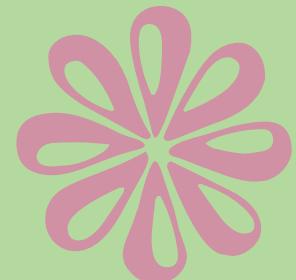
Reading 1



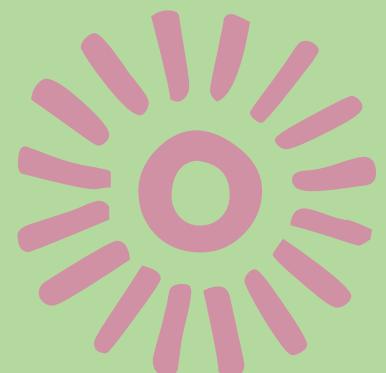
While I have given some thought to the concept behind the word “digital” (and have kind of come to an in-between conclusion about it), I have not really thought about how the digital intertwines with art and how art can broaden the definition of the word. I never thought deeply about the ways in which technology and “the digital” have developed over time. Throughout my academic career, I have thought about the digital realm as something that is separate from us. It wasn’t until I was in a class called “Theory of the Digital”, where I was forced to reckon with the challenge of finding its true meaning. I found that the best way to describe it was as an extension of us, as one meaning of “digit” is finger, and therefore the digital is sort of an extension of our fingers and bodies. When Paul discusses the digital as a medium, it really opened my mind even more about the discussion of the term “digital” as an extension of our artistic visions and minds.

It was very interesting to learn the interplay between engineers and artists and the merging of the two, especially in early computing days. I was really pushed to think about what the computer was made for, who it has actually been used by, and in what ways. I was delighted to learn about all of the ways in which the tech world has transformed art and vice-versa, such as Nancy Burson’s work, for example, with her “computer-generated composite photographs” (Paul 28). This reading also connected the concepts of the “digital” and technology to the concept of interactivity and how art can be that bridge connecting the two realms. Digital art can also receive and “talk back” to the user/viewer, which adds a sort of conversation to the dynamic. The interface and its ability to connect the user with the art piece is a crucial aspect to digital art that other mediums are not really capable of accomplishing. This reading has changed and redefined my perception of digital art from something “flat” and almost incomprehensible to something deep, undefinable yet understandable, and incredibly useful.

