CART 360
DEC 7TH, 2022

Final Artifact Documentation

Reihaneh Tamizkar
Man Zoun
Professor Elio Bidinost

Documentation website: https://github.com/uozmann/CART360/tree/main/everywhere%3Dnowhere%3Dnow

CART 360
DEC 7TH, 2022

Table of content

Reihaneh Tamizkar
Man Zoun
Professor Elio Bidinost

Documentation website: https://github.com/uozmann/CART360/tree/main/everywhere%3Dnowhere%3Dnow

Abstract

Living beings tend to adapt to the environment for survival needs, living beings also tend to shape their environment to adapt to their own needs. Our team is particularly interested in this dynamic between environment and identity, and how this concept of environment can mean a tangible space, as it can mean the immaterial, id est spiritual environment.

Following a series of reflections based on our memories, we realized that the past impacts we lived have in fact powerful influences on how we are shaped. In return, the way we react face to an external influence contributes to building our identity. The identity-building process serves to protect and train us to face similar future situations, however, it restricts at the same time our mind, meaning that it becomes a framework that we have to follow.
.

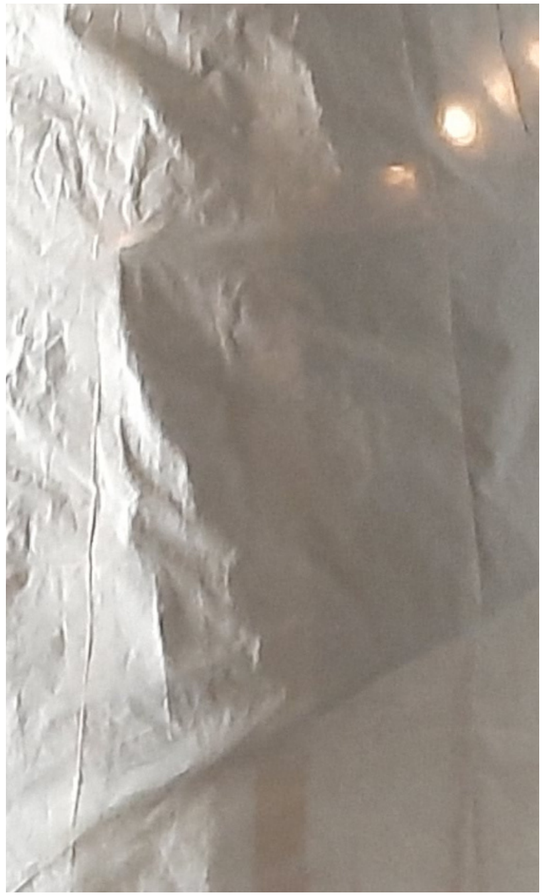
As those influences change over time, once our current framework could not bring the anticipated level of comfort, our identity alters to adapt to those new sources of impact. Which, we like to call self-destruction and self-regeneration.

In our project creation, we decided thus to center around the cycling development and destruction of one’s psychological world due to the repercussions of emotions and thoughts provoked by external influences.

Cocoon is a collapsible mobile installation where one is invited to be immersed in an audiovisual environment and interact with the artifact. This artifact is designed to trigger, stimulate and evoke diverse sentiments that would encourage the user to explore and reflect upon their personal emotions and be aware of how sounds can affect them in a safe space.

As a cross-sectional team with cultural differences, we collected, recorded and designed sounds that would speak to us culturally, contextually and personally and sounds that would also provoke feelings of relaxation, anxiousness, and more through the compositions for the user.

Our visual stimuli and light incorporations within the installation were designed to work as a deeper layer of translation of the sounds and intensify the emotions perceived as well as to decode the sounds into visionary, just like seeing the sounds lighting and morphing in the space.



Prototype Process

- Research

We conducted some research on how sounds affect us. based on *Seven Ways in which the Brain Can Evoke Emotions from Sounds* by Patrik N. Juslin, "Sound moves us. It may cause great pleasure as well as great pain"(N. Juslin 9). This essay proposes that the brain provokes and reacts emotionally to sounds. Sounds not only move us emotionally through reflexes in the brain, and how sounds could provide therapeutic mechanisms (10, 20, 28).

This research expanded our ideas and provoked us to explore our ideas more in-depth. We know that the power of the environment on people’s growth is undeniable, and the consequences of its prolongated and gradual influence are often hard to notice. As concluded in the research on how sounds impact us emotionally, we decided to explore how it may also influence our reactions in an experimental way.

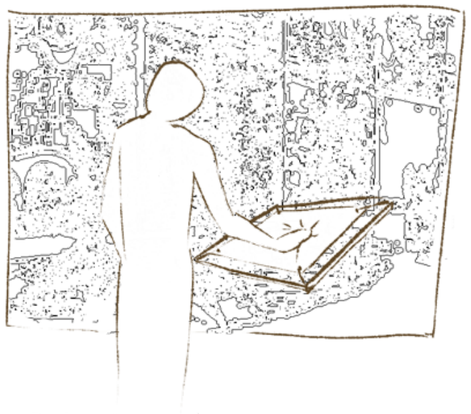
Prototype Process

- Research

Regarding the materiality aspect of our creation, we were deeply inspired by the concept of e-textile and wearable electronics. In our research from *E-textiles - alleviating the healthcare scene*, we learned that it is a growing practice to use wearable sensors in medical fields to collect bodily data from patients, sensors were incorporated in their clothing, and that information can be sent to doctors and other people wirelessly. Those measurements vary from movement recording to heartbeat monitoring and chest compressions. Wearables can also offer responsive treatment to bodies, such as temperature control.

We were particularly interested in the connectivity of those types of sensor, more especially on the layer of communication that e-textile can establish, and how it can project one's self to others while not necessarily being in contact.

1. Body interaction with the sensing surface



2. Realtime imagery change on screen

Sensing Surface, microcontroller and computer

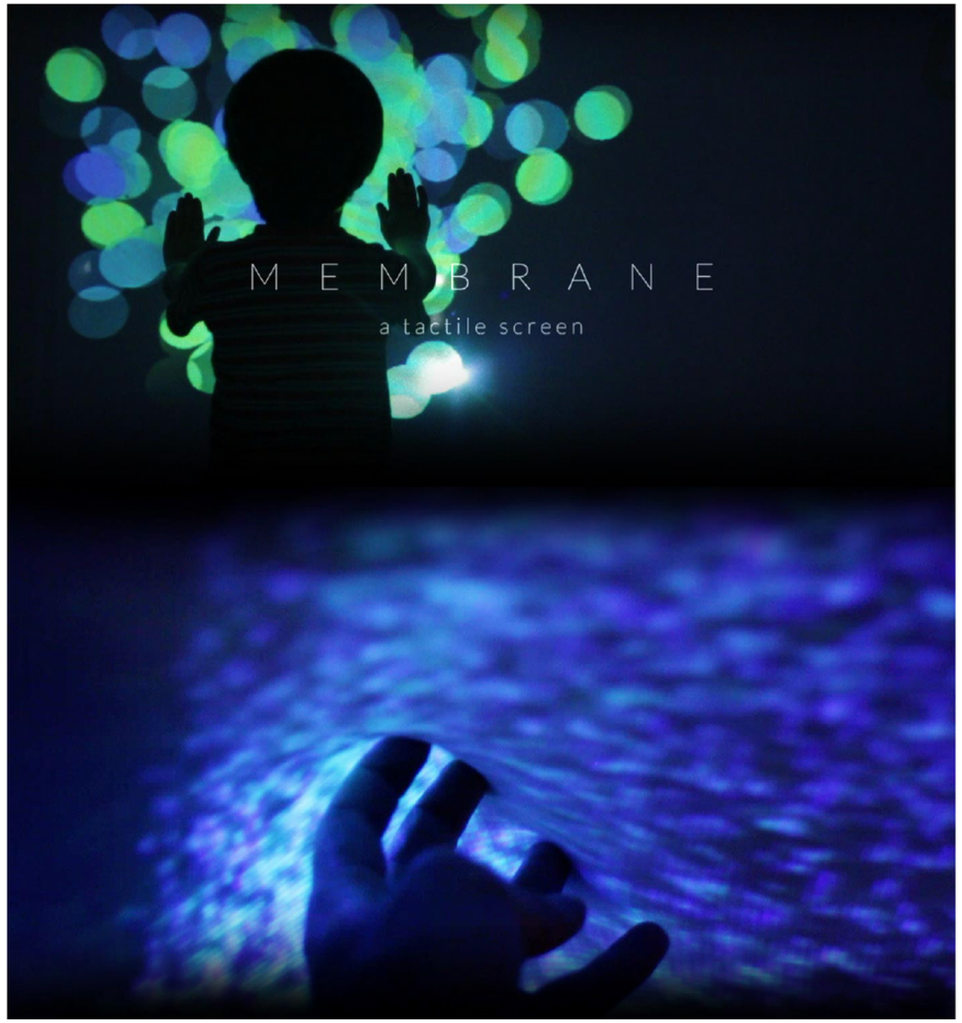
Possible structure and container of the sensing surface

Prototype Process

Our proposal explored expressive interfaces. We aimed to question, analyze and visualize the effects of sounds (nature, environment, relaxing, noises, etc.) on our reactions and interactions. The experience we proposed was meant to bring closeness and consciousness to how we might unconsciously react to the effect of sonic stimuli and our environments by visualizing and translating the interactions into more understandable data. We were interested in integrating an interactive soft surface screen within the project, which would record users' reactions (touch, pinch, tap, etc.) while reflecting on the sounds played into a more perceivable visual abstraction on another screen.

We were planning to use ultrasonic, capacitive, flex and force sensors to sense our desired data from the user's interaction through their hand gestures.

- Initial proposal
- artifact



Prototype Process

- Inspirations

In the initial stages of our project, we were inspired by a wide range of designs with concepts that manifest our desired interactions. Below you can find those projects manifesting visuals, touch design or mood visualization in immersive environments, which collectively compose our idea.

