NIKODIMOS ZELALEM SENDEK

Portfolio

Contents

Nikodimos Z. **Sendek**

Personal Info

460 Beacon St, Boston, MA

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@nikodmas

nsendek.github.io *(coming soon)*

Skills

Software
Adobe Creative Suite
Rhinoceroes & Grasshopper
Unity
3ds Max

Programming
JavaScript/TypeScript
C++
Python
Java

Physical Prototyping
Sketching
3D Printing
Laser cutting
Painting

Relevant Coursework
Computer Graphics (6.837)
Algorithms (6.006,6.009)
Artificial Intelligence (6.034)
Software Construction (6.031)
Design Technologies (4.022)

Interests

Computer Graphics
UI/UX Design and Full Stack
Computational Design
Visual Effects & Animation
Visual Arts
Film

Education

Massachusetts Institute of Technology — ***Class of 2021***
Bachelor of Science in Art & Design and Computer Science
GPA: 4.1/5.0

Project & Work Experience

Momentum 2020 (16.682) — ***January 2020***
Teaching Assistant
- Working as a teaching assistant for the 2020 program, sponsored by General Motors. Providing technical assistance to participants.

Google — ***Summer 2019***
Engineering Practicum Intern
- Worked as a UI/UX intern for the MediaPipe product: a framework for building multimodal applied ML pipelines (further descriptions can be found at https://mediapipe.dev).
- Used TypeScript and Angular to create/test clean and concise code for additional features to the pipeline visualization web app, which can be visited at https://viz.mediapipe.dev.

Nasdaq — ***January 2019***
Full-Stack Engineering Extern
- Used Revact Native to develop an iOS app that demonstrates the tools of the markets API in an online ride sharing market similar to Uber and Lyft.

Nasdaq — ***Summer 2018***
Full-Stack Engineering Intern
- Developed a RESTful API using PostgreSQL, MongoDB, Express, and Node.js to allow developers to utilize Nasdaq technology.
- Built a UI using React and Redux to demonstrate the capabilities of the API.
- Designed API capable of being used in hackathons and was

Momentum 2018 (16.682) — ***January 2018***
Program Participant
- Developed in Unity and programmed in C# to create an educational Virtual Reality lab safety simulation.
- Prepared, presented, and demoed our project to a panel of judges with experience in VR.

Clubs & Activities

Student Cable — ***8/2018-Present***
- Provide assistance in filming and creating video content such as live streaming student events.Developed experience in filming and editing.

Tea With Teachers — ***10/2017-5/2019***
- Recorded student run interviews with MIT professors, so that students get to know them better.
- Edited videos using Davinci Resolve to be uploaded to the Tea With Teachers YouTube Channel.

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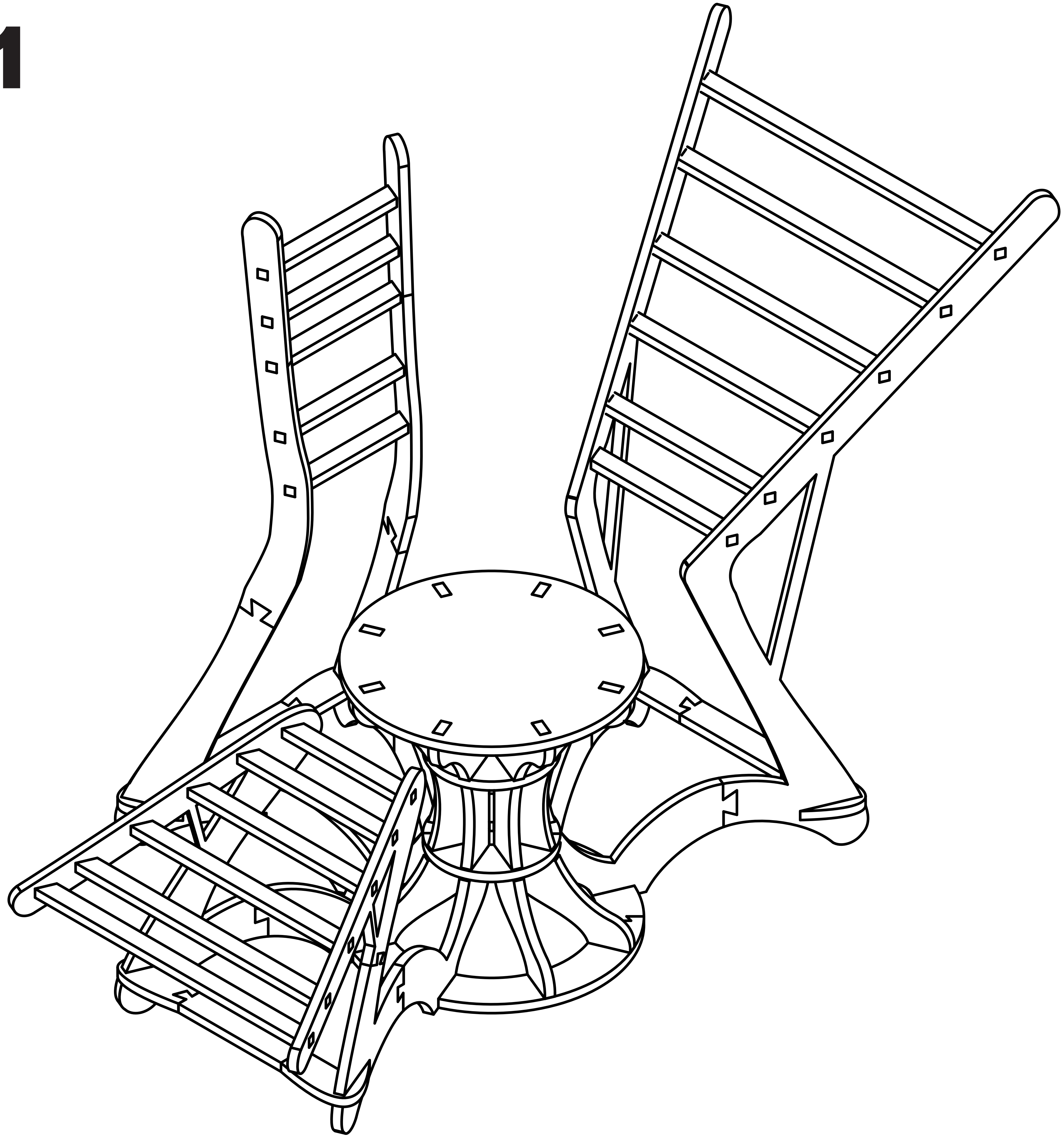
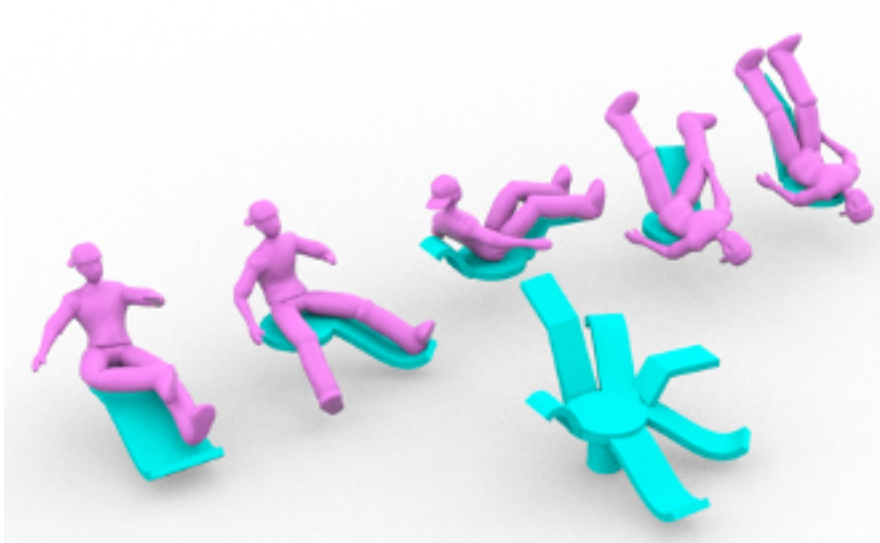