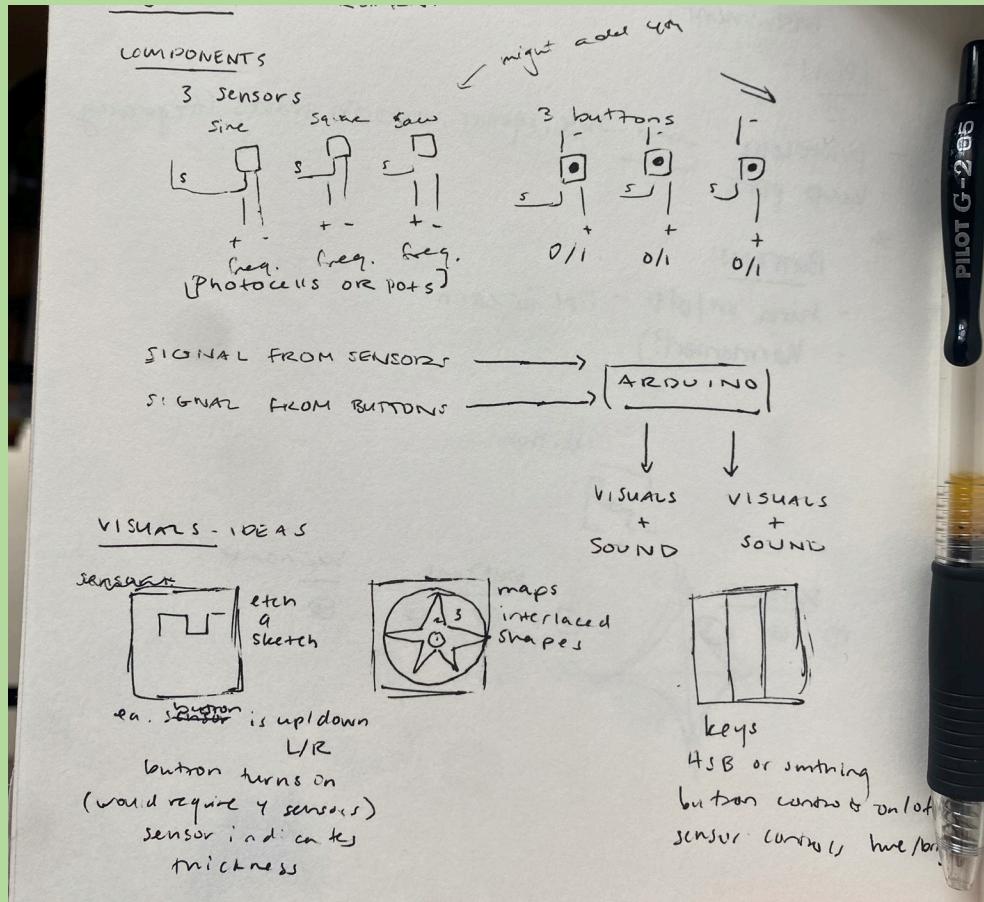
Workshops



Workshop 1



Ideation



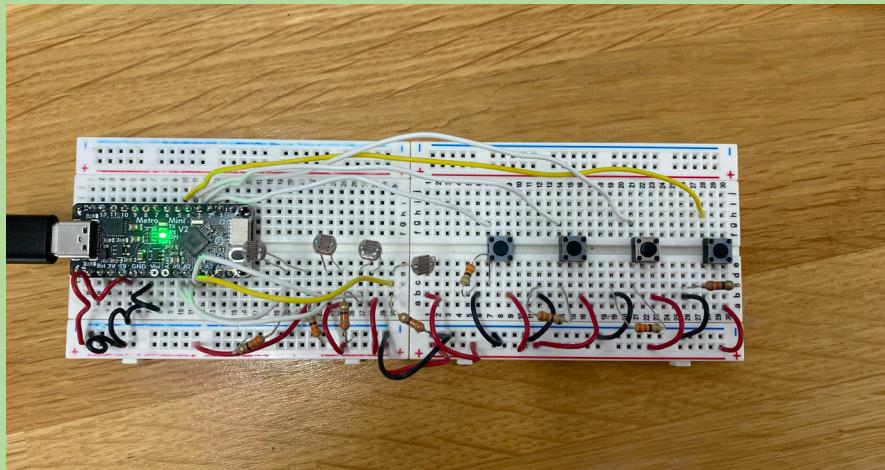
Components:

- * 3-4 sensors
- * 3-4 buttons
- * Breadboard + other components
- * Adafruit Metro Mini
- * Processing tools - oscillators and canvas/visual component

Visuals:

- * Interlaced shapes changing sizes with frequencies
- * “Keys” with changing brightness and hue depending on the frequency
- * Etch-a-sketch - a drawing tool with different directions, stroke weights, and colors

Creation



Wiring and Basic Controls

- ✿ 4 photocells and 4 buttons
- ✿ Each photocell controls the frequency of 1 type of waveform
 - 1: sine
 - 2: square
 - 3: sawtooth
 - 4: triangle
- ✿ Each button turns on the corresponding waveform

Code

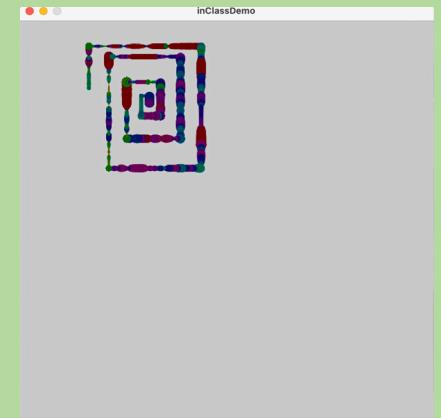
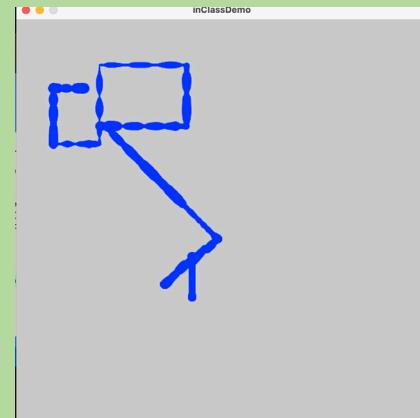
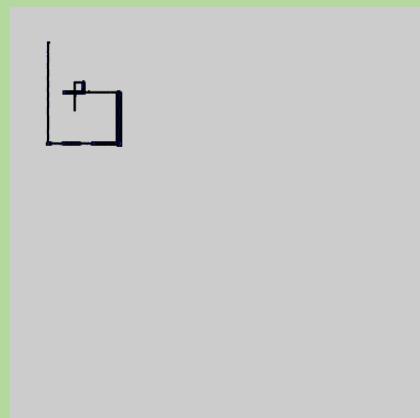
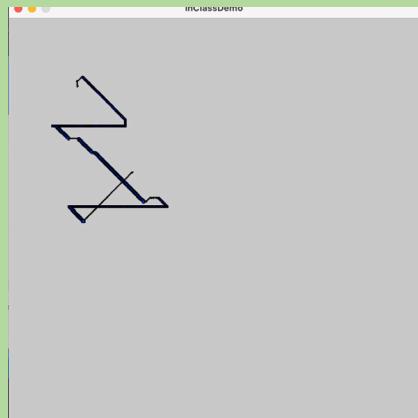
- ✿ Arduino IDE sends 8 outputs to Serial as one string with values separated by commas
- ✿ Processing splits said values into an array
- ✿ Conditionals test to see if each button is being pressed
- ✿ If each button is pressed, a circle moves along directions designated to each button
 - Diameter and color of the circle/pen depends on the value coming into the photocell

```
Serial.println(String(potVal1) + ", " + String(potVal2) + ",
```

```
if (int(buttonVal1) > 0) {  
  
    sine.play();  
  
    dir = "up";  
    float sineFrequency = map(float(potVal1), 0.0, photo1Max, 80.0, 1000.0);  
    sine.freq(sineFrequency);  
  
    diameter = map(float(potVal1), 0, photo1Max, 1, 15);  
  
    ypos -= 1;  
  
} else {  
    sine.stop();  
}
```

