

A thesis submitted in partial fulfillment of the requirements for the Bachelor of Interior Architecture Degree in the Department of Interior Architecture of the Rhode Island School of Design, Providence, Rhode Island.

Holden Rappuhn
Baiqiang Zhang

May 23, 2025

Approved by Examination Committee:

Johanna Barthmaier-Payne, Thesis Chair, Department Head, Landscape Architecture

Tom Weis, Thesis Chair, Associate Department Head, Industrial Design

Wolfgang Rudolf, Thesis Critic, Associate Professor, Interior Architecture

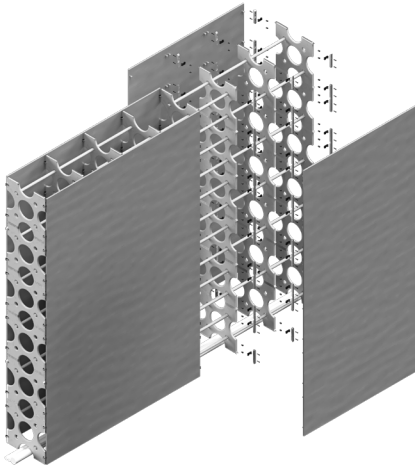
Sara Ossana, Primary Thesis Advisor

Table of Contents

1

Abstract & Concept

6



2

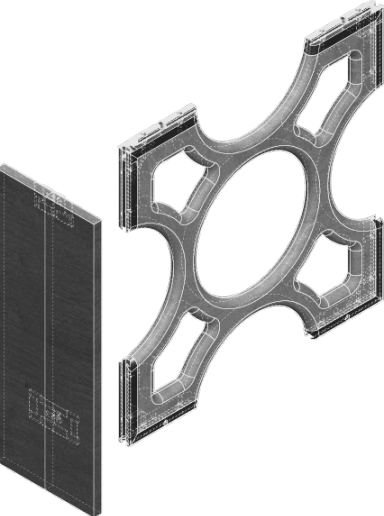
Design Development

- Web Design 8
- Connector Design 10
- Panel Connector Design 12

3

Case Study

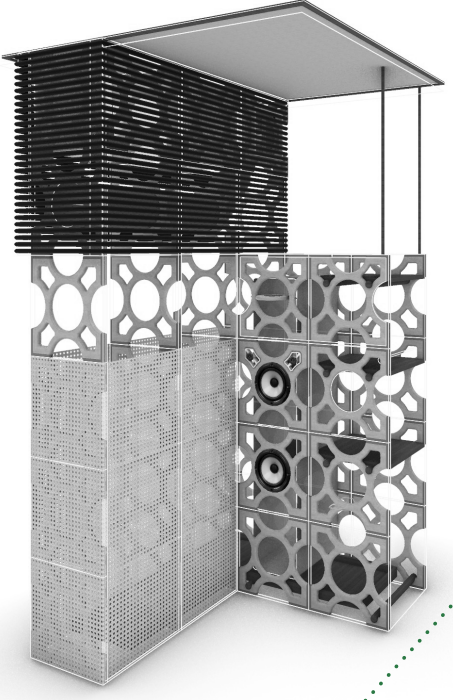
14



4

Exhibition Design

16



5

Extra

- Collage 18
- Collaboration Statement 20



Abstract

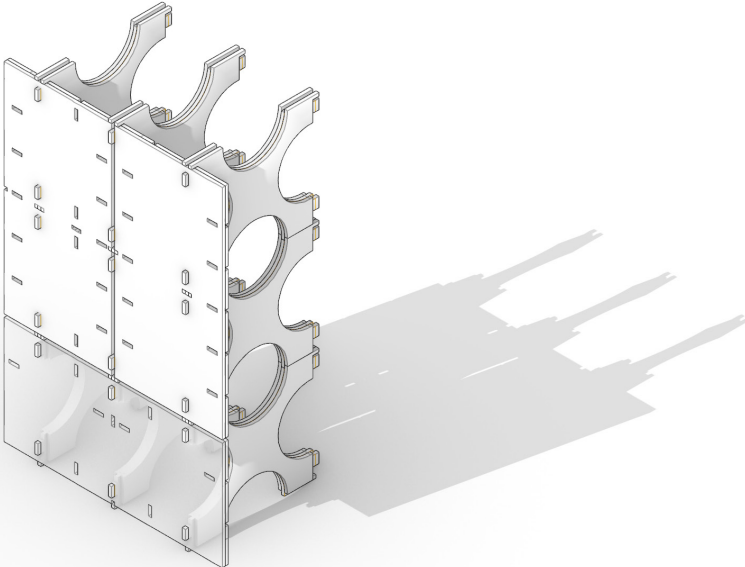
A modular framework that evolves with you.

We need to reach a more sustainable relationship with our interiors. As our personal spaces shrink and inflation rises, the materials and fabrications we use to build and furnish our spaces need to work harder and function better.