THE SQUID CHAIR

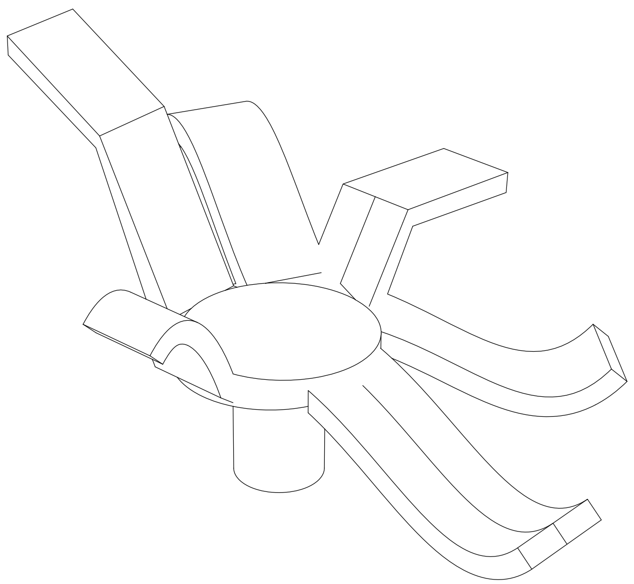
"A chair that looks like a squid...."

Originally built around the precedent that its user could restlessly change their position on the chair. It required multiple faces which gave the appearance of six tentacles expanding out from a flat headed squid. Developed as a final project for the MIT course Design Computation: Objects and Space (4.500).

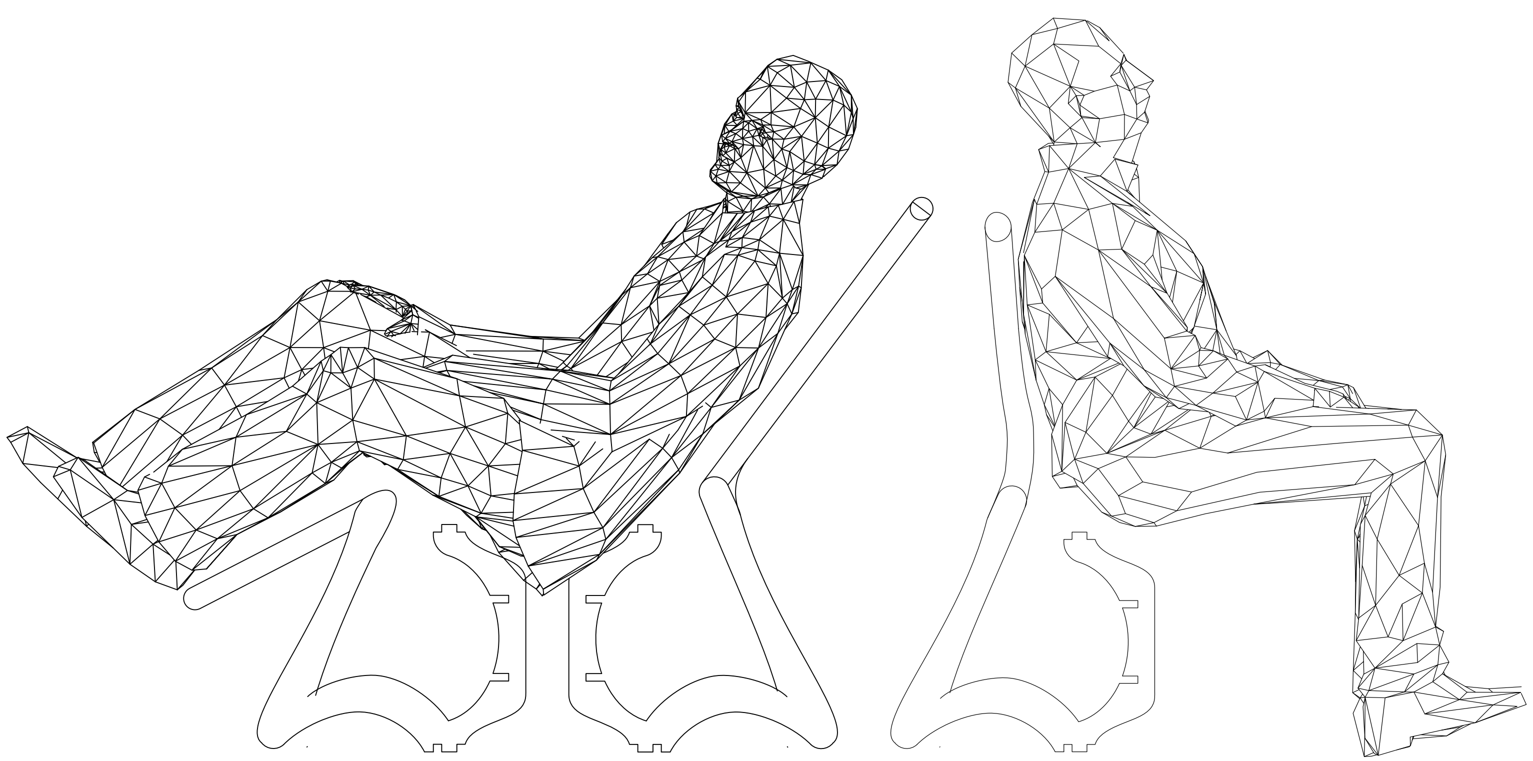
PRECEDENT



The goal user experience was established around the idea that this chair would not be built to only be sat in one specific position but multiple. The user can rotate at least 180 degrees around the chair into different levels of recline.