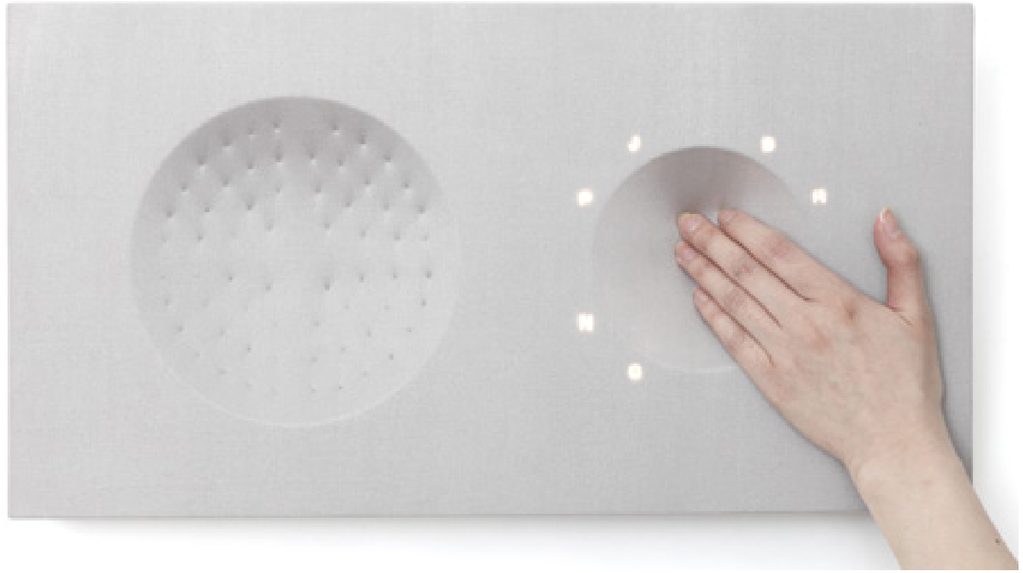
- **Membrane - an interactive textile experience by MELT**

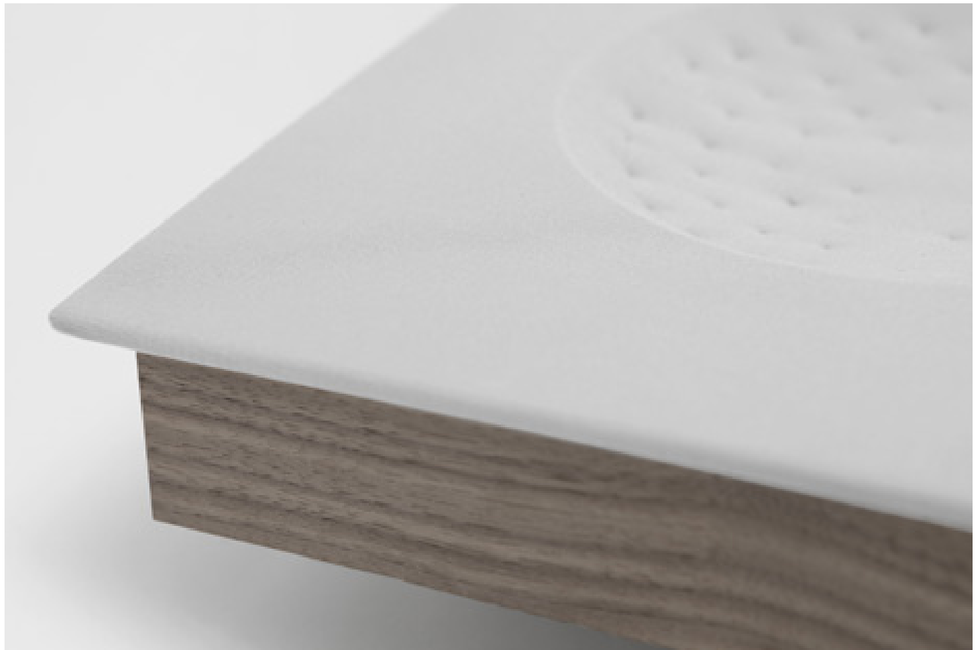
A human-sized tactile touch screen made of fabric bringing in an interactive installation with lifelike technology that reacts and responds to touch. In this installation, the organic structure and the feel of the fabric to the touch, coupled with sound generation by analyzing the pressure of your touch, generate distinctively audiovisual explorations (MELT). (link to the video:https://vimeo.com/67897675?embedded=true&source=vimeo_logo&owner=4990387)

Prototype Process

- TTI by Eunhee Jo

A tactile speaker, the designer has employed a fabric control panel and speaker that moves with the sound of music, a distinctive approach to traditional speakers. With the control panel for this Tangible Textural Interface (TTI) speaker and using a variety of hand gestures, the user can adjust the volume, skip tracks and more. On the other side of the speaker, the surface pulsates and responds according to the beat of the music (Emilie Chalcraft, Tangible textural interface by Eunhee Jo at show RCA 2012). (link to the video:https://vimeo.com/44646607)





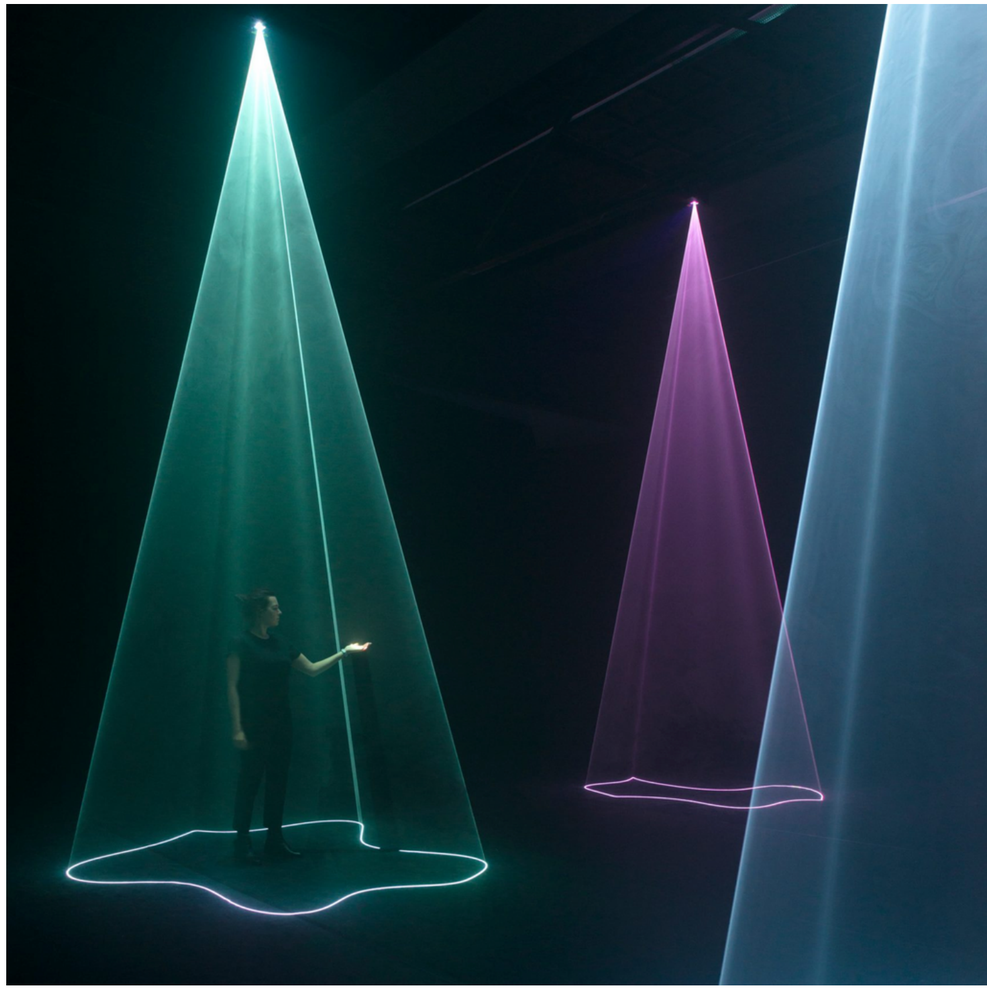
The control pad and hand gestures

Prototype Process

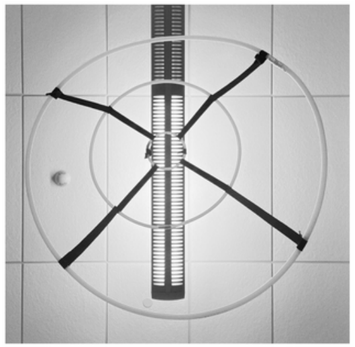
- Aura installation by Studio Nick Verstand

An immersive audiovisual installation that translates emotions into light compositions. To capture the visitors' emotions while interacting with the installation, they were equipped with biosensors that capture brainwaves, heart-rate variability, and galvanic skin response. Music was employed to trigger emotions, and then the visitor's emotional data was analyzed and reinterpreted into diverse light beam colours, forms and intensities projected onto them. This installation manifested the emotional interaction visible to other visitors (Ali Morris, Audiovisual installation transforms emotions into beams of light). video link (https://www.youtube.com/watchv =8FkBA3xTne0&feature=emb_imp_woyt&th emeRefresh=1)