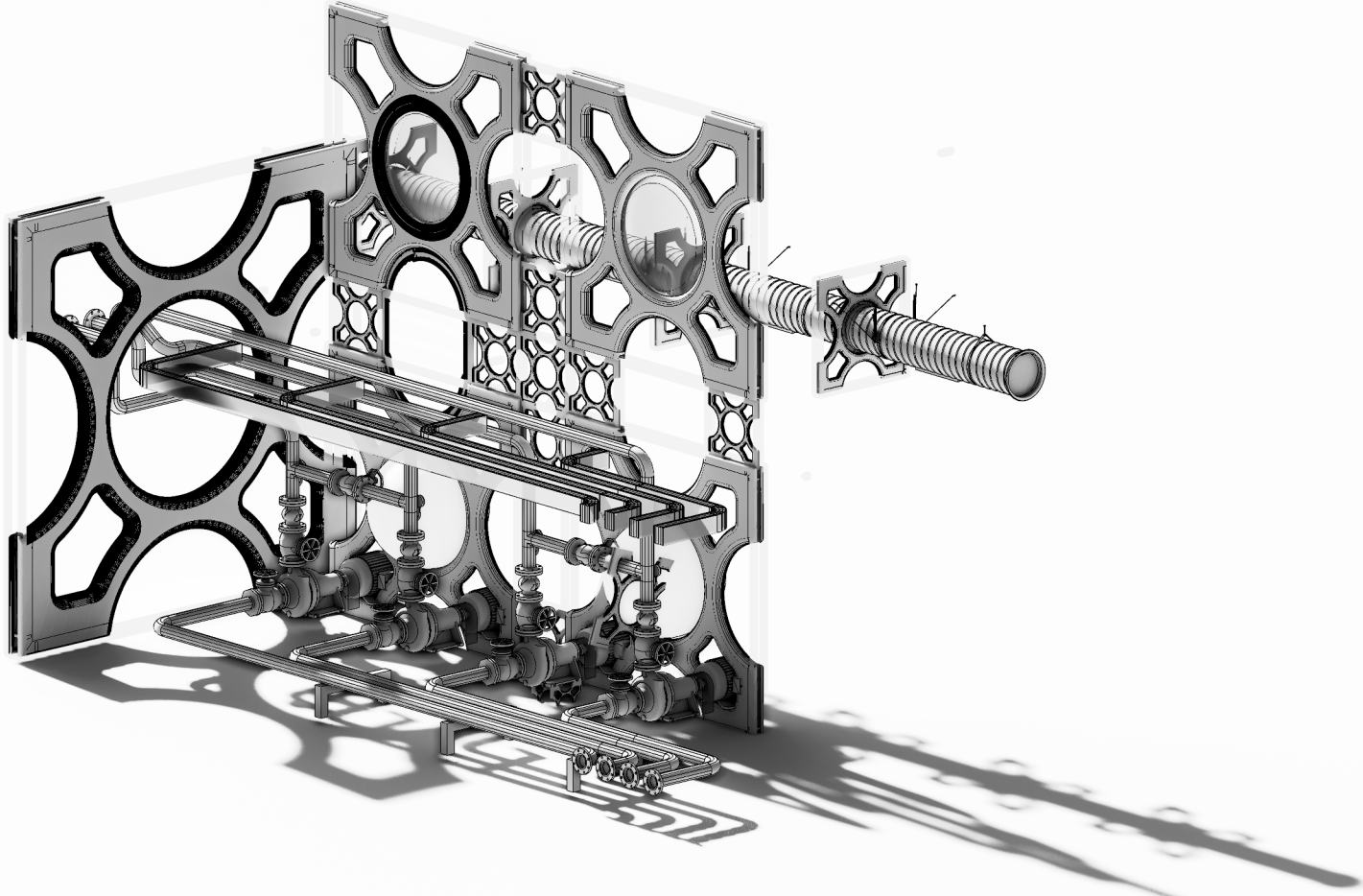
The values for production have shifted to accept unnecessary standards of fastness established by big box retailers in the furniture market and by architectural developers in efforts of increasing profit margins and matching trend cycles that only seem to shorten each new "season". The demands from both the producer and consumer has sped up shipping times and production leads to an alarming rate. So much so that we have exchanged quality for planned obsolescence; quality control for same day shipping, and uniqueness for safe audience tested designs.

The solution is not as simple as suggesting someone buy something of a better quality. People don't have time to turn over every stone to find their perfect match, let alone feeling comfortable enough to invest in the steep pricing for custom fabrication or tailored construction. The sentiment of an object being hand crafted or well built is no longer a good enough reason. Pieces can still be under appreciated and replaced if it does not resonate for longer than a given trend since there's always something shinier one click away.

But... Can you have it all? Can you still address the fastness set by the fast furniture model to satisfy both consumers and producers... all while executing on the basis of sustainability?

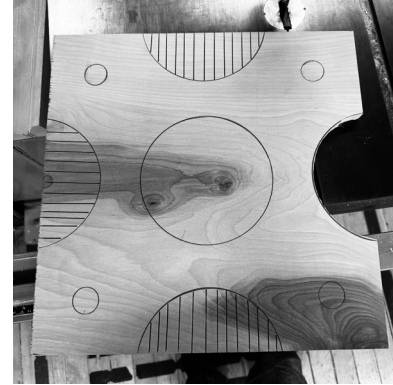
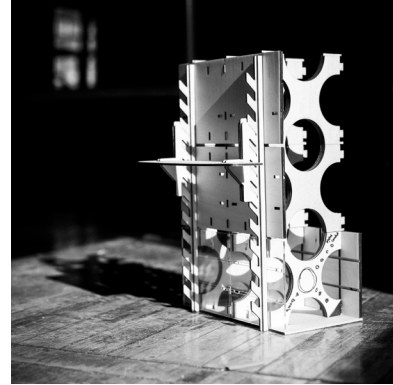
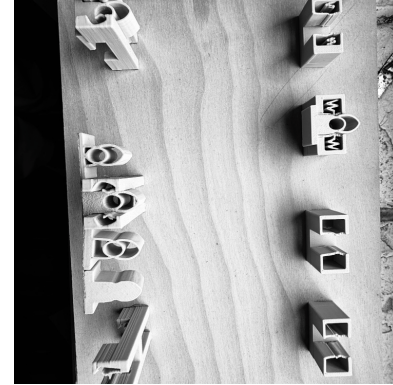
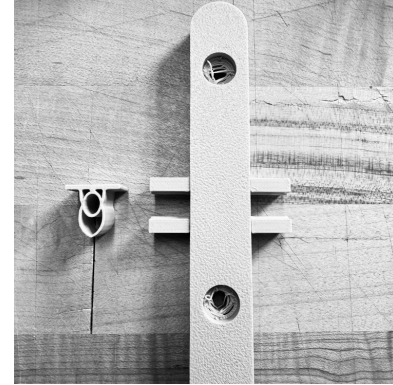
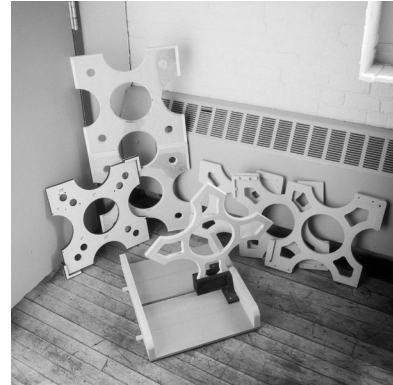
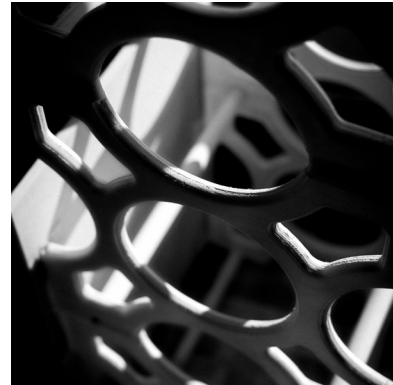
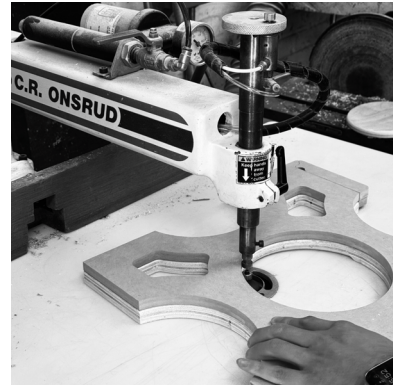