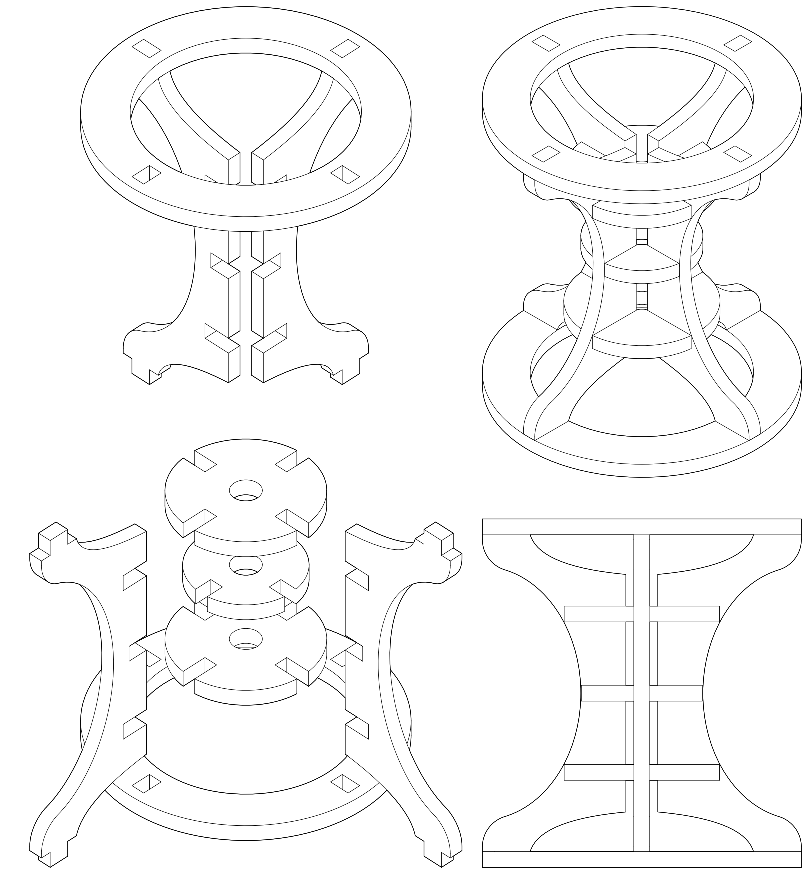


The original iteration shows more that just three faces. Too many faces would make the chair heavy and require excess materials. Prioritization of material for the chair required a reduction in total number of faces for the final model. becuase of the fact that multip can have differentpreferences for seat angle in their experience another important feature of this tool