visior interacting with the installation



Physical Prototype



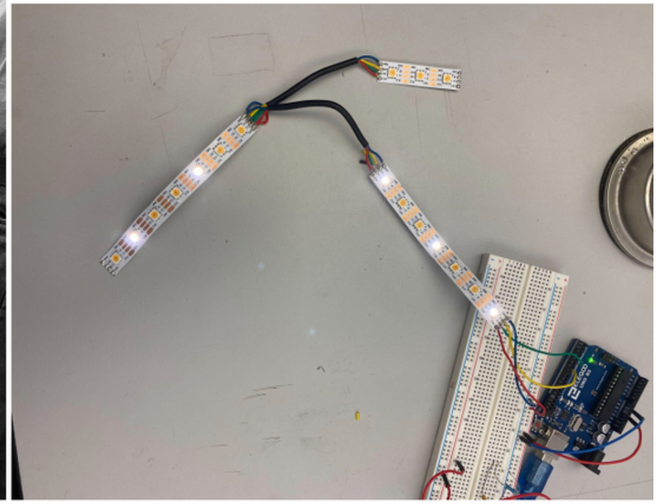
Bottom view

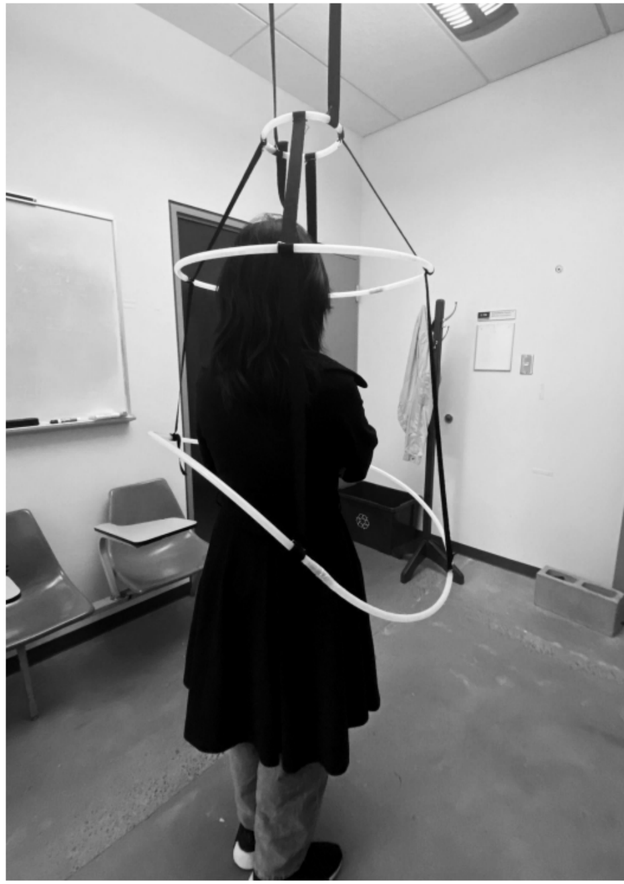
Prototype Process

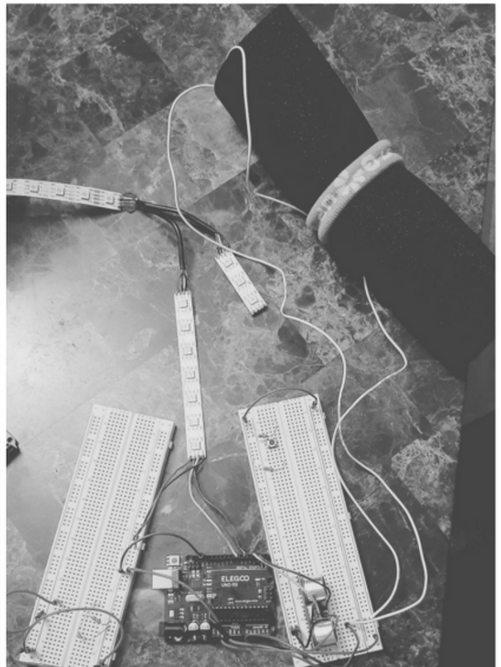
In the prototyping stage of our project, our main idea almost remained the same; we still aimed to bring an immersive audiovisual experience that integrates sound stimuli and visualization that mesmerizes the user. However, our prototype was reframed into a new structure that works more effectively with our idea of bringing consciousness.

The new structure could prepare a pod-like environment for the user, just like a semi-closed cocoon enfolding their body for a more personal yet playful experience where they can explore and communicate with the artifact. The elaborated concept creates a more welcoming space that would enhance the interaction and flow of the movement to be more natural and intuitive for the user. To amplify the immersion effect, we also decided to swap using abstract visuals that would have been displayed/projected outside the artifact generating various lighting patterns inside the cocoon by implementing LEDs. The experience sequences have become more detailed as well.

The opening sequence works as a gateway which prepares the user for the experience with pulsating LEDs, fading in and out collectively. After that, the user can add sound layers with different textures and volumes that would compile together, accompanied by a lighting pattern.







Prototype Process

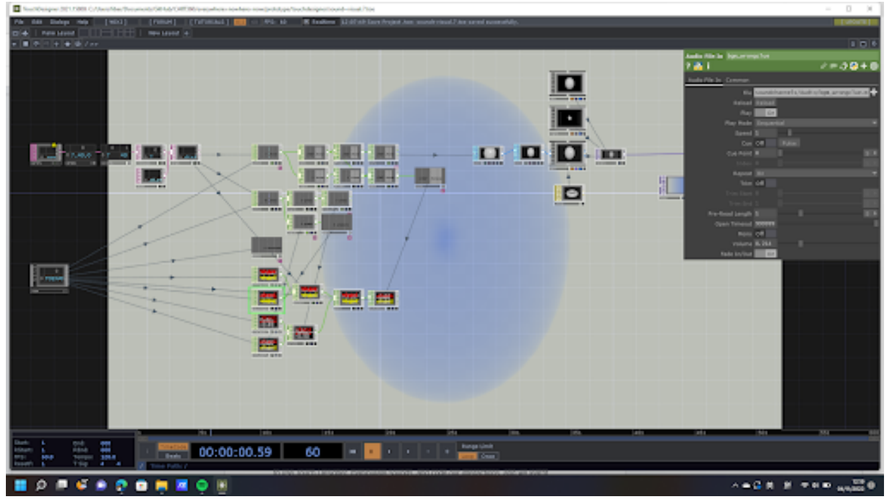
To convey our idea, we decided to translate the joyful, hurtful, inspiring, numbing and angering impacts one can receive through sonic experiences. The sonic experience we aim to offer is divided into two parts: environmental impacts and targetted impacts.

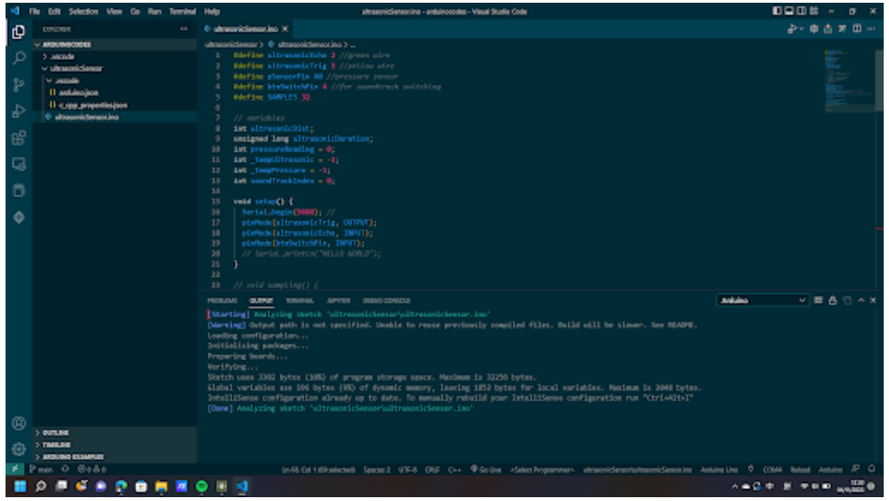
- Environmental impacts: the power of the environment on people's growth is undeniable, and the consequences of its prolongated and gradual influence are often hard to notice. For our project, we decided to use music to zoom into specific types of environments and accentuate those influences. Each music track represents a particular type of environment one can live in.
    - Triggers and sensors: We will use sensors that don't require a profound interaction such as ultrasonic and capacitive sensors to trigger an environmental sound. The reason is to afford a less visible cause and effect. Also, the fact that those sensors are primarily used as on/off switches conveys the idea that once entering a particular environment, one is directly subjected to its influence.

- Targetted impacts: other than environmental impacts, we are often subject to targetted impacts, which are actions and consequences directed purposely at us. The experience of those impacts varies from person to person; some people may never experience a certain impact, while others have to deal with it daily. For our project, we decided to use the sounds of whispers (whispers of things said to us in the past that marked us) to reflect those targetted impacts.
    - Triggers and sensors: to trigger a targetted impact, we will use sensors that require a certain effort to trigger, mainly pressure sensors. As targetted impacts often generate more emotions, having people associate those sentiments with a physical response is one of our goals. In this way, they can share parts of their emotion through the way they interact with the cocoon, and we can observe those numbers documented by the sensors to learn about what happened inside the cocoon.