Results

Progression of Test Sketches



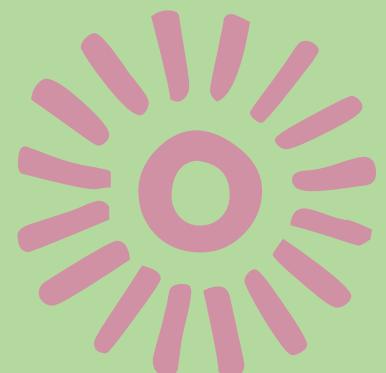
Learnings + Improvements

- * I had some challenges with buttons and wiring issues - sometimes clicking one button would result in turning “on” another input
- * Figured out that the play() and stop() methods needed to be called in the conditional
- * I had to map the values of the photocells to the range in which they occupied, as some covered very different ranges and mapping from 0 to 1023 was sometimes too large of a range

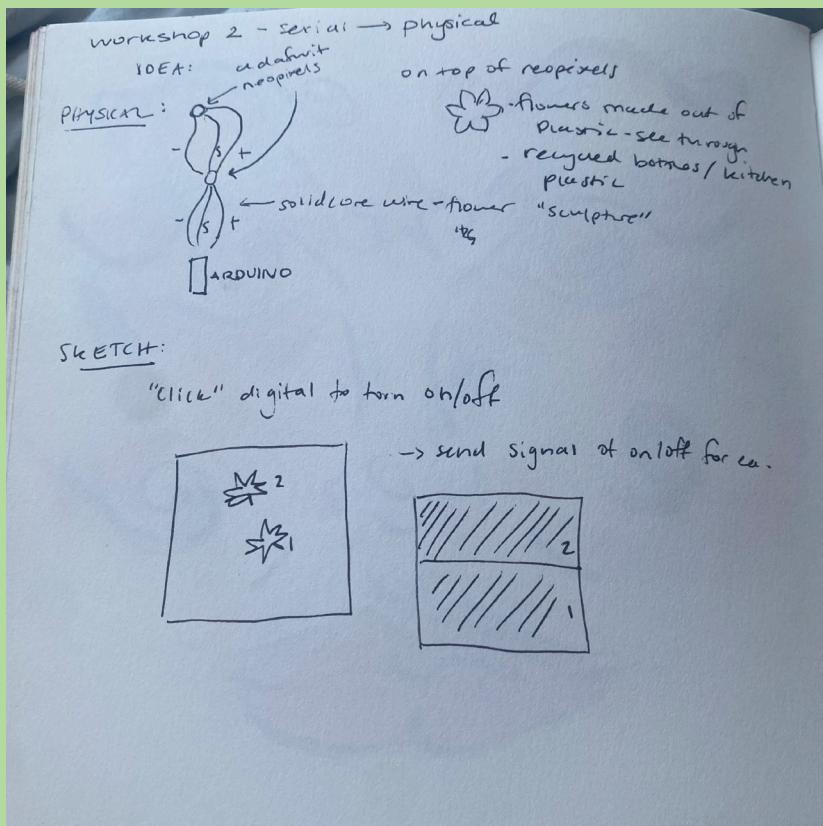
What I’d Improve in the Future

- * I would probably add more controls like an “erase” button or different pen shapes
- * I would add more musical functionality like somehow generate harmonies with a button
- * I would try to create more unconventional buttons, perhaps a glove with switches instead or something along those lines

Workshop 2



Ideation



Idea:

- * Two flowers made out of recycled plastic
- * Flowers "light up" upon clicks on the screen
- * The light will make the flowers appear with color

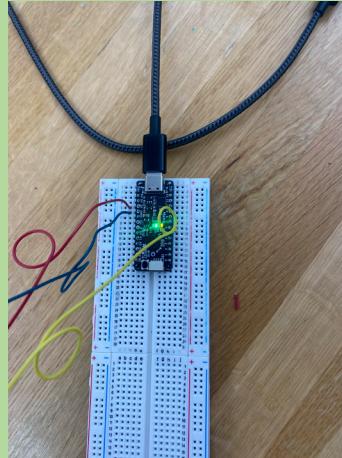
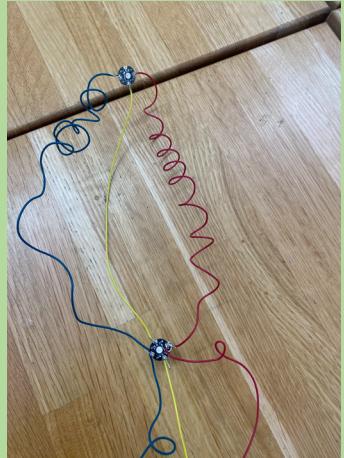
Components:

- * Adafruit NeoPixels
- * Wire
- * Adafruit Metro Mini

Visuals:

- * A couple of stars representing the two flowers
- * Flowers turn into a color when clicked
- * Corresponds with the physical design