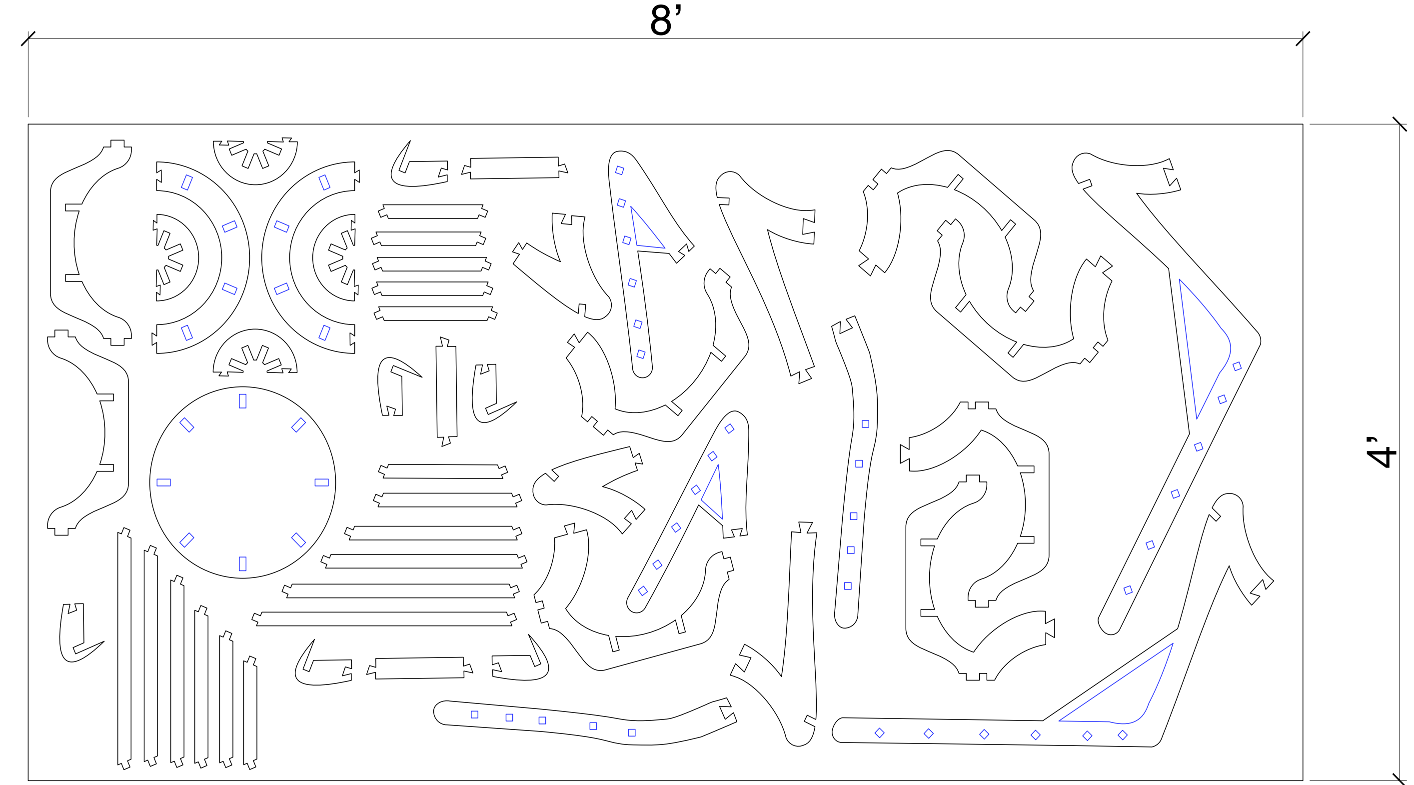


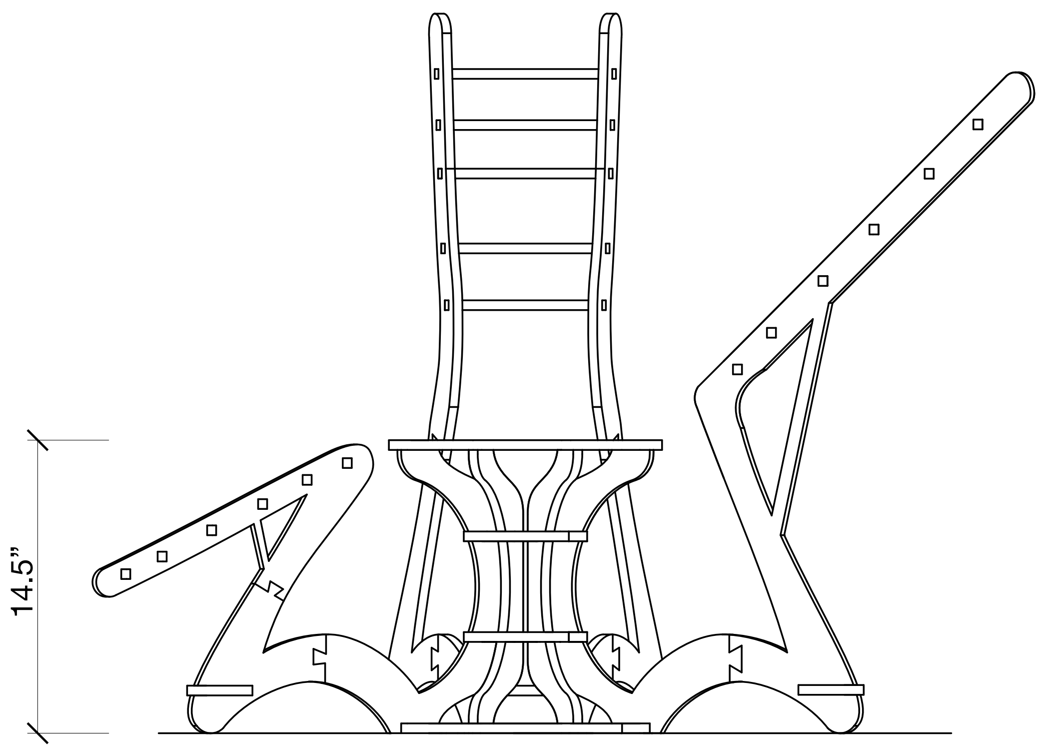
ITERATION

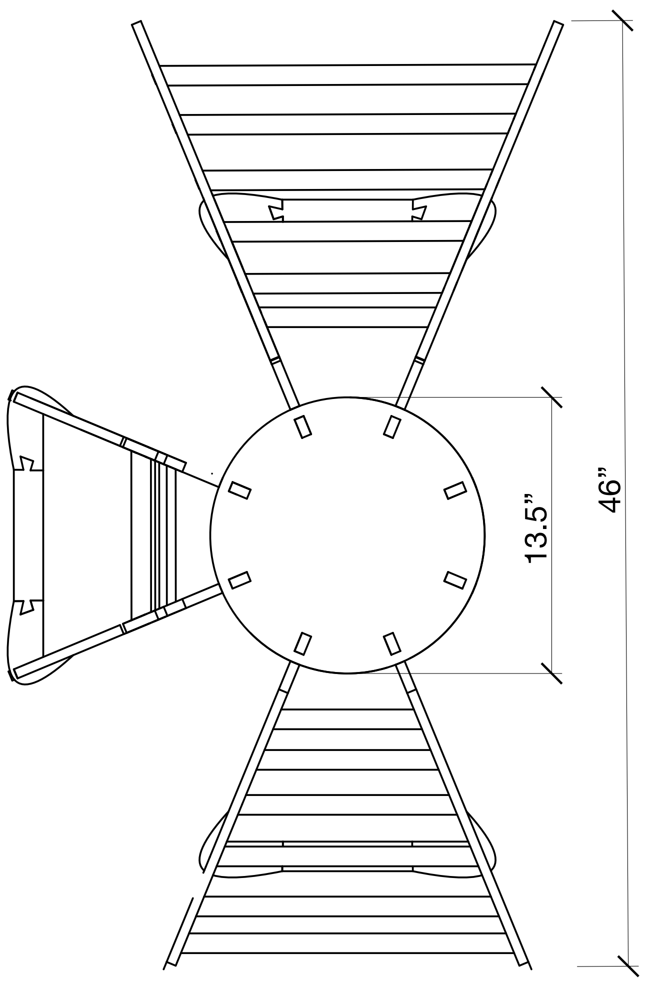
The fabrication process for involved CNC cutting and simple assembly. The alloted amount of plywood was a 4′ x 8′ x 1/2″ sheet. The goal of the course was to design a chair that could be easily produced by an automated process (i.e. CNC cutting) and assembled. Because the chair had multiple faces, the best choice for the base became a stool. The base of the chair became the first modeled and tested part of the chair *(pictured right)*.

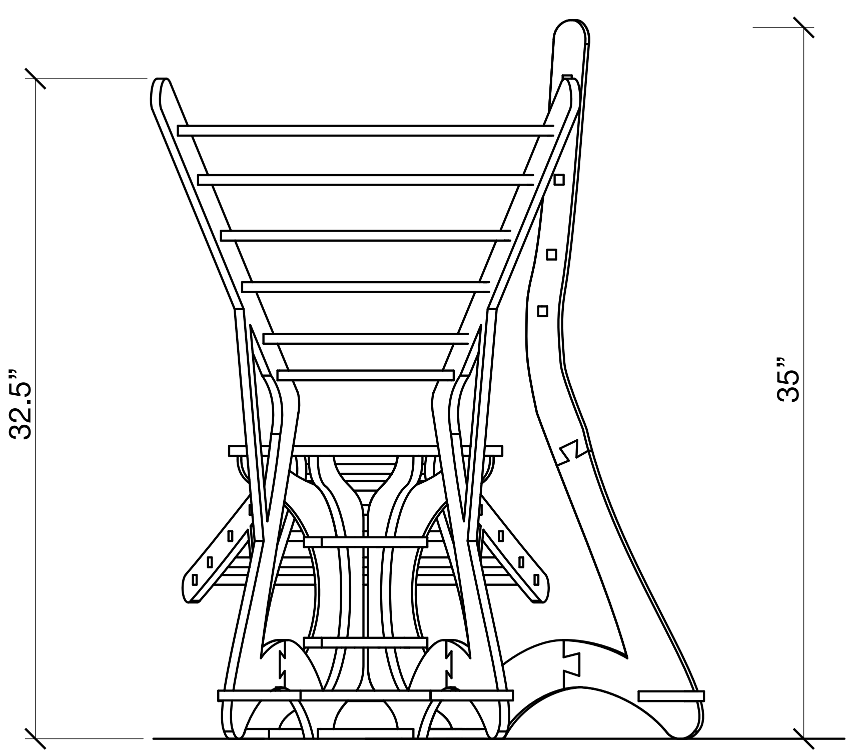


A focus of the chair was the ability for it to be modular. The prototype of the stool consisted of 4 pillars evenly spaced out, but the final stool is built with 8 pillars that also branch from the bottom to for the frames of the seat backs. This allows for comtomizable seats backs that are easy to swap out in assembly. The whole chair (stool and three faces) can be laid out flat to be CNC cut on a sheet of plywood *(pictured below)*.




14.5"


13.5"
46"


32.5"
35"