Concept Model

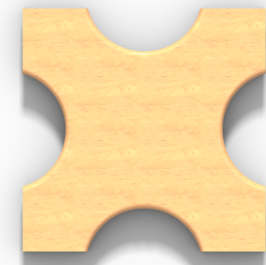


Concept Model

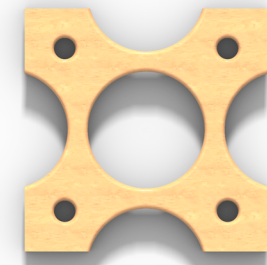
Work Images



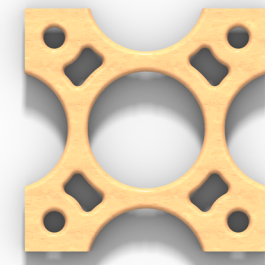
Web Design



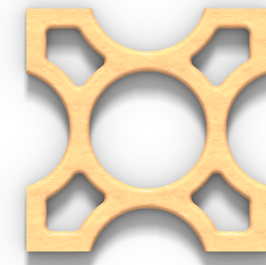
1th Generation
Weight Reduction
23%



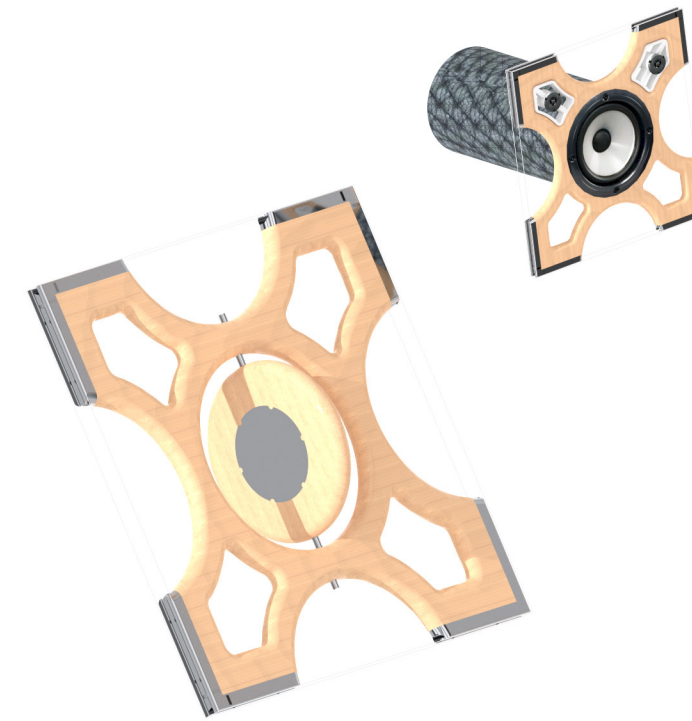
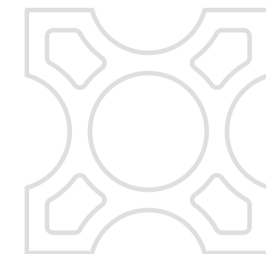
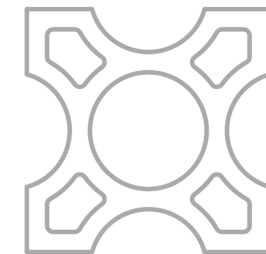
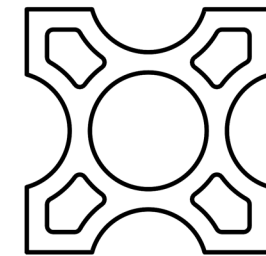
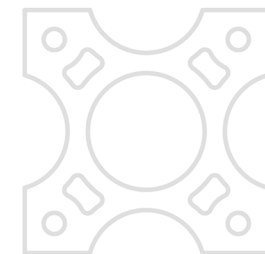
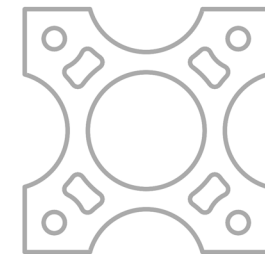
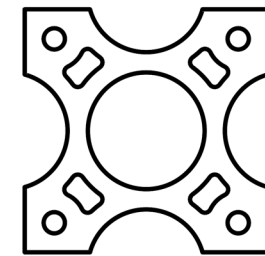
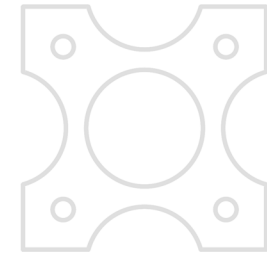
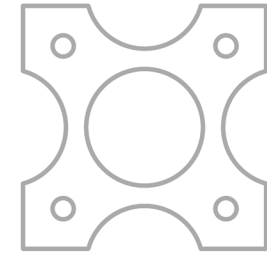
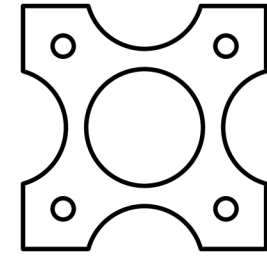
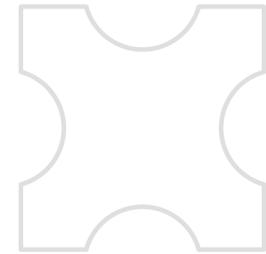
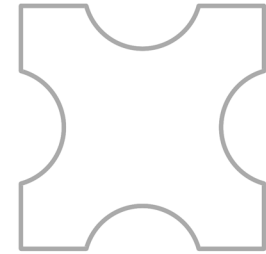
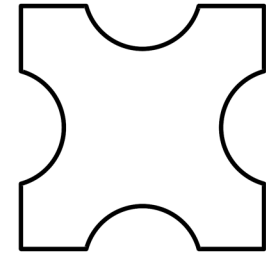
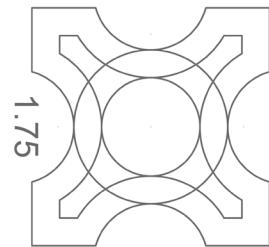
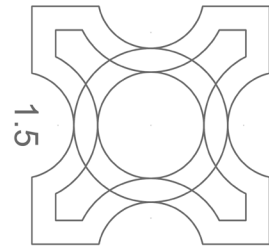
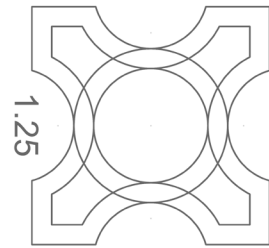
2th Generation
Weight Reduction
37%