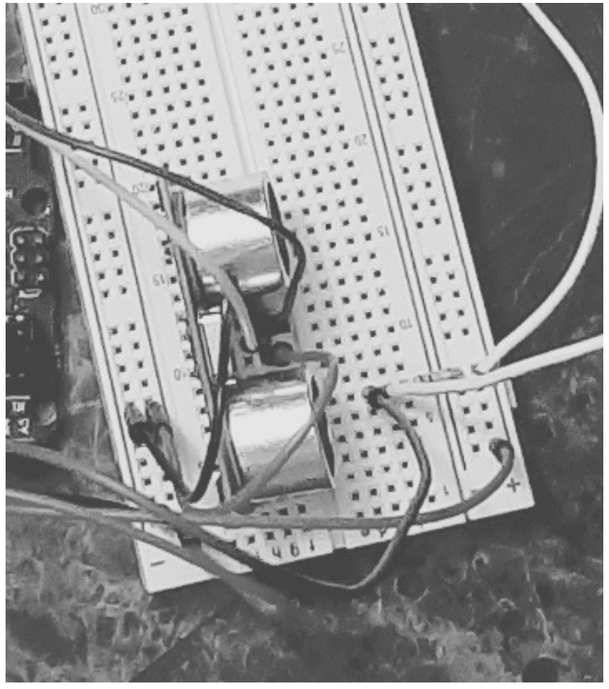
Prototype Process

Touch Designer



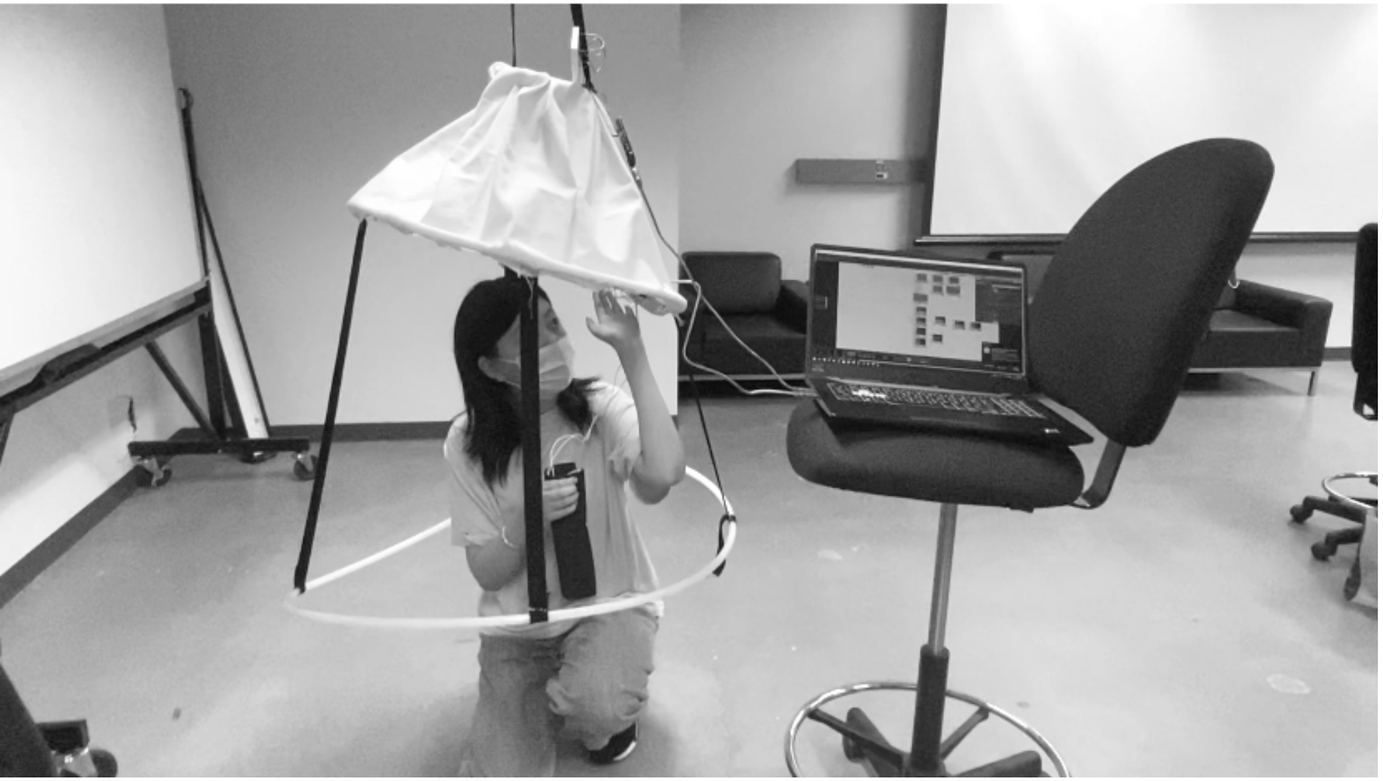


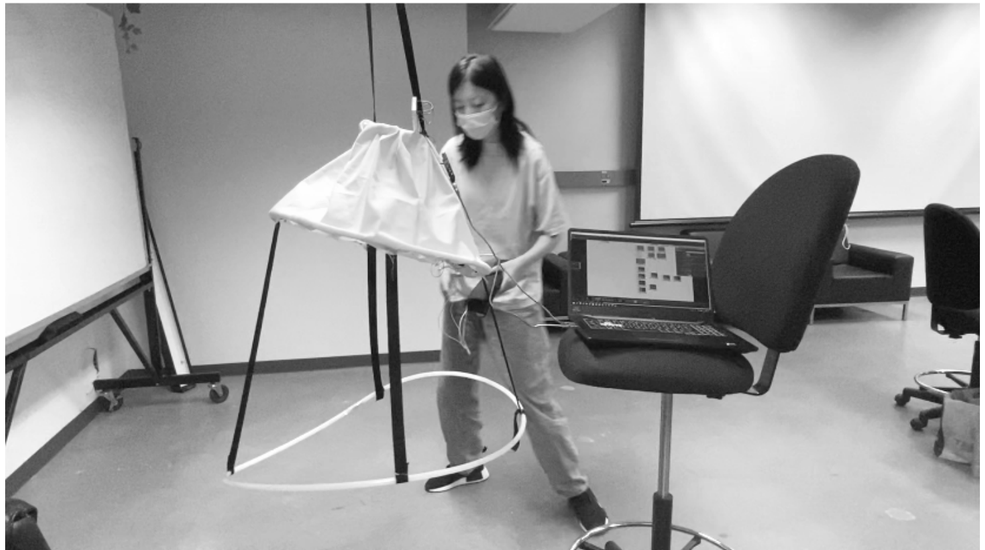
Part of code



- Ultrasonic Sensor
  - Haptic experience: no touch is needed, nor intended.
  - Dimensional experience: allows an embodiment of the cocoon, as users can manipulate its behavior once inside through their presence.
  - Hearing experience: none, nor intended.

- Pressure Sensor
  - Haptic experience: allows an emotional outlet as a response to a sound environment. Also acts as an interaction element to feed new whispers to the cocoon.
  - Dimensional experience: help visualize a more .
  - Hearing experience: none, nor intended.





Physical Structure

The physical structure was inspired by cage crinoline. We were interested in the collapsibility of this structure, so we tried to use the same techniques to make our cocoon.
This idea also worked well with our idea of having a mobile artifact.

Our fabrication started with researching the materiality of our artifact we knew that we want to use soft surfaces for the main material of the cocoon, but we were hesitant about the material used for the rings, so we did a couple of field trips to look for polyester bonings that could be used in such a structure. the lightness of our structure was so important to us as we had designed it to be mobile; therefore, we explored different possibilities of using laser-cut plywood, low gauge metal rods and more. we recuperated part of our electronics and also part of our fabric.
we also did a couple of consultations with wood, metal and soft surface lab technicians to make sure that our ideas are doable.

Before starting the fabrication process, we made the 3D model of the cocoon using Rhino and figured out how our sewing patterns should be.

We then made our metal rings, cut the rods to the circumference length of the rings, bent them using two roller machine in the metal shop and then whelded them. the sewing part was one the most laborious parts we had to cut large pices for each inner or outer surface, 32 in total and then had to sew them, iron, and hand stitch some of the parts.

Then we sewed the ring into the inner fabric surface. and draped the white part on top of it.

Final Artifact ●●●

Physical Structure

Our circuit went through many iterations since the prototyping phase, where we were controlling the sensors through one Arduino and the LEDs through the other Arduino. The first change we brought to it was the incorporation of capacitive sensors to Arduino using the Capacitive library. Shortly after, we switched to using Particle Argon as our microcontroller to transmit data to TouchDesigner via OSC. For this, we had to adapt the Arduino's library to Particle. After this, we incorporated the LEDs and a power module to share the power evenly for both the 5V powering the LEDs, the 3.3V powering the microcontroller, and the 9V for the amplifier. However, once the LED codes have been integrated, we realized that particle does not work well when running the capacitive sensor functions and the LED functions one after another. In order to avoid any new unpleasant surprises, we decided to introduce a new microcontroller dedicated to control the LEDs only. Another reason that push this decision was the fact that we could not find an optimal use of the 3.3V motion sensor, so we had to go back to using ultrasonic sensor, which runs on 5V.

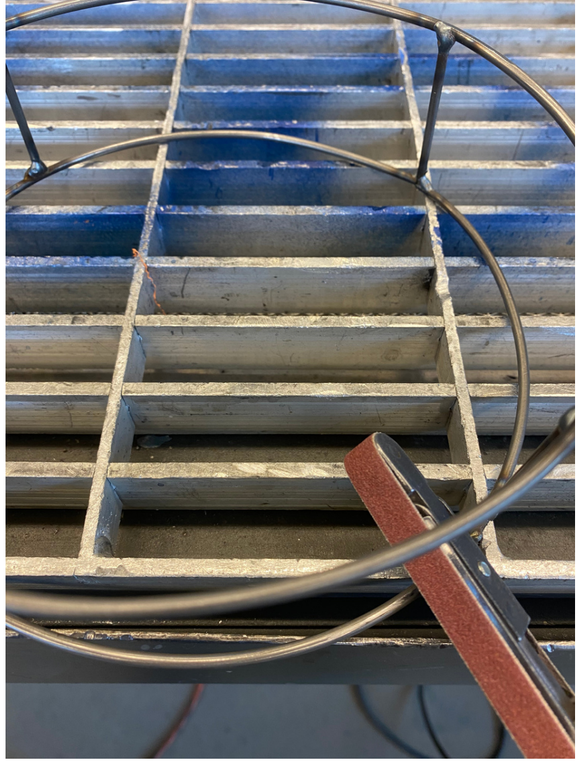
Instead of making Itsy-Bitsy communicate to Particle, for safety reasons and for the cleanliness of our codes, we decided to communicate the capacitive sensor information to the Itsy-Bitsy and not receive any 5V signal from it.

The capacitive sensors and pressure sensors were all handmade, the pressure sensors take the form of demi moons, so that it can adapt better to the shape of our hands. The capacitive sensors are running thread of 3m each, that we sewn into the fabric layer of the cocoon.

The rest of the circuit is glued to a wooden circle, and we drilled holes all around it so we are able to sew it to the fabric. The ultrasonic sensor is placed on the other side of the wooden pannel to detect when someone has entered the cocoon. The circuit was then powered using a 9v power supply.