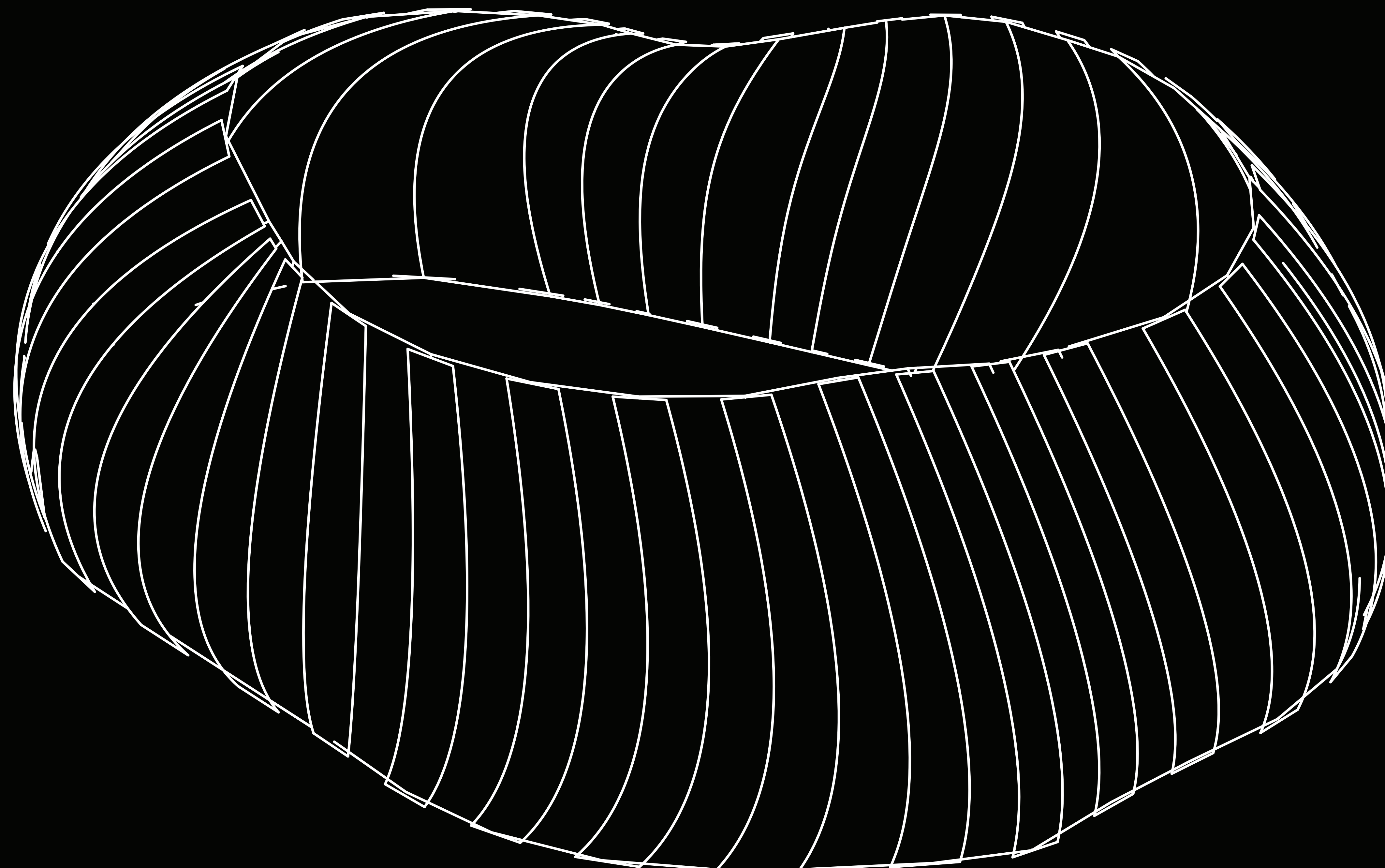

EMOTION

2

Audi-O

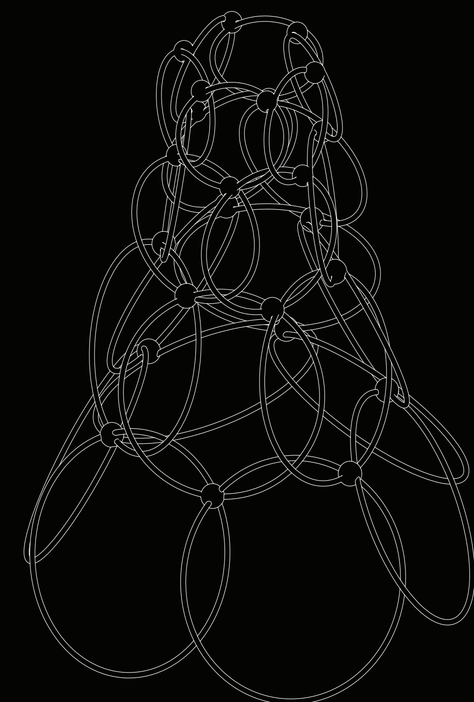
The Audi-O is an acoustic space for a user to experience audio in a new way. This project focuses on the illusory impact sound has on the individual. It is a complex installation modeled though geometric optimization using Grasshopper. This project was done in collaboration with two classmates for the MIT Design Studio: Design Techniques and Technologies (4.022).

I worked on a combination of the computational modeling of the structure and the design of electronics within it, as well as running fabrication research on how to manufacture this installation.



PRECEDENT

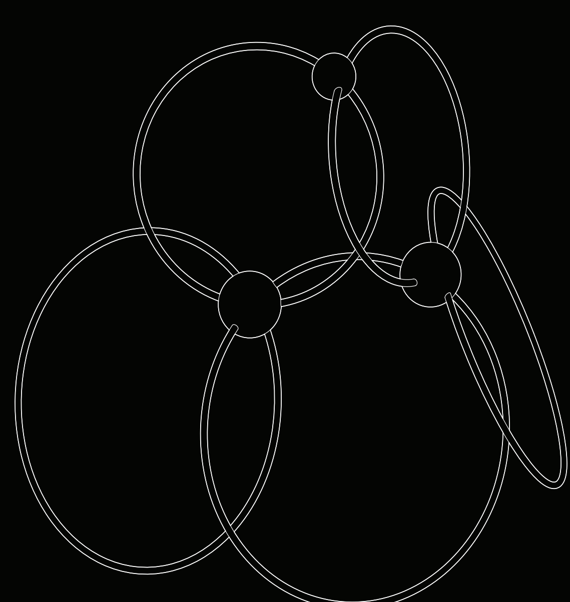
The goal was to develop a concept for a one-person enclosure and figure out how it will relate to the body and mediate the environment? The enclosure was to be developed computationally using parametric models in Grasshopper. After a few weeks of tinkering with our ideas, two classmates and I grouped up to design one larger of an enclosure (under a budget of ~$300).

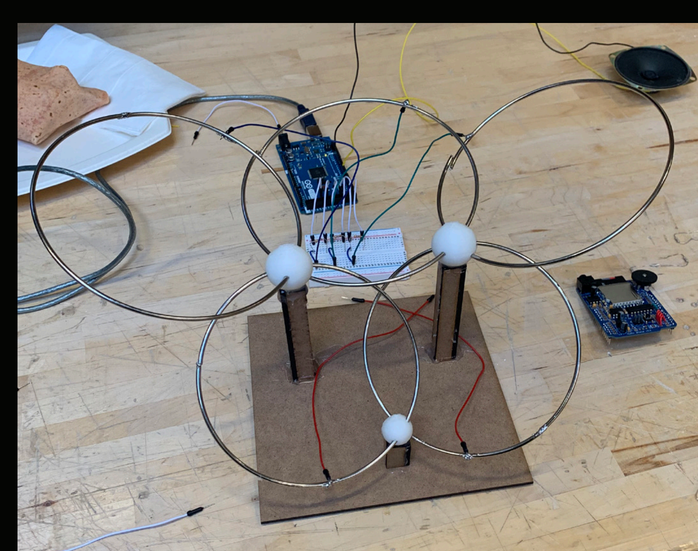


My initial inspiration for an enclosure began with concentric rings that encircle the occupant. The rings would intersect with 3D printed joints containing holes that would allow the rings to slide through and spin freely in. The rings are also oriented in such a way that they never intersect with each other but only the joints.