3th Generation
Weight Reduction
41%

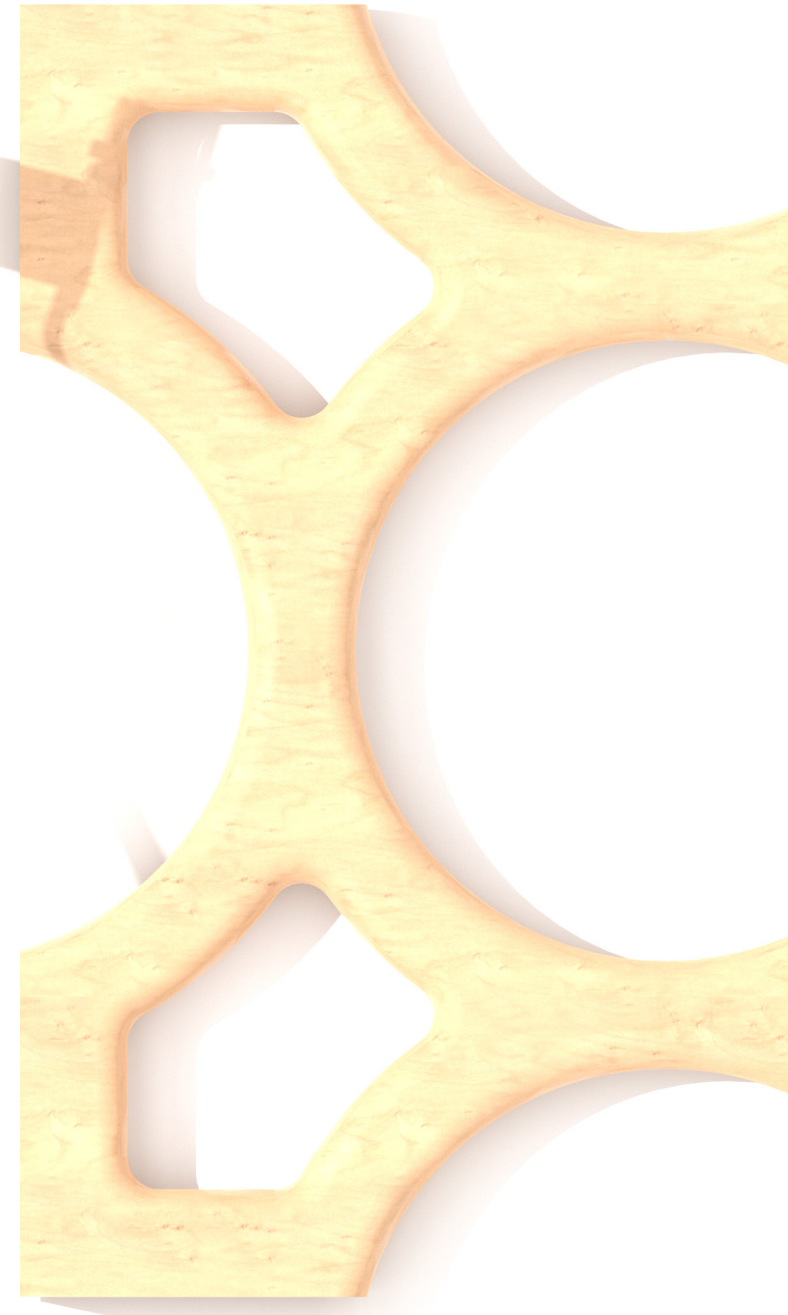


4th Generation
Weight Reduction
47%



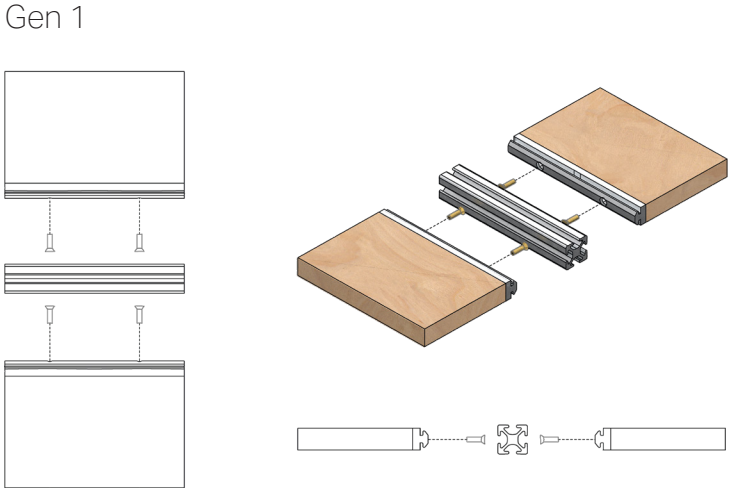
Structural Webbing is a 15" x 15" X made of three quarter plywood. Ideally we would use a material with little to no adhesives, but plywood was both accessible and strong for the sake of this project. Its purpose is to be the sort of skeleton, giving the framework volume and structure. There were many versions before arriving on the final design in efforts to reduce the weight, retain strength and rigidity. The cutouts add functionality, letting you mount and weave things through it like HVAC, plumbing and electrical or more fun things like plants, speakers, and lights.

The final version totals up to a 47% weight reduction with a shape that's based on a calculation, keeping a uniform 1 1/4" of material between the edges of each cut out. Each web module is very light, making them ideal for flat pack shipping; simple storage; and finished with a smooth round off for easy handling.