Creation



Code

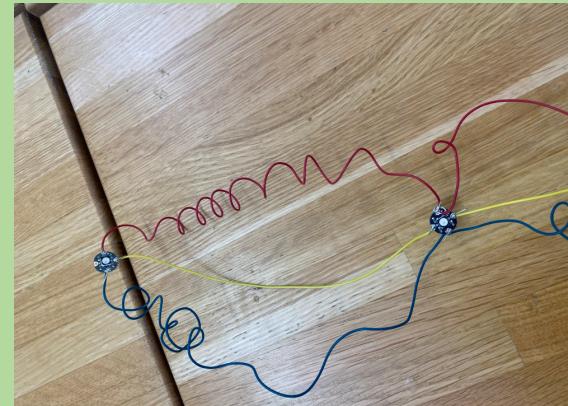
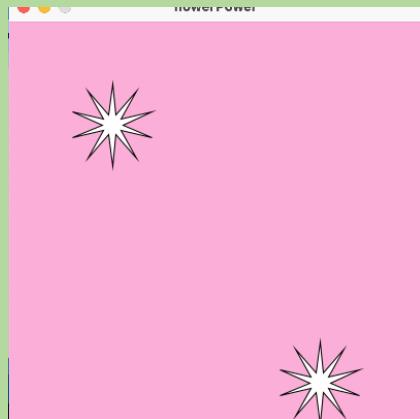
- ※ Serial library is imported to Processing
- ※ Two “flowers” are drawn on opposite corners of the screen
- ※ If the flowers are clicked on, the fill of the flowers changes
- ※ Once clicked, variables toggle on/off
- ※ Variables are sent out using Serial.write()
- ※ Adafruit NeoPixel library is imported
- ※ The two NeoPixels are part of one “strip”
- ※ Serial.read() takes the variables and uses them to turn light on/off

Wiring and Basic Controls

- ※ Simple wiring
- ※ One signal wire
- ※ One power wire
- ※ One ground wire
- ※ Click of the “flower”/star on screen to turn each one on/off

```
if (Serial.available() > 1) {  
    light1On = Serial.read();  
    light2On = Serial.read();  
  
    if (light1On == 1) {  
        strip1.setBrightness(50);  
        strip1.setPixelColor(0, strip1.Color(255,0,0  
} else {  
  
    myPort.write(light1On);  
    myPort.write(light2On);  
}  
  
void mouseClicked() {  
    if ((mouseX > 70 || mouseX < 130) && (mouseY > 70 && mouseY < 130)) {  
        if (led2On == 1) {  
            led2On = 0;  
        } else if (led2On == 0) {  
            led2On = 1;  
    }}}
```

Results



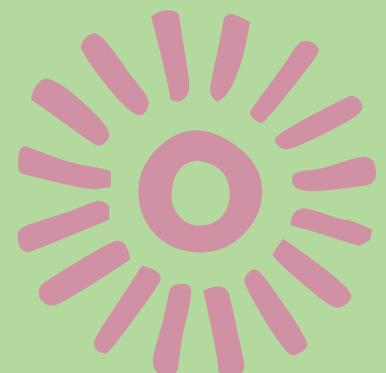
Learnings + Improvements

- * I had some difficulty figuring out how to receive and send information from Processing to Arduino
- * I also had some difficulty with the conditional statements and making the lights turn on properly
- * It was a risk making the flowers out of plastic, but I'm generally very happy with them!
- * I like how the wires appear like vines/stems

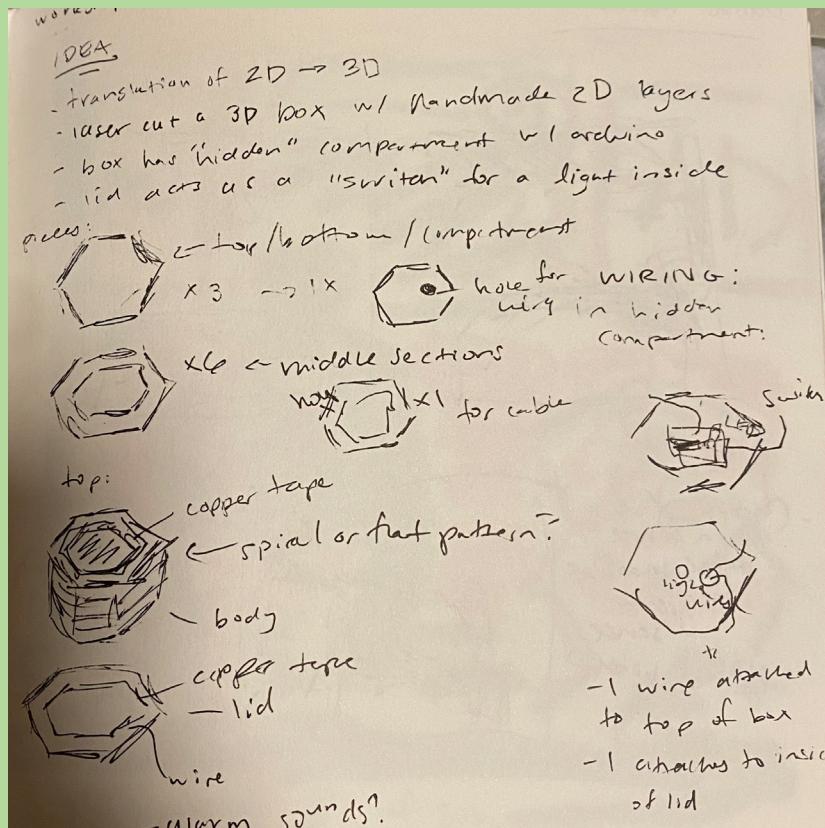
What I'd Improve in the Future

- * I would make the sketch more complex and more flower-like
- * I would probably add a way to change/vary the colors on the NeoPixels
- * I would have made more complex, robust flowers