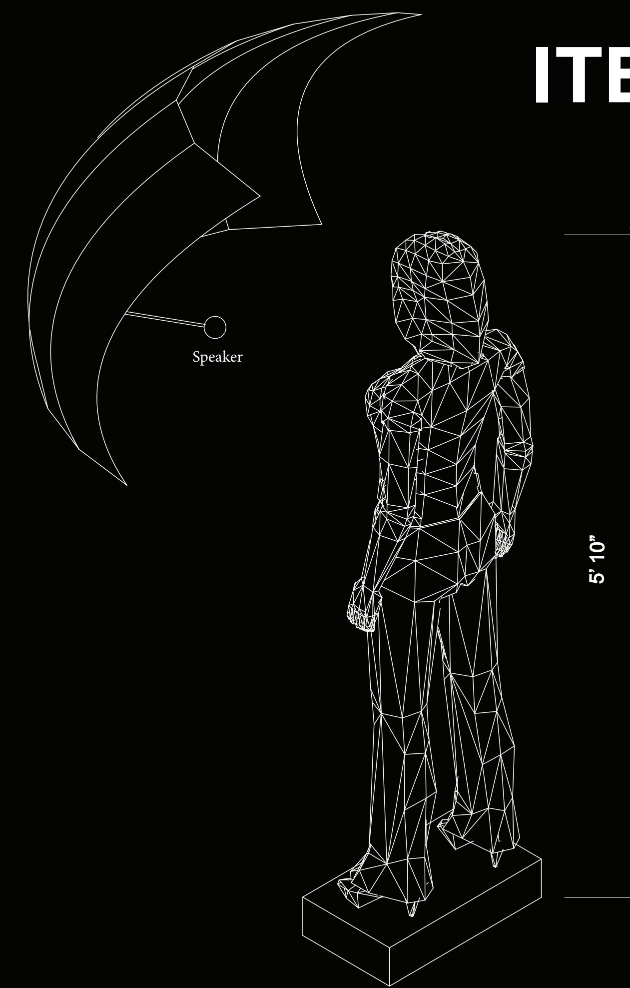
Once electronics were to be added, I incorporated the free spin of the rings and the contactless intersections. Using a capacitive touch library in Arduino, i was able to turn the rings into tools that react with human presence. The rings would respond to the presence of a human hand and create sound in response to them.

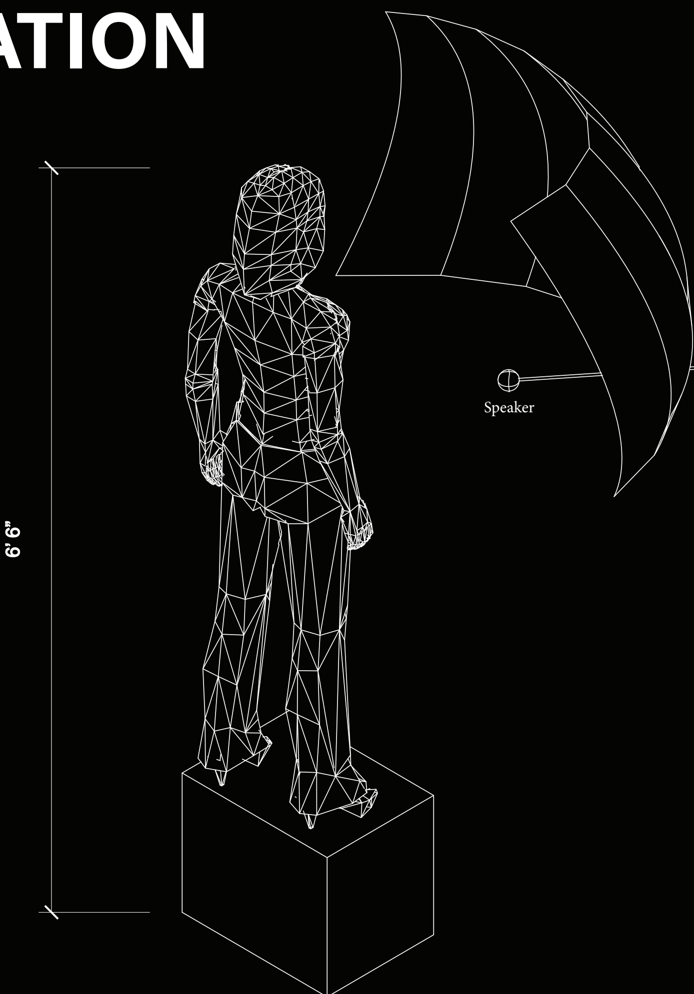
This collection of precedents was taken and improved upon in the final iteration, leading to the creation of a singular ring with thickness and curvature in order to not only create sound but to also re-direct it to the user.