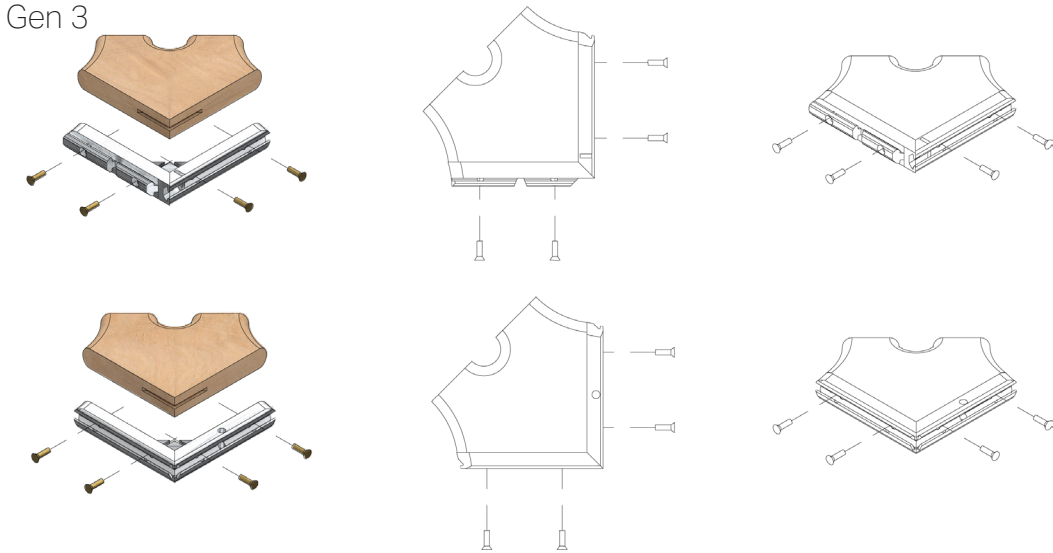
Connection Design

The weakest part of the framework would have been the connection moments if left unfinished. By making them interchangeable, the longevity of the system could be extended tenfold, simplifying repair; reducing downtime; and minimizing obsolesce and unnecessary waste. The connectors are modified versions of T-Slot aluminum extruded rails that allow the framework to scale far past any system we've come across, letting you aggregate on the X, Y or Z axis.



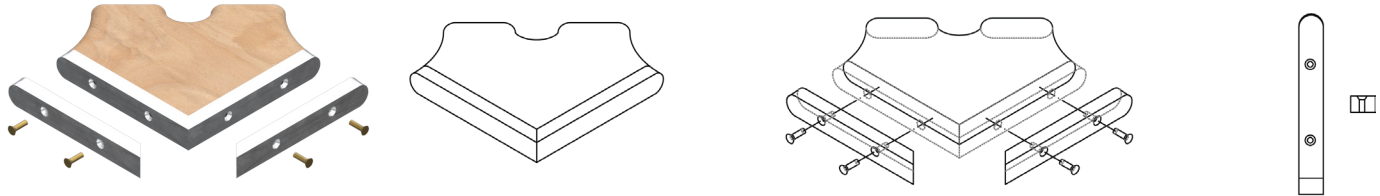
In addition, there are also universal screw mounts, letting you add components outside of our proprietary offerings so you can tailor the system to your liking even when your taste, lifestyle or living conditions change.

In the final version of the model, we combined the previously separate connectors into a single piece and used 45-degree slots to secure them to the X system without fuss.