Workshop 3



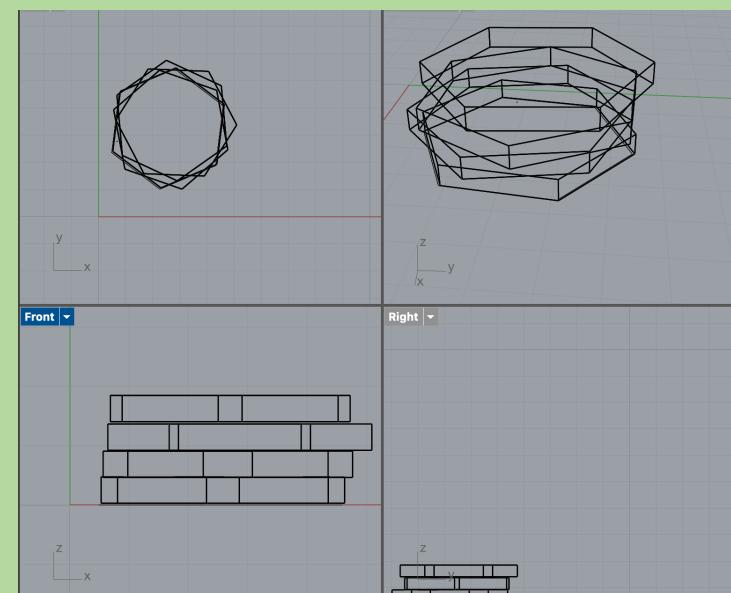
Ideation



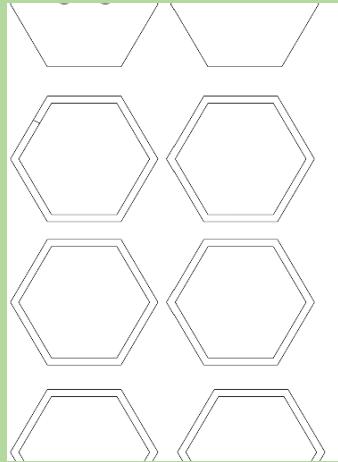
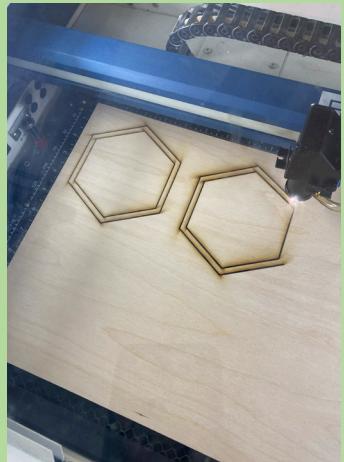
Idea:

Components:

- LED
 - Photocell
 - Laser cut pieces



Creation



Code

- * A photocell peeks out of a hole made in the bottom compartment
- * The LED also pokes out
- * The photocell values are mapped to a value from 0 to 255
- * PWM allows the light's brightness to be mapped

```
void loop() {  
  
    cellVal = analogRead(cellPin);  
  
    if (cellVal > cellMax) {  
        cellMax = cellVal;  
    }  
  
    int ledVal = map(cellVal, 0, cellMax, 0, 255);  
  
    analogWrite(ledPin, ledVal);  
  
    Serial.println(cellVal);  
}
```

Results



Learnings + Improvements

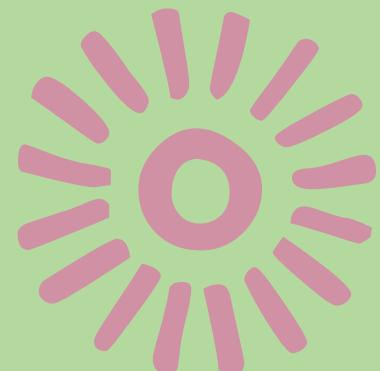
- ✿ I had some difficulty learning to model the piece on Rhino, but was able to do a very lo-fi model!
- ✿ I also had difficulty with the laser cutter being unable to cut all the way through the wood on the first try
- ✿ I was able to learn how to take 2D parts to make a 3D whole
- ✿ I also was able to learn a bit about creating discreet containers of electrical systems



What I'd Improve in the Future

- ✿ I would make the design more intricate
- ✿ I would have made a more complex model
- ✿ I would have found a way to better hide the wires
- ✿ I would have decorated the piece
- ✿ I may also have added a sound component, like an “alarm” that goes off when the box is opened

Project 1



Ideation

The Background

Persian rugs are a staple in many Persian households, including mine. The more a Persian rug is walked on, the more valuable it becomes. I have been looking for an outlet to explore my connection with my culture and the ways it has been broken by severed relations between both the two sides of my family and the two countries my family members are from.