Process photos of the fabrication

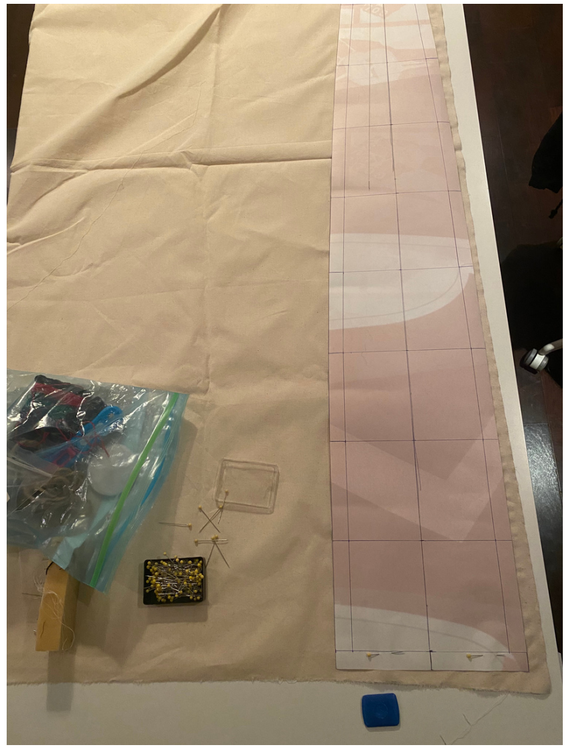
paper mockups for
the pattern



Sanding the
rings/boning

Final Artifact ●●●

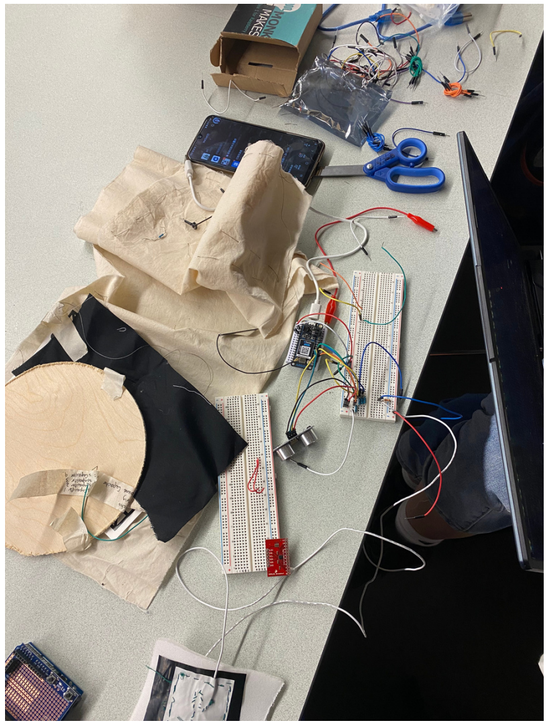
Process photos of the fabrication



Cutting the pieces,
sewing, ironing

Final Artifact ●●●

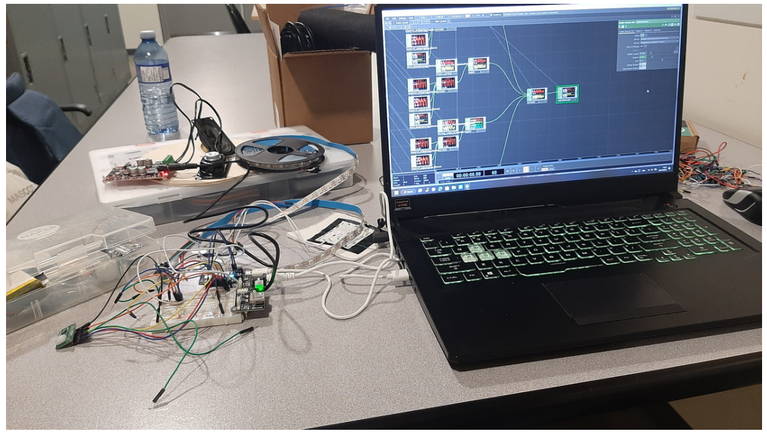
Process photos of the fabrication

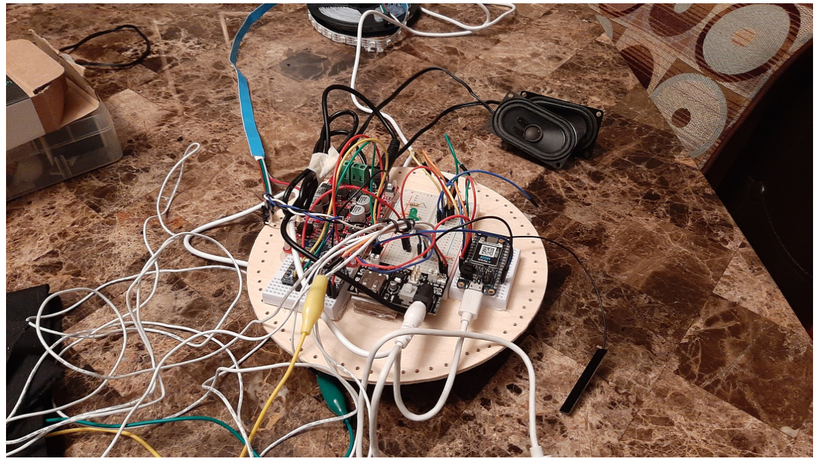


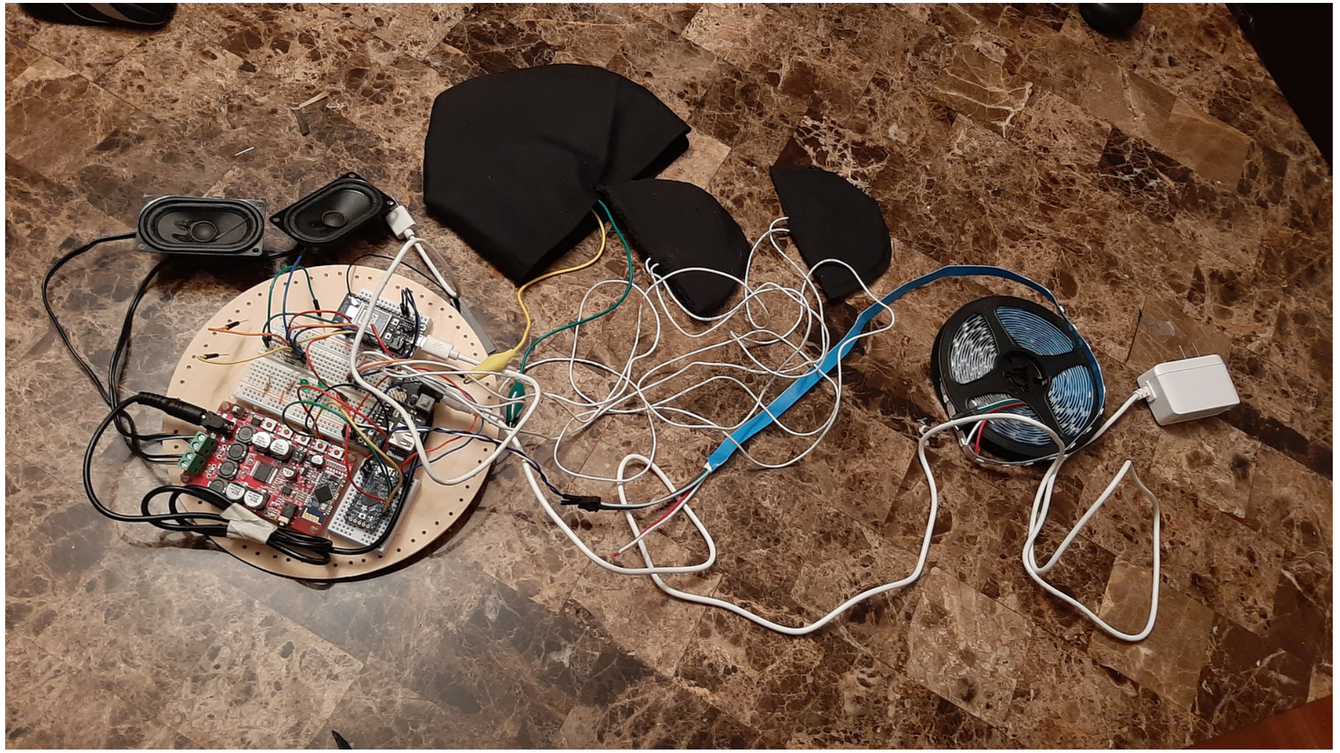
Working on the
inner surface

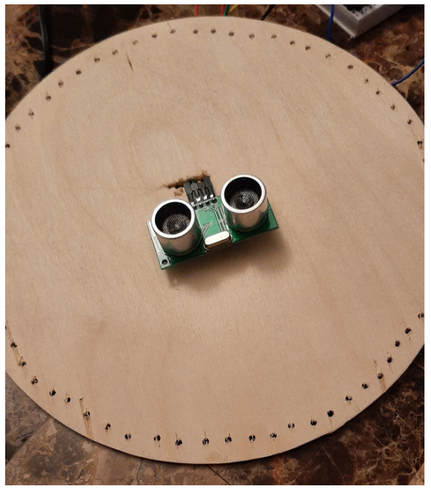
Final Artifact ●●●

Process photos of the fabrication





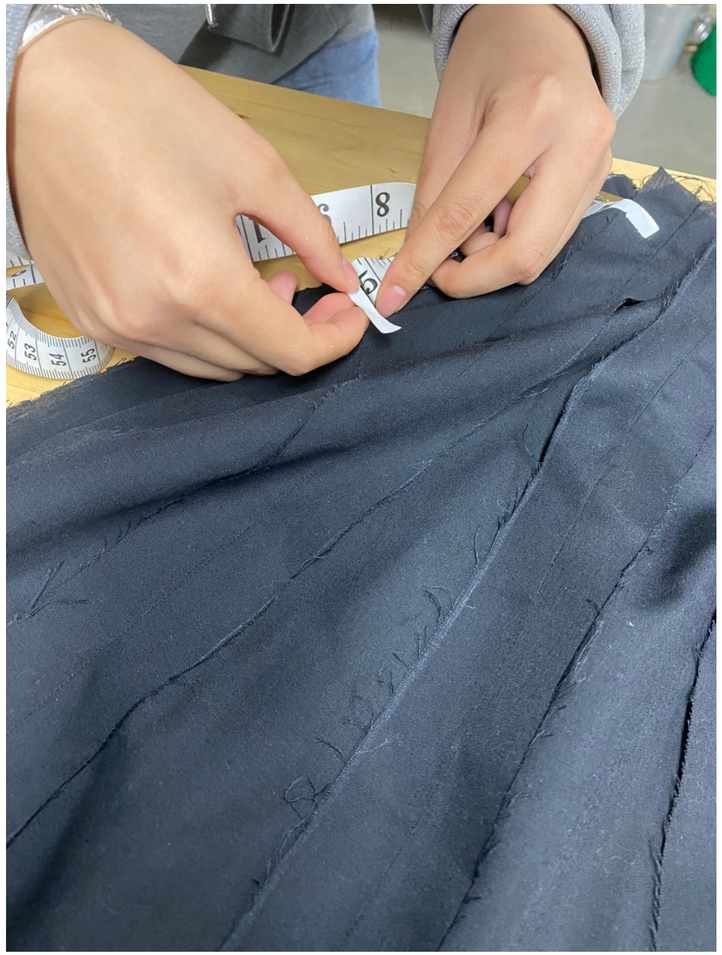




Circuit Design

Final Artifact ●●●

Process photos of the fabrication



inner part and
suspension

Final Artifact

Physical Structure

To make the artifact accommodate different bodies, we designed the suspension part to be adjustable.
the structure consists of metal rings as the boning of our cocoon, two sewn soft surfaces in which between we embedded our electronics between them, the circuit itself, the adjustable suspension part, LEDs, the wooden platform to hold the circuit at the top of the structure and more.

The inner surface of the cocoon is made out of black fabric to make the user immerse more in the artifact and experience the space in their own solitude.

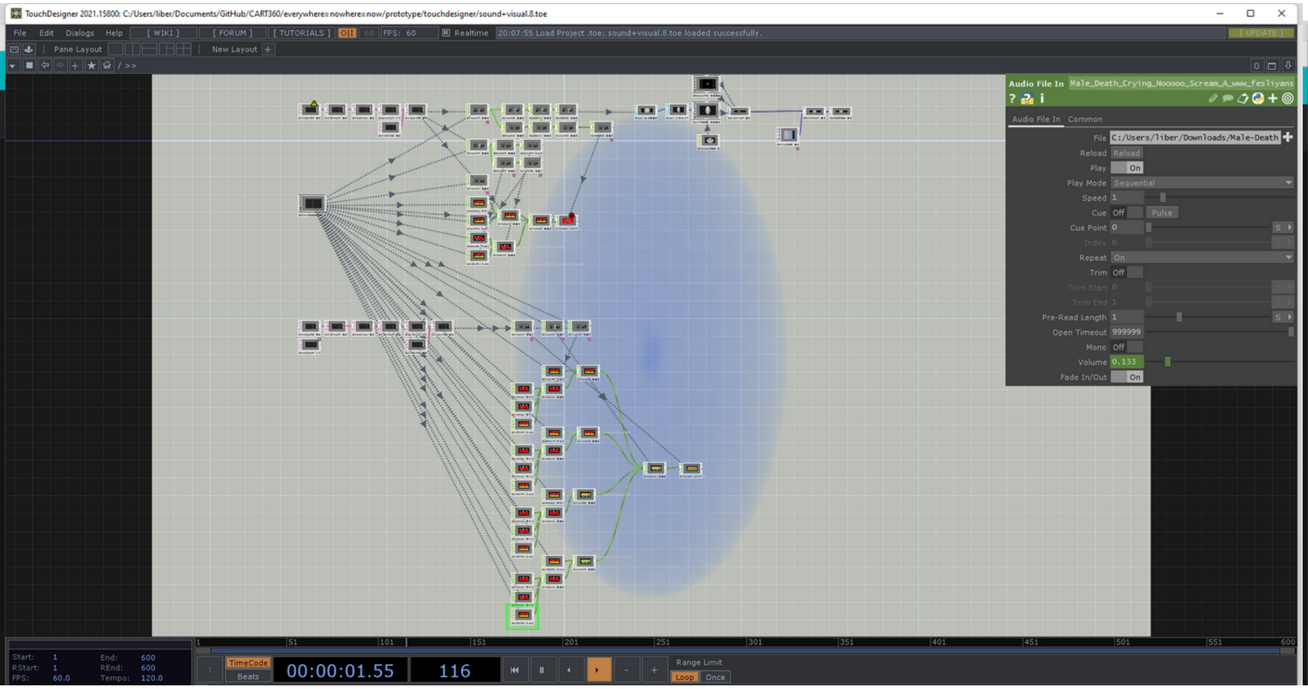
Our sound tracks were voices and sounds recorded from friends or environmental sounds that we mixed and edited using Amadeus pro.