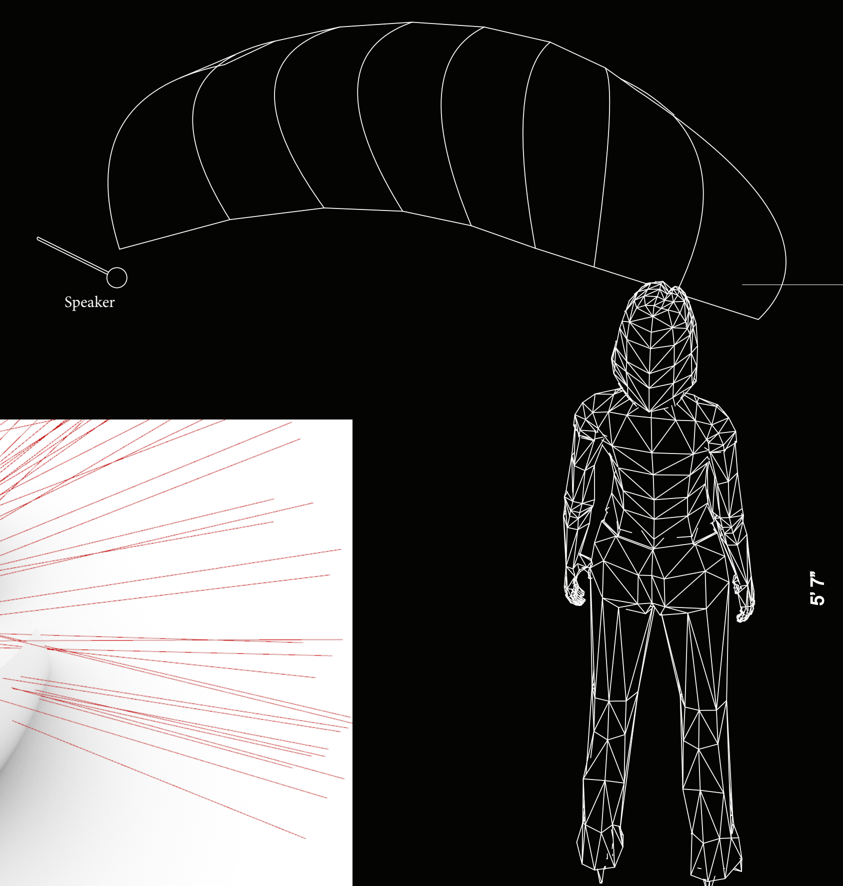


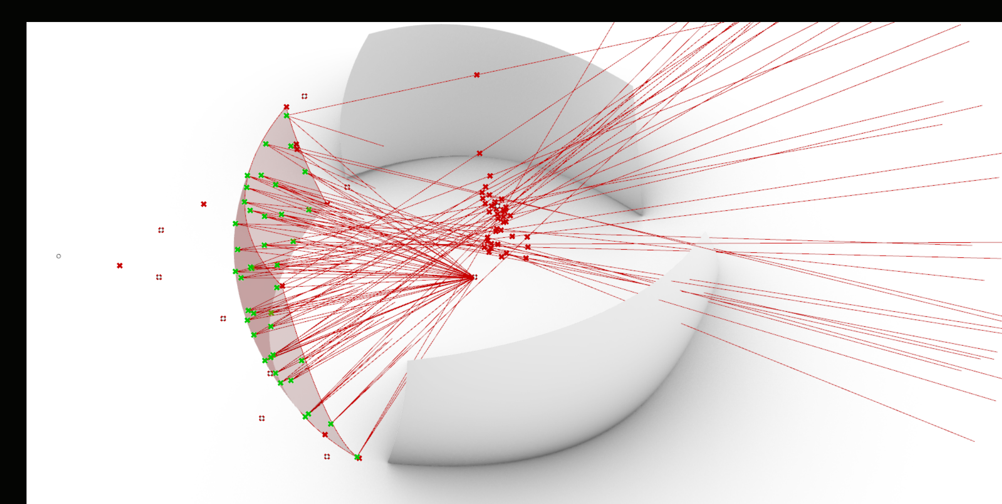
ITERATION

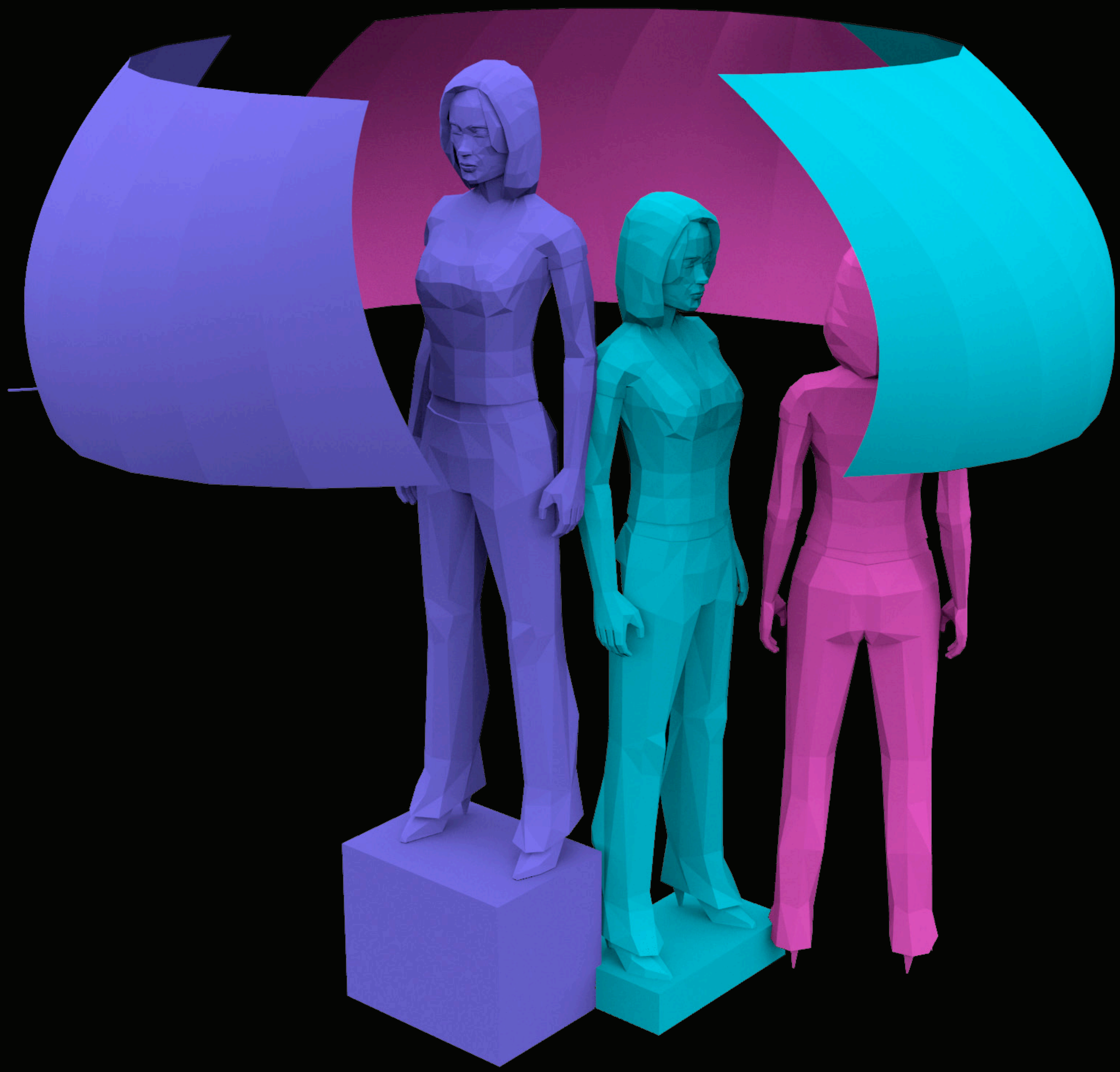




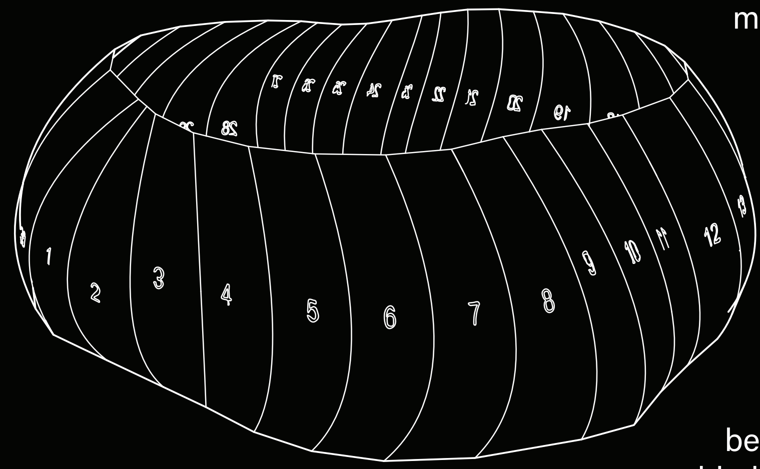
The ring was modeled using Grasshopper's Galapagos tool. Using an audio-equivalent process to ray casting, Galapagos then runs an iterative optimization algorithm to determine the best curvature of a surface section such that it can bounce sound from speaker A to person A within the ring (pictured below). The sections are then lofted together by the edges to create a closed ring.