The Idea:

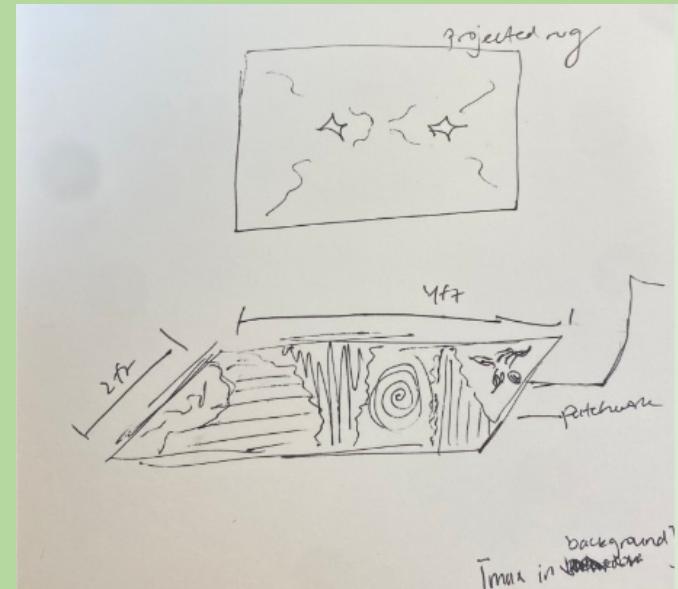
I also have a great passion for textile arts and physical computing, which led me to the idea to make a rug made up of fragments - fragments of photos, different textile art techniques, etc. I wanted to create an experience when interacting with the piece. When the user steps on the rug, sounds and elements of a projected Persian rug are triggered.

The Components:

- * A rug made of different “swatches” of different styles
- * Pressure sensors
- * Audios
- * A projection of a rug with moving elements

Inspiration/elemental ideas:

- * Incorporate image transfer - photos
- * Felt, crochet, weaving
- * Vibrant colors
- * Abstract imagery and composition



The Plan

Overall Plan

Since this is a project of larger magnitude, it will be split into the first and second halves of the semester, and may even become a project used for a future thesis.



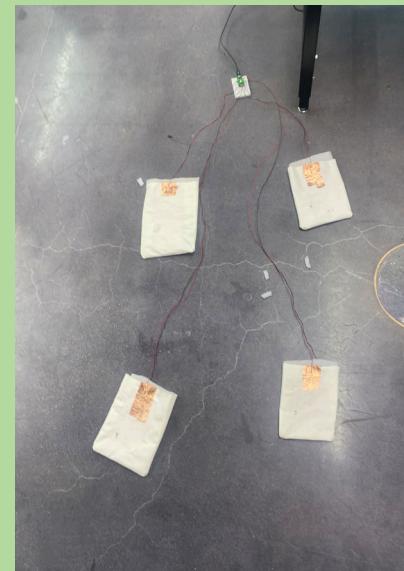
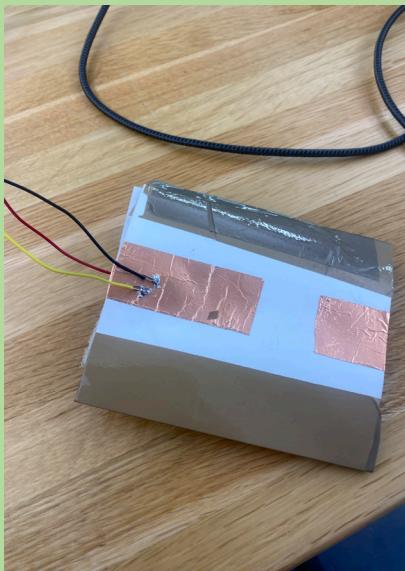
Week 1:
Order materials
Begin rug elements

Week 2:
Finish rug
Basic wiring

Week 3:
Attach wiring
Begin coding audio/serial communication

Week 4:
Finish coding
Finalize presentation

Building THE ELECTRONICS



Week 1:

Researched materials and ideas - velostat, conductive fabric, etc.

Week 2:

Finalized model - pockets with copper tape and foam

Week 3:

Made models

Week 4:

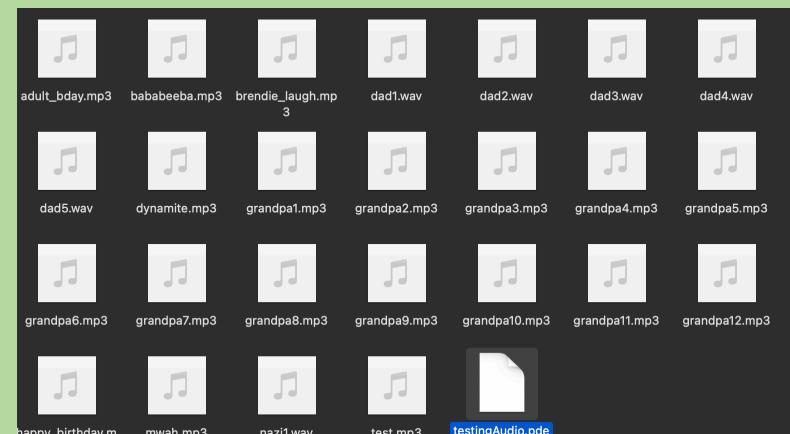
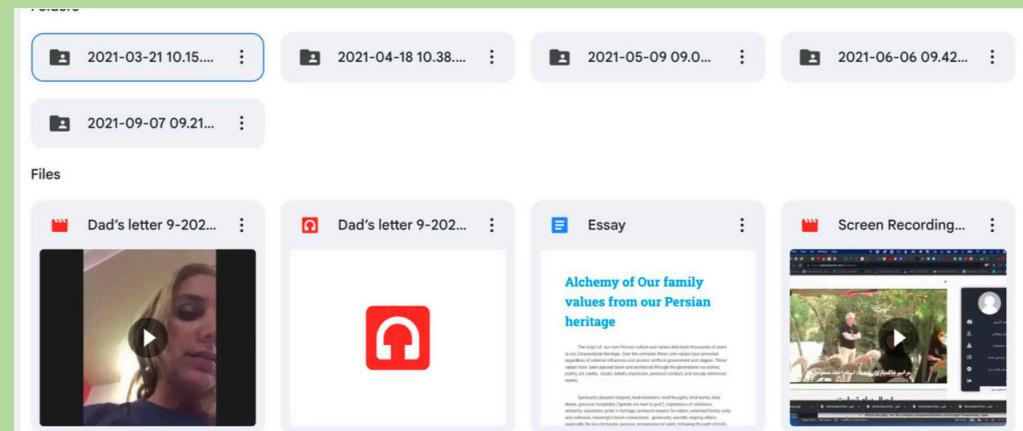
Finished assembling and soldering