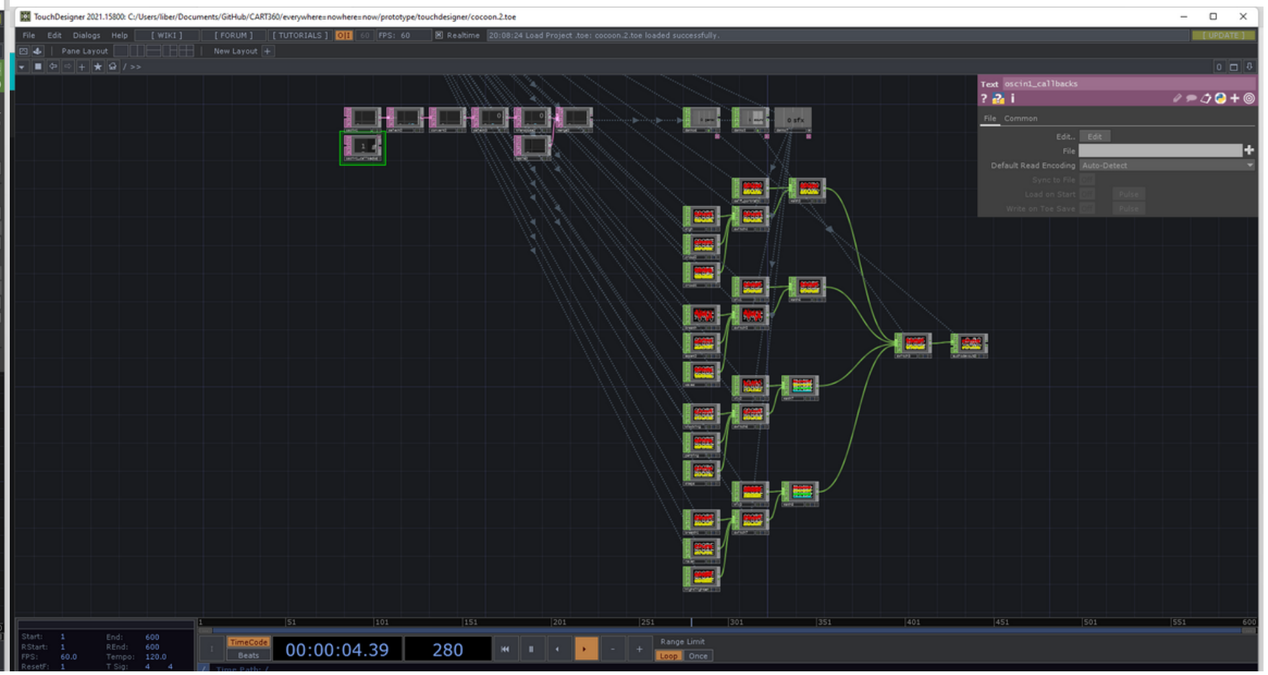
Physical Structure

To make the public immerse more in the space and to bring the idea of space, we used two speakers and stereo soundtracks that panned from left to right and right to left . We also designed 3 different LED patterns that light up. There will be no LED when no one is detected by the ultrasonic sensors and the capacitive sensors. Once the ultrasonic sensor detects someone, a heartbeat pattern will be shown, identifying that there is now life within the cocoon. Once the capacitive is triggered, the pattern changes to a cascading pattern, hinting at the establishment of communication between the person and the cocoon. Finally, when the person is not detected by the ultrasonic sensor but is touching the capacitive sensors, a cascading light will wipe on the existing pattern for one time.

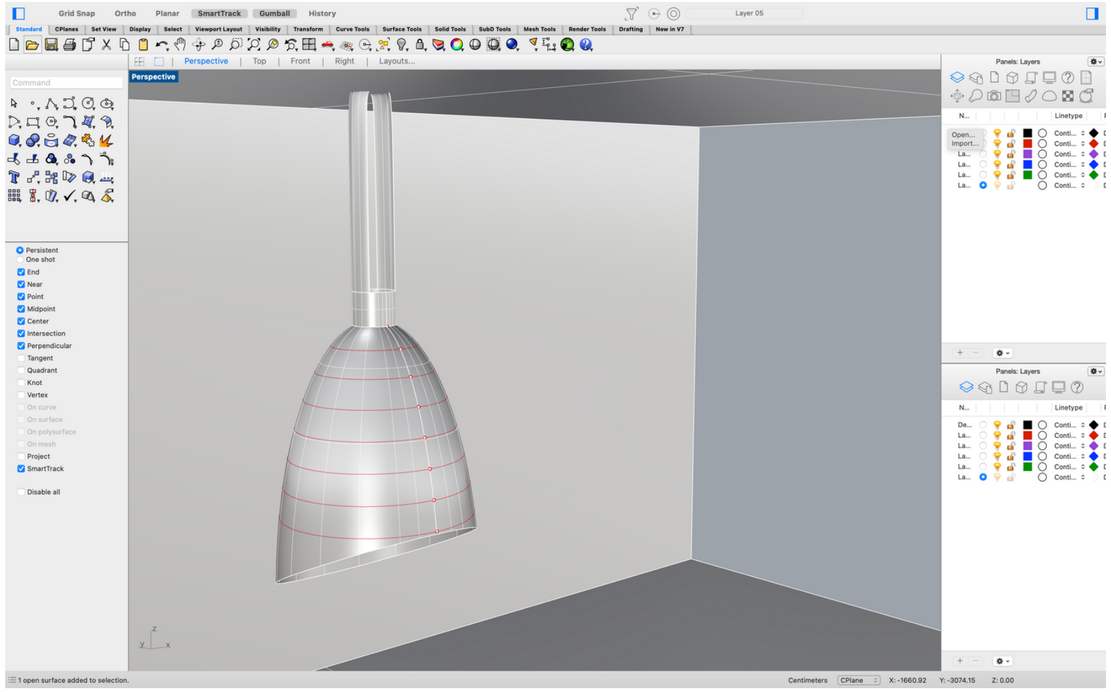
Codes and Software

In the final version, we put all the logics and conditions inside Particle, so that we don't need to use nodes inside TouchDesigner to do the conditional statements. Here attached is a difference of before and after.