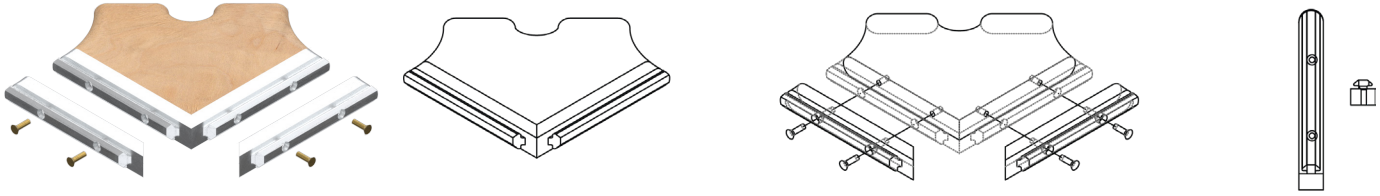


Gen 2

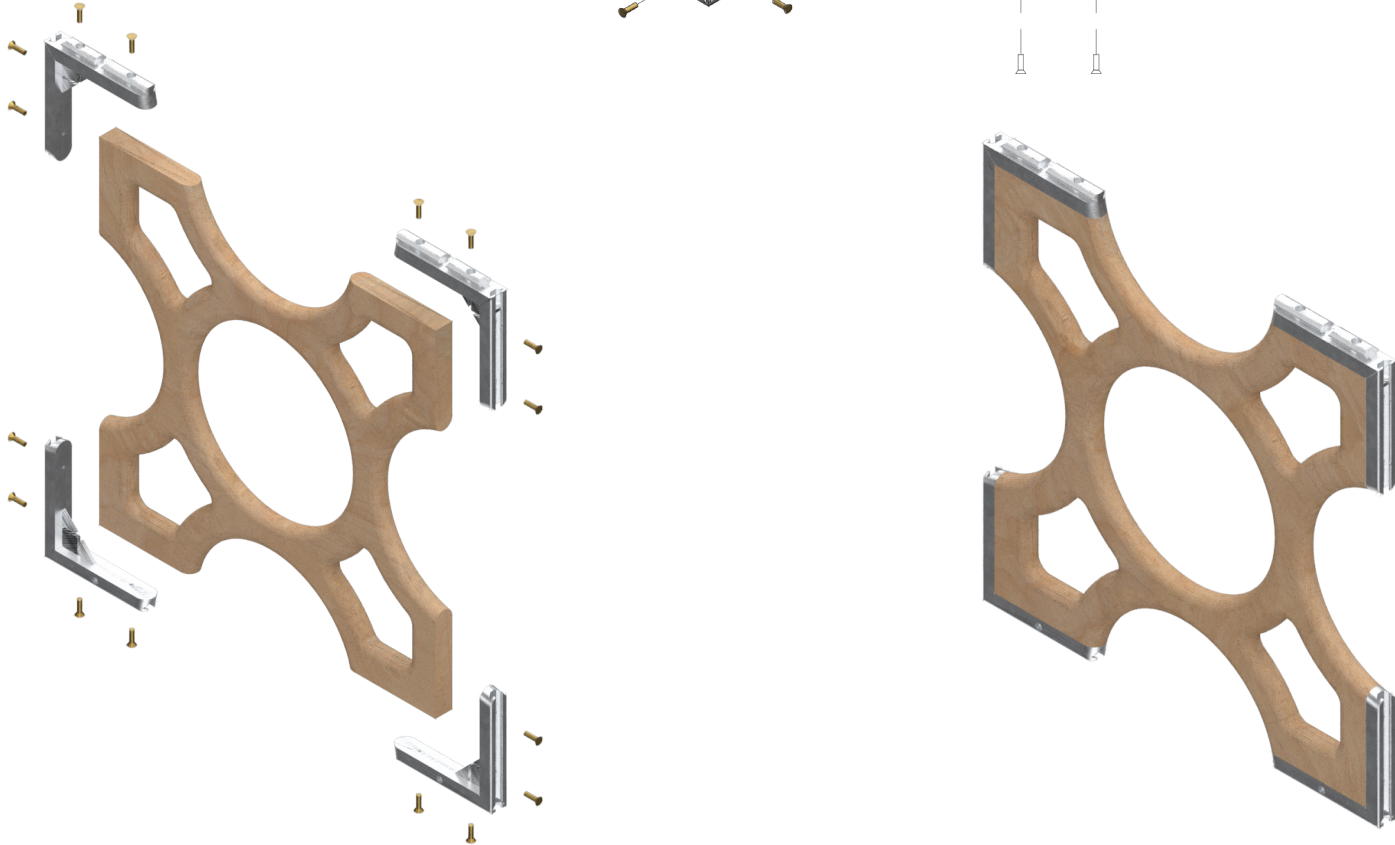
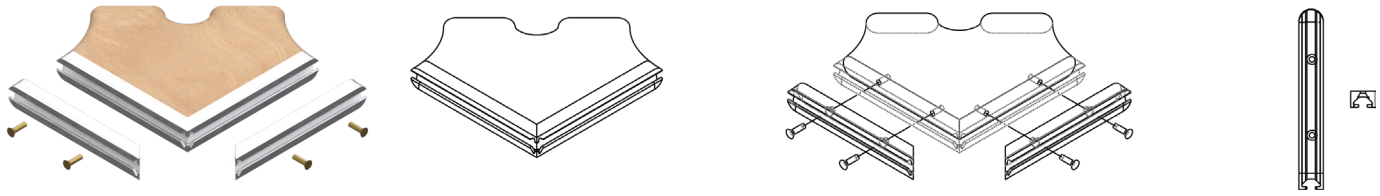
Positive Connection