Building THE AUDIO



Sourcing Audio

Luckily, my grandfather, in his final months alive, rekindled his relationship with my father. The two had extensive Zoom calls, one of which was a “goodbye” letter to everyone in our family, including my brother and I. I sourced a majority of the audios from these recordings. It took a while of sifting through the footage, and because I don’t speak Farsi, I had to go off of feel, which I think makes the project even more aligned with my message of a sort of “broken” relationship with my heritage. I also found some home videos taken by my brother, myself, and my parents. I sourced a few of those to reconnect the project to my life and my perspective on the Persian-American experience. I edited the audios, adding a reverb effect to add an even more “distant” feeling to these memories.



Results



The rug:

The rug came together nicely and I was able to fit the pressure sensors underneath the corners of it. It is a very delicate piece, so it is going to have to be a requirement to use no shoes in the final presentation of it.

```
if (isPlate4 == 0 && !soundPlaying(4)) {  
    int chosenIndex = int(random(6));  
    if (chosenIndex == 0 ) {  
        dad1.play();  
    } else if (chosenIndex == 1) {  
        dad2.play();  
    } else if (chosenIndex == 2) {  
        dad3.play();  
    } else if (chosenIndex == 3) {  
        dad4.play();  
    } else if (chosenIndex == 4) {  
        dad5.play();  
    } else if (chosenIndex == 5) {  
        dad6.play();  
    }  
}
```

```
//plate 4  
dad1 = new SoundFile(this, "dad1.wav");  
dad2 = new SoundFile(this, "dad2.wav");  
dad3 = new SoundFile(this, "dad3.wav");  
dad4 = new SoundFile(this, "dad4.wav");  
dad5 = new SoundFile(this, "dad5.wav");  
dad6 = new SoundFile(this, "adult_bday.mp3");
```

The computing:

I ran into some minor wiring issues, but the pressure sensors work effectively underneath the rug. I'd like to reinforce the wires and the pads when it comes to the final presentation. I also ran into some issues because there were too many files for p5.js to load all of them. I ended up making the swatch to processing and using the sound + serial libraries. The communication is effective and it is a well-working system.

The Future ◉

REFLECTIONS

I am very happy with the way this initial piece of the project turned out. I am satisfied with the condition of the pressure sensors and the initial durability of the rug, although it is a bit too delicate for repeat use. The audio and coding portion works well and has an echoed, distant effect, just like I was hoping for. Stepping on multiple sensors gives off a very captivating experience. I tested the piece both on computer speakers and headphones, and plan to use a small speaker during the “midterm” presentation.

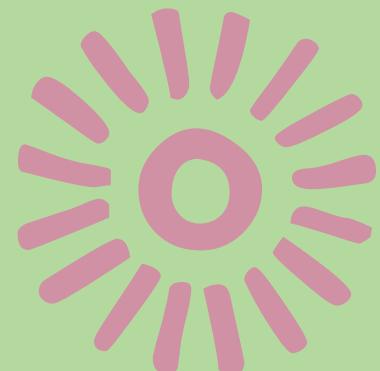
FUTURE PLANS

I am thinking of turning this project into a bit of a different direction. Initially, I wanted there to be a projected aspect to this project. And, while I do not want to “scrap” that idea (I may add it onto this project as a part of a thesis/broader project), I want to turn a bit more focus to the physical space of the project. I’d like to, instead of the projection, create an “altar”, a haft-seen table combined with another way to honor my ancestors. I’d also like to create scattered fragments of the rug that extend around the space; they would also have sensors. Perhaps I’ll dig into some US-Iran relations audios for that aspect, a more modern aspect of this project. I’m also considering a performance aspect to demonstrate the way I want the project to be interacted with.