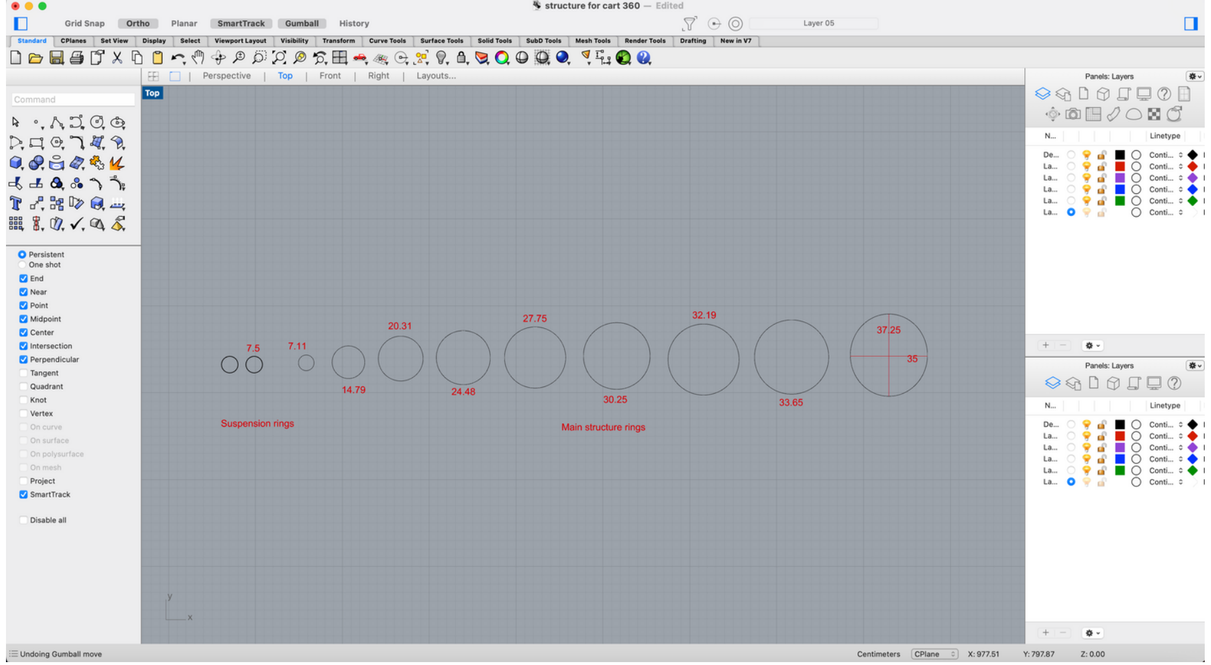


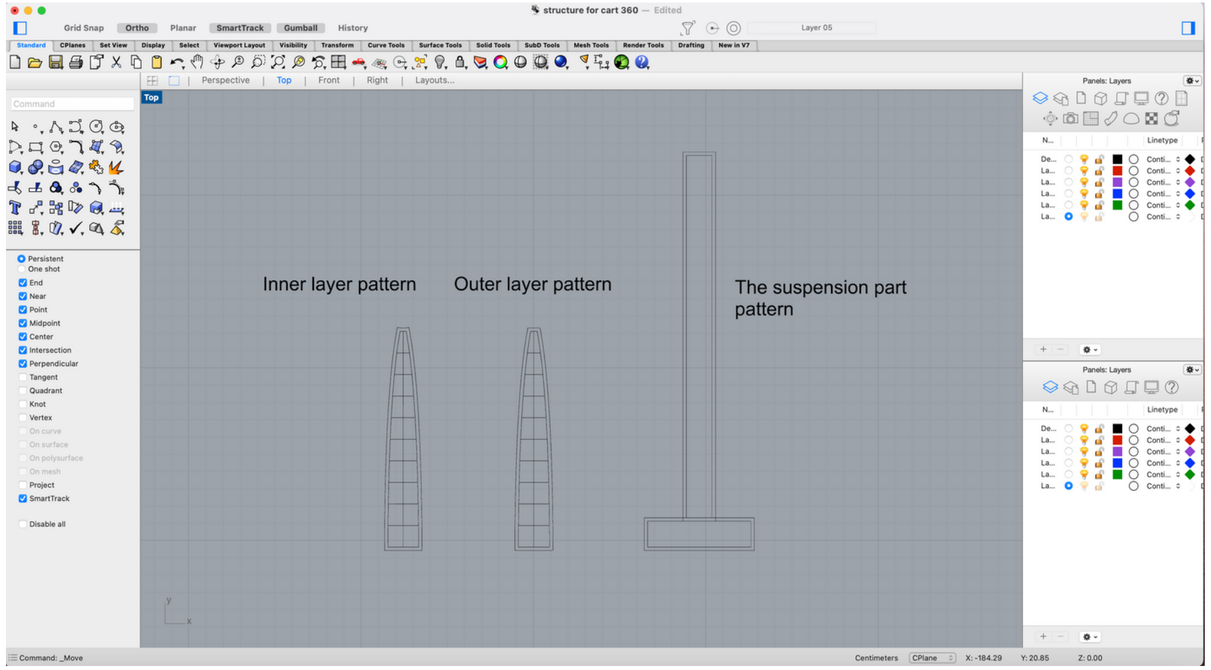


Codes and Software



Rhino model,
patterns and rings





Final Artifact ●●●

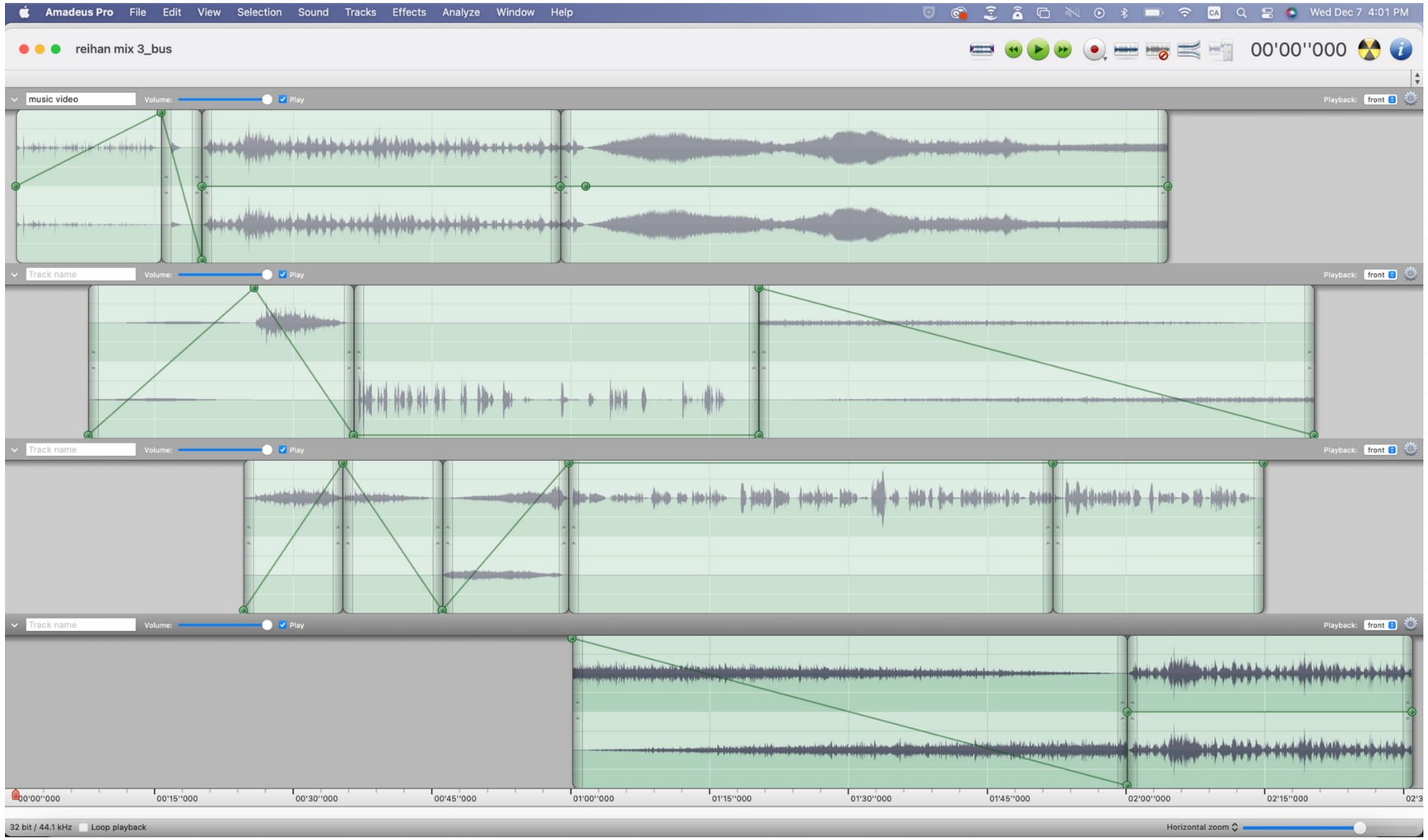
Codes and Software

Rhino render of the artifact

Final Artifact ●●●

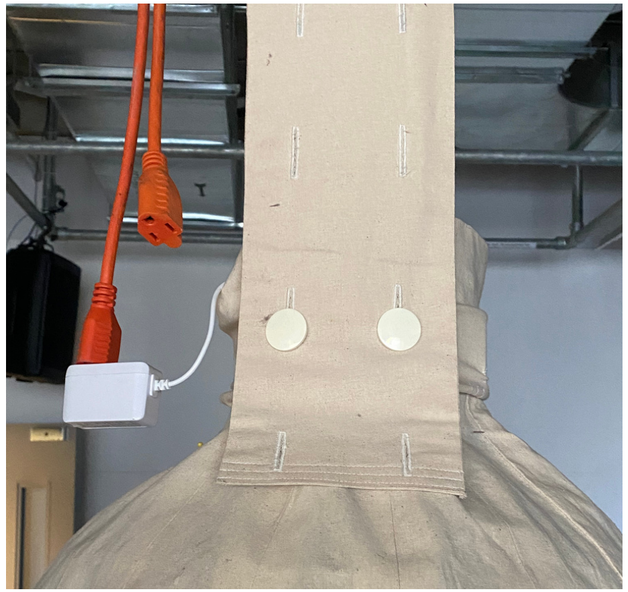
Final Artifact

Codes and Software

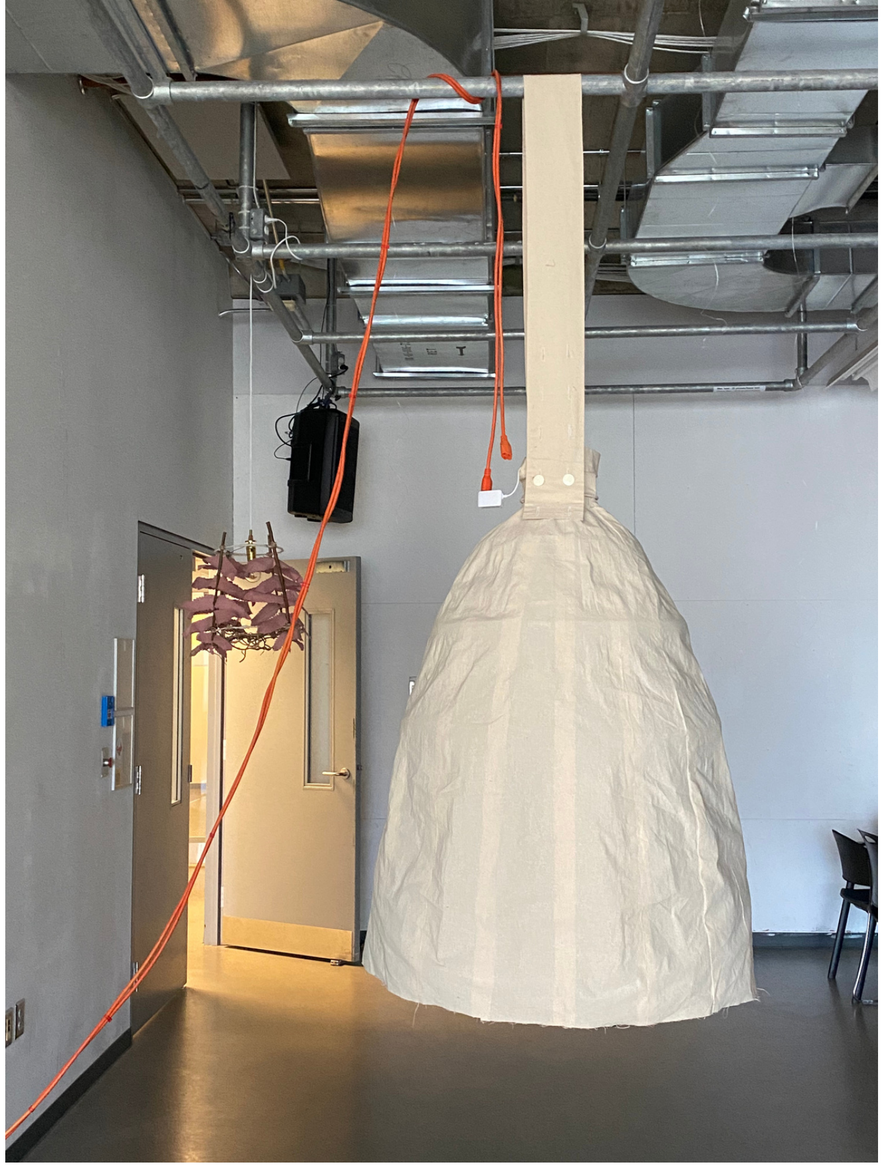


Sound Design and mixing of the soundtracks using Amadeus Pro

Installation

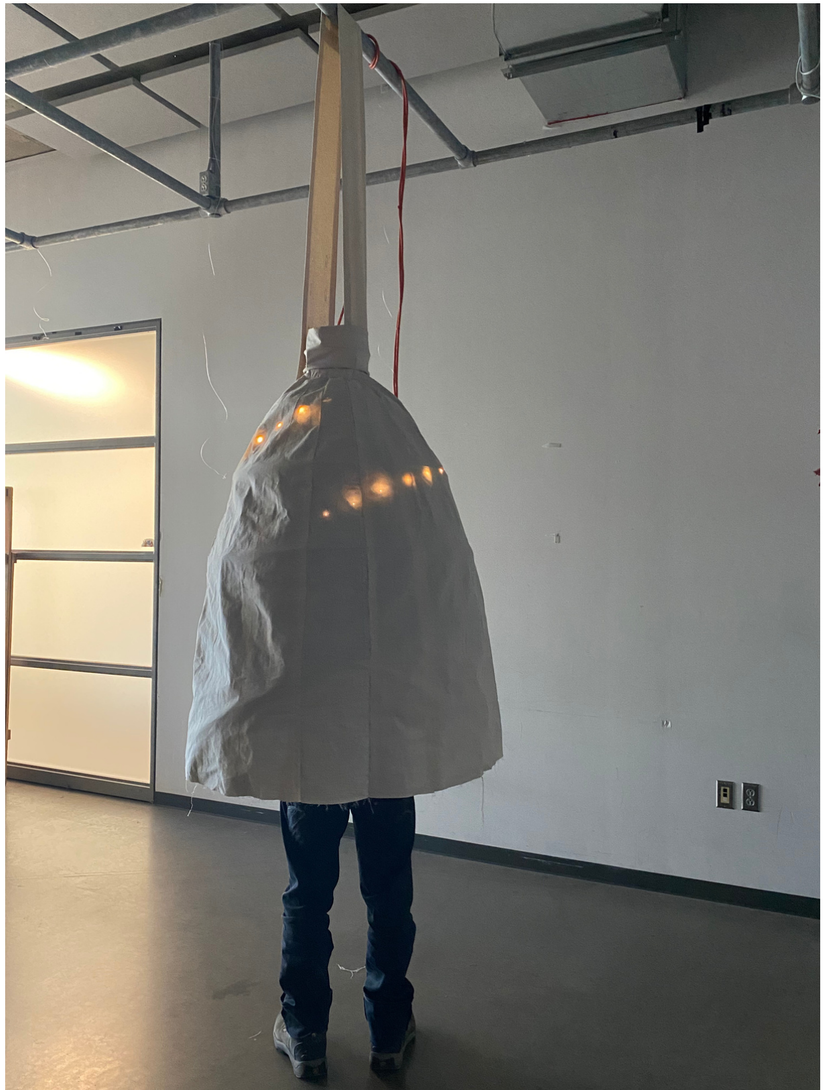


Installation of the final artifact



Final Artifact ●●●

Installation



User interacting
with the artifact

Final Artifact ●●●

As mentioned before, we found inspiration in the elliptical crinoline cage for our structure, so we used the same techniques for our physical prototype. At first, we planned to create our prototype cage rings with cardboard. However, considering the qualities of cardboard and how easily it could bend and deform, we used silicone tubes instead to make the rings. After that, we used a couple of webbing straps and safety pins to secure the rings together in the structure. as we could not source enough lightweight fabric, we only covered part of the structure with some scraps of fabric we had.

Since we had a 3D model prototype with structure measurements, fabricating the physical prototype was pretty easy. Our physical prototype consists of the structure, an ultrasonic sensor used to trigger soundtracks using Touch Designer and a small part of our LED network, which lights up in one of our patterns. While creating the prototype, we learned how to use Touch Designer, manipulate sounds, and code our interactions, and we learnt hands-on skills such as soldering.

View of the interior

Sewing pattern

Final Artifact ●●●

Collapsable Structure

Final Artifact ●●●

Adjustable height

Final Artifact ●●●

Observations

observations:

- capacitive sensors to be made as handles that people can grab onto them or they could be embroideries stitched on top of the fabric in a reflective colour that would show on the black fabric, or they could be cut out patterns from conductive fabric
- sound should be amplified or we could add more speakers
- maybe make the pressure sensors contrasting with the black fabric for acceeibiliy reasons
- what else? soldering all of the circuit parts and using heat shrink to make sure we minimize the possibility of getting short circuited

In the ideation, we learnt that agreeing on one idea between multiple people could sometimes be complicated but efficient and inspiring. The discussions facilitated our brainstorming, and we decided on the type of interactions we wanted to incorporate into our project, the overall looks of it and its affordances.

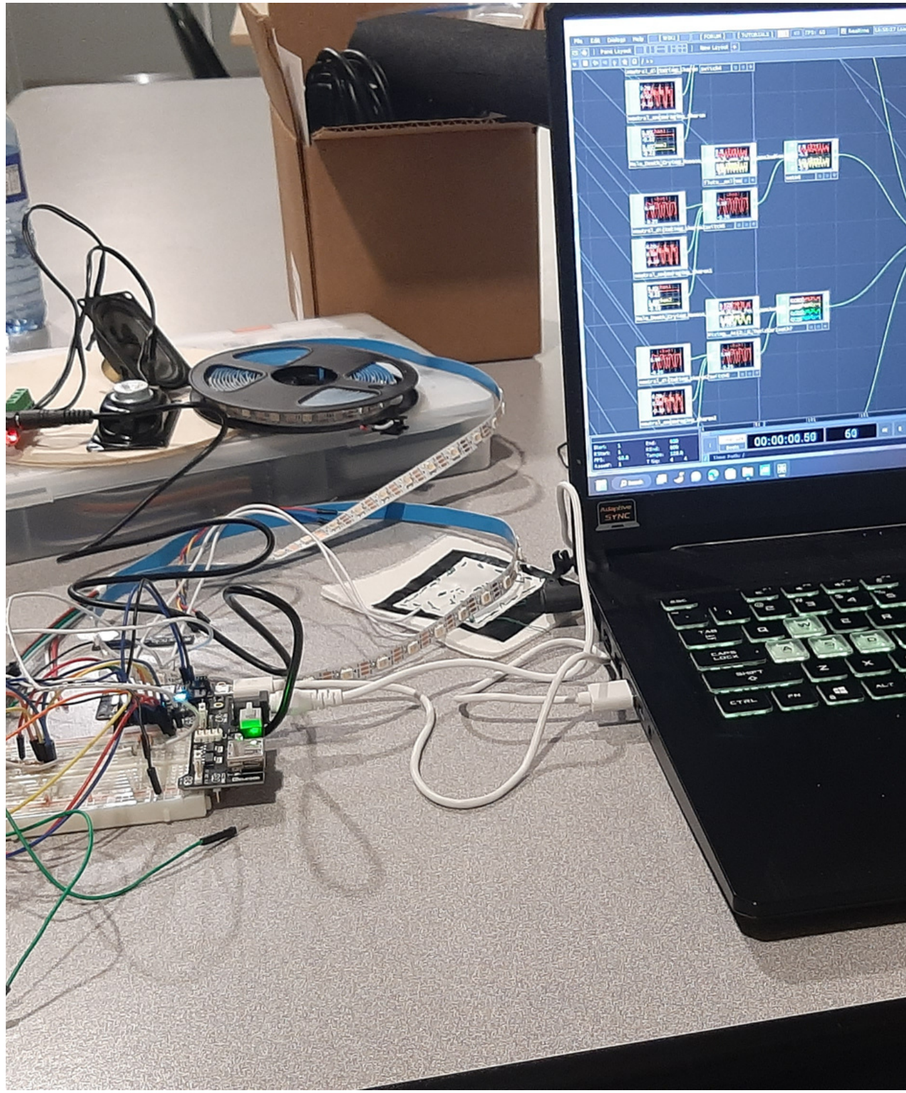
In the iteration process, we learnt that refining our concept is primarily beneficial for us, as this process narrows down the window of possibilities so we can concentrate on thinking about the details of our project. Even though we made some changes, we stayed within our initial project’s goal and philosophy.