Negative Connection

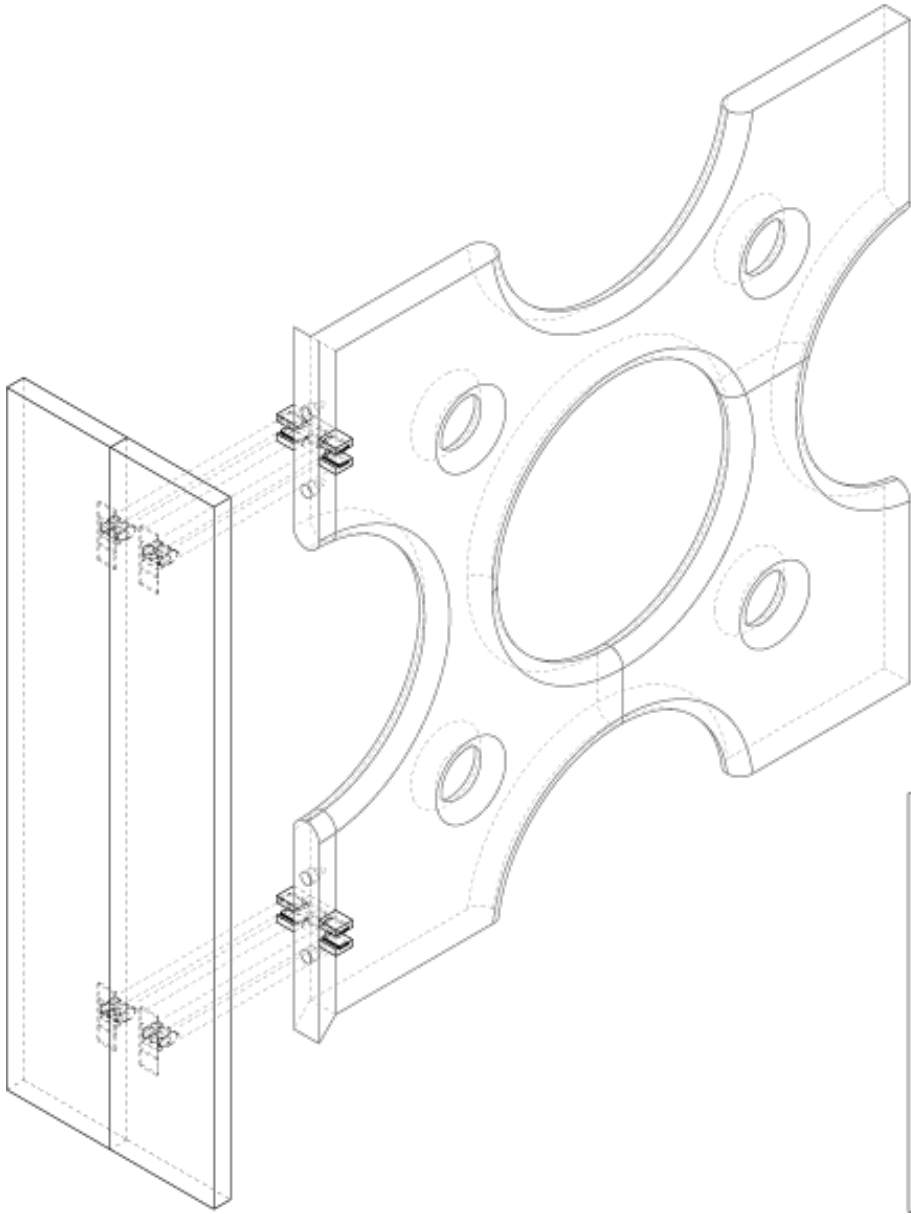


Neutral Connection

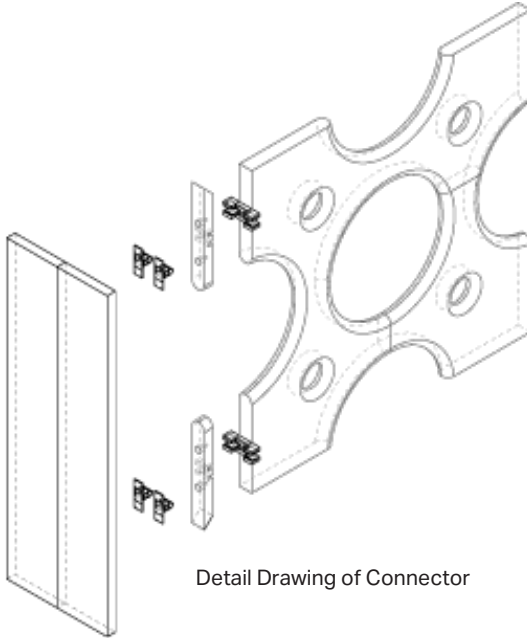


Panel Connector Design

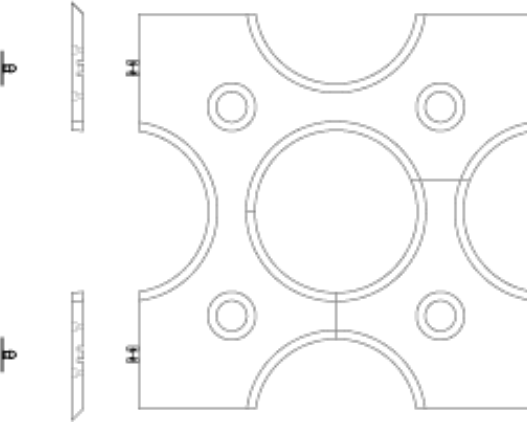
Gen 1



Detail Drawing of Connector

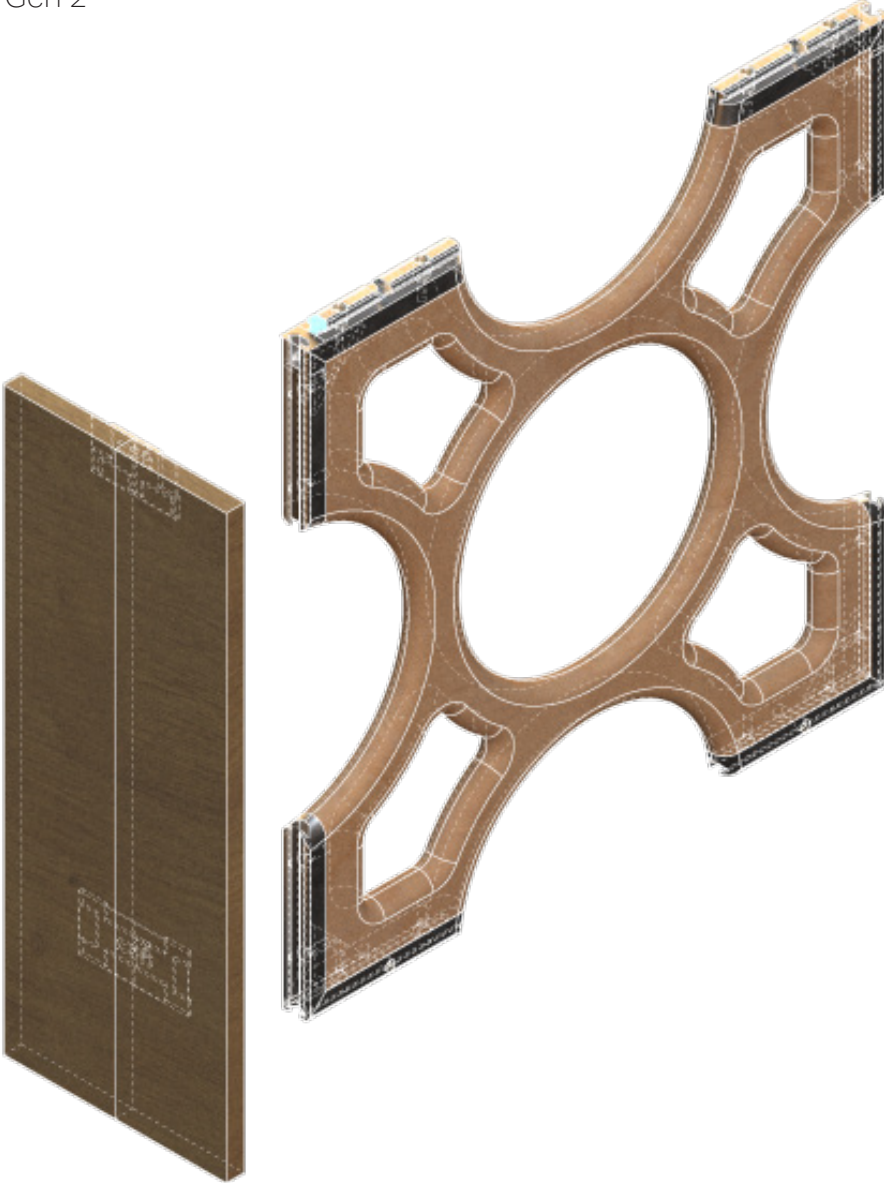


Detail Drawing of Connector



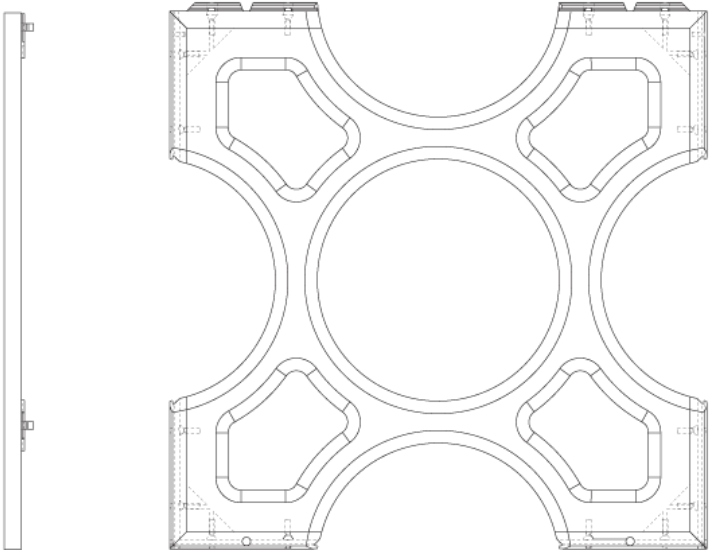
Detail Drawing of Connector

Gen 2



A major hurdle throughout the design process was attaching the panels to the webbing. The early iterations were inspired by cabinet cam locks, but they