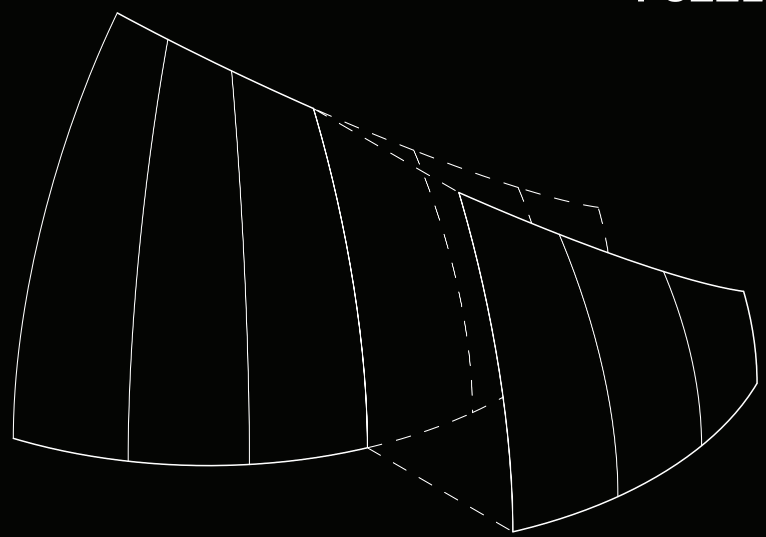
FABRICATION



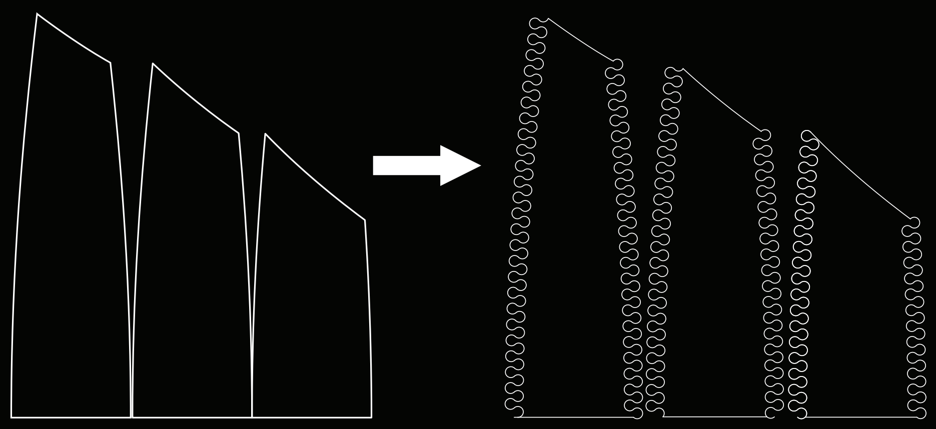
The next goal was to develop an appropriate fabrication method. The material needed to be light and flexible enough to quickly construct the ring and stand it at the necessary height, but it also had to be thick enough to bounce sound back into the ring instead of letting it pass through. We decided to build the ring using 1/8" plywood.

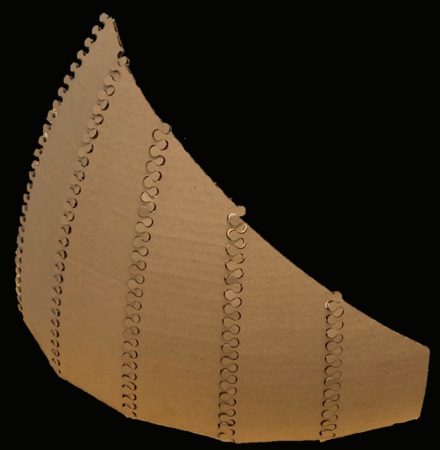
Since the structure is dependent on its acoustic properties, I had to fabricate the double curvature of the surface as accurately as possible. When unrolling a double curved surface there will always be a tolerance of error in the process. Therefore I divided it into small enough sections that the area loss was only ~0.02% and within tolerance.

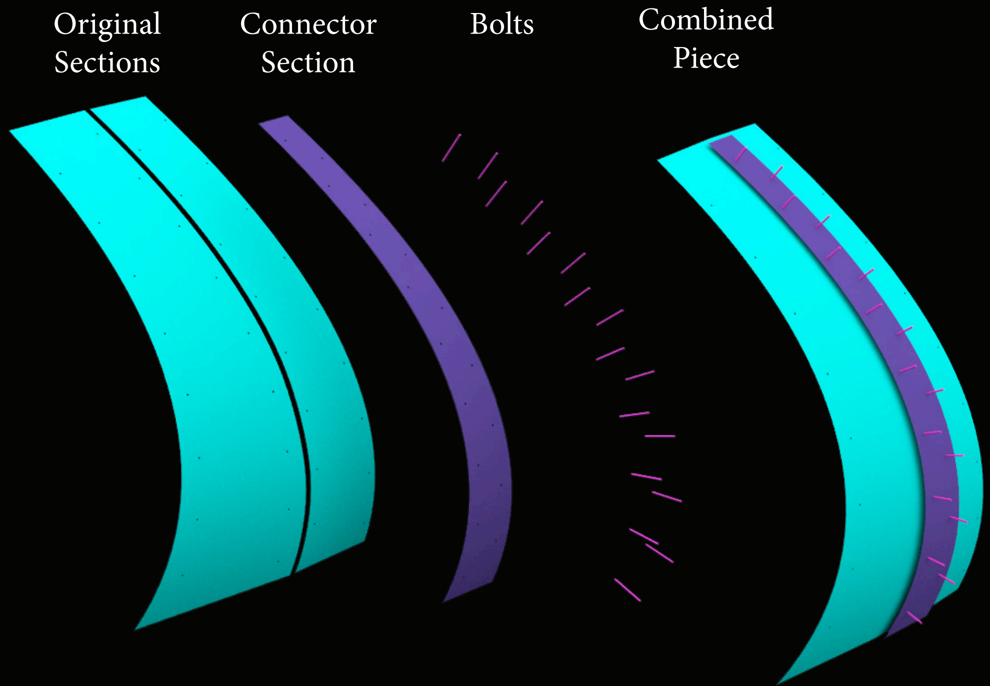
PUZZLE FIT



A method of fabrication we attempted was using puzzle fit patterns to combine sections. The process involved taking consecutive sections of the surface, unroll them, and attach alternating puzzle piece patterns on each side of the sections. They can now be wedged together and the force of friction between the edges will hold and replicate the double curvature. Testing on cardboard looked good, but switching to plywood yielded unstable fits due to plywood's higher rigidity.







PLATING FIT

A better method of fabrication I attempted was adding additional middle plates and joining sections long with the middle plate by screwing in bolts. We created a middle piece between each pair of sections. We then created 17 surface normal cylinders and punched them through all three surfaces. Once we unrolled and laser cut the them. Screwing in small 1/8" bolts into each of the punched holes would force the plywod pieces to bend into the expected curvature needed for those pieces.

The resulting structure is not only more stable then in the puzzle method, but its also thicker, boosting its acoustic quality.

The resulting installation, stood at roughly 7' tall and once the speakers were attached, there were 3 focal points of concentrated sound that a user would experience if they stepped inside and sound was playing. Another interesting feature of the enclosure was due to second and third level audio bounces happening inside, this actually caused the user to have trouble localiz-ing the speaker that was making audio, this resulted in a trippy feeling once stepping inside the enclosure.