By carefully considering our intentions, we realized that to fulfil the collapsibility and mobility of our concept, we should think of lightweight materials and a retractable structure to hold the fabric membrane. In our first iterations, we considered using wooden or metal rings for the cage structure; however, considering their weight, we decided to go with the crinoline cage structure and similar materials for the final artifact.

Observations

We visited CUCCR to look for and recuperate fabric for our project. Considering that the fabric should be as lightweight as possible, we realized we would need to buy it since we could not find any large pieces at the CUCCR. We worked on a 3D model prototype to understand and plan the physical prototype more smoothly. During this process, we made iterations and simplified the overall looks to be more minimal and hemogenous.

In the prototyping process, we learnt that while adjustments due to constraints are inevitable, it is also worth it to thrive through challenges, as in the prototyping phase, it is undesirable to alter our concept due to technical difficulties. Technically, we should have spent more time working on the electronic circuits as we aim to convey a rather complex interaction based on
multiple sensors and outputs. We would have an audiovisual experience where sound and light are triggered by touch. Our code has yet to allow us to trigger both entities concurrently; we are still working on the code to be able to convey our idea.



Future Directions

Initially, we imagined our artifact to be individually installed in an exhibition or public space. For our future explorations, there are several things that we would like to enhance. One of our ideas is integrating a more comprehensive range of sound compositions with a broader variety of themes.

We are interested in bringing our installation to the public and inviting a more comprehensive range of individuals to interact with the artifact. In this direction, we can have multiple cocoons in a public space to accommodate more people. In order to provide a more situated experience and contextualized feedback, the cocoons can have the option to communicate with each other or remain as individual experiences. The communication can be through the incorporation of voices from the users that their cocoon is paired with each other, or it can be a dialogue starting from a cocoon and extending to others and building a conversation through sounds and light that could reflect one's emotions like a domino effect.

Bibliography ●●●
(DONE)

Ali Morris |25 November 2017 12 comments. “Audiovisual Installation Transforms Emotions into Beams of Light.” Dezeen, 12 Jan. 2022,www.dezeen.com/2017/11/25/aura-installation-translates-emotions-into-beams-of-lightstudio-nick-verstand-dutch-design-week/.

Emilie Chalcraft |28 June 2012 4 comments. “Tangible Textural Interface by Eunhee Jo at Show RCA 2012.” Dezeen, 12 Feb. 2022, www.dezeen.com/2012/06/28/tangible-textural-interface-by-eunhee-jo-at-show-rca-2012/.

“Growing Use of E Textiles in Healthcare Sector.” Fibre2Fashion, https://www.fibre2fashion.com/industry-article/6908/etextiles.

“Membrane Experience - by Melt - Virtual Reality & Multimedia Experiences.” EXPERIENCE-by MELT - Virtual Reality & Multimedia Experiences, MELT, www.bymelt.com/portfolio/41-membrane_experience.

Mossberg, F. Sound, Mind and Emotion - Research and Aspects. Vol. 8, 2008.