proved unstable. Panels were falling off easily, and the protruding locks disrupted the overall aesthetics. The panels hide unsightly utilities, wiring and even plumbing like a regular wall but with the added benefit of easy access. An electrician needs to see the wiring harness inside? No worries, just pop off as many panels as you need.

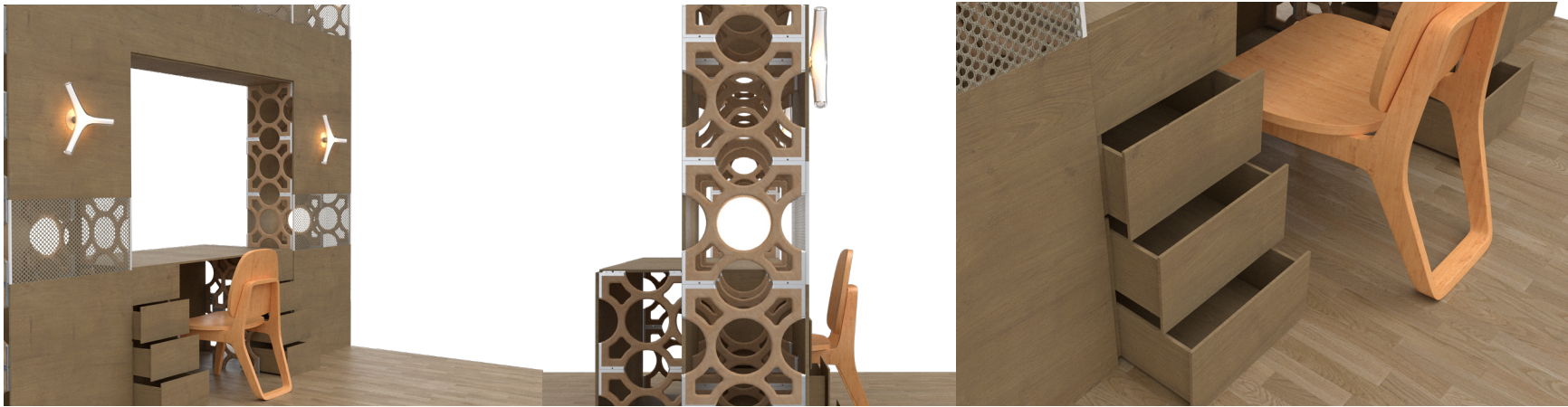
In the second version, we replaced the neutral connectors with negative ones and used a snap-fit mechanism to embed the panels for a more seamless look.