NEXT STEPS

- * Sewing the rug pieces together to reinforce them
- * Creating more fragments to add to the project
- * Creating more pressure sensors
- * Designing a haft-seen table to not only add a dimension/living-room type of feel to the space, but to also cover wiring
- * “Choreographing” a performance
- * Creating a booklet of information for onlookers to use and interact with, to get to know the piece more technically

Project 2



Ideation

The Background

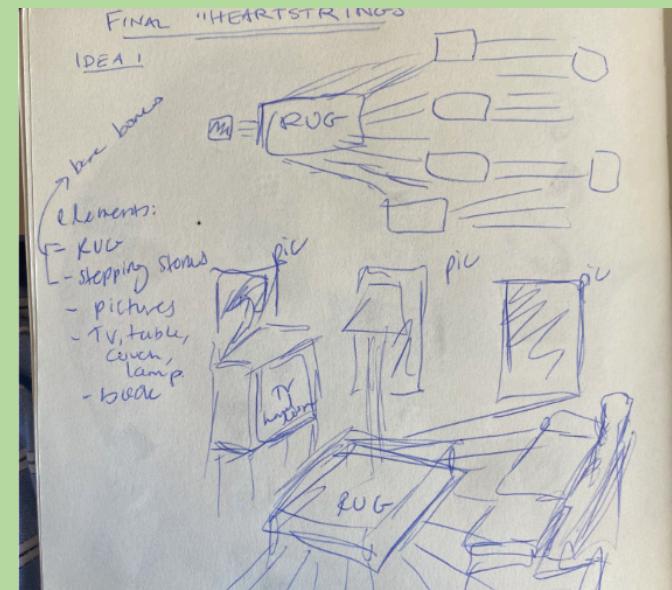
I wanted to incorporate my rug piece into a full installation, submerged into a contextual experience. I decided to continue this rug project because I felt that there was more that could have been done to create an experience that emulated what I wanted to emulate from the piece.

The Idea:

I wanted to create a living room scene, featuring furniture, family heirlooms, imagery on the walls, etc. I also wanted to make 4-6 new pressure pads that extended from the main rug and represented different parts of me and my life. The pressure pads would be like fragments, scattered around the room.

The Components:

- * My original rug (with new hand-sewn details)
- * More pressure sensors
- * More audios
- * Furniture
- * An explanatory book



The Plan



Overall Plan

Since this is a project of larger magnitude, it will be split into the first and second halves of the semester, and may even become a project used for a future thesis.

Week 1:

Make pressure plate bases
Begin sewing rug
Transfer photos
Begin weaving fragments

Week 3:

Wire pads
Find furniture
Plan layout
Edit audios and code
Continue book

Week 2:

Finish sewing the rug
Continue making fragments
Collect audio
Start book

Week 4:

Finishing touches on the rug
Finish and print book
Map out setup and get props

Materials:

- * More pressure plates
- * More woven pieces
- * Images from my childhood
- * Fabric transfer
- * Furniture

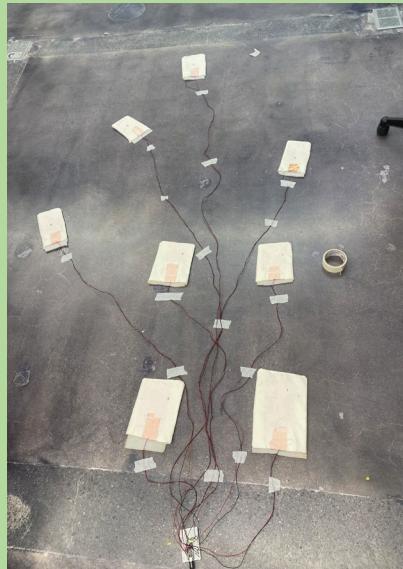
Possible challenges:

- * Layout issues
- * Figuring out how to find furniture

Building FRAGMENTS



Mapping



Mapping was a crucial part of the process. I needed to make sure that all of the wires were the desired length and that each pressure pad worked. I was also playing around with presentation and wanted to experiment with laying strings around the pads. I didn't end up using them, but it was important in thinking about layout and presentation.

Projection



I decided to create a projection element that would be included on a screen. I wanted to incorporate a workshop done in TouchDesigner and include my family home videos in it. I tweaked the code a bit by adding a noise function instead of mouse input and I made the video file a video taken on the home computer. The design in itself resembles rug patterns.

Results



The final piece included a table with family heirlooms and photos and several copies of the book, the projection element, two small couches and a table, and the rug with its fragments. It was displayed in the corner of the Media Commons, resembling a Persian living room.

Reflection

Overall Reflection

I'm incredibly happy with how this piece turned out. It worked exactly how I wanted to and, while it took a slightly different form than what I had envisioned, I still feel as though the piece represented myself and my journey in the way I intended it to. It was incredibly fulfilling to see that people not only enjoyed interacting with the piece, but many people actually immersed themselves in the piece by sitting in the furniture and truly taking it in. I am also incredibly satisfied with the fact that the piece evoked emotion and memories for many onlookers.

What I'd Do Differently

I would probably have sourced more material to recreate a living room setting. It would have been nice to have a lamp or other types of lighting to create more of an ambiance. Additionally, I'd have made more pieces, possibly even more textile pieces that could have been used on the walls. I don't think I'd change what I created, however.

The Future

I envision this project being a possible thesis exploration with more time to explore textile types, weaving techniques, etc. I hope to make this a greater, larger project in the future and explore my relationship to my culture as I grow and develop as an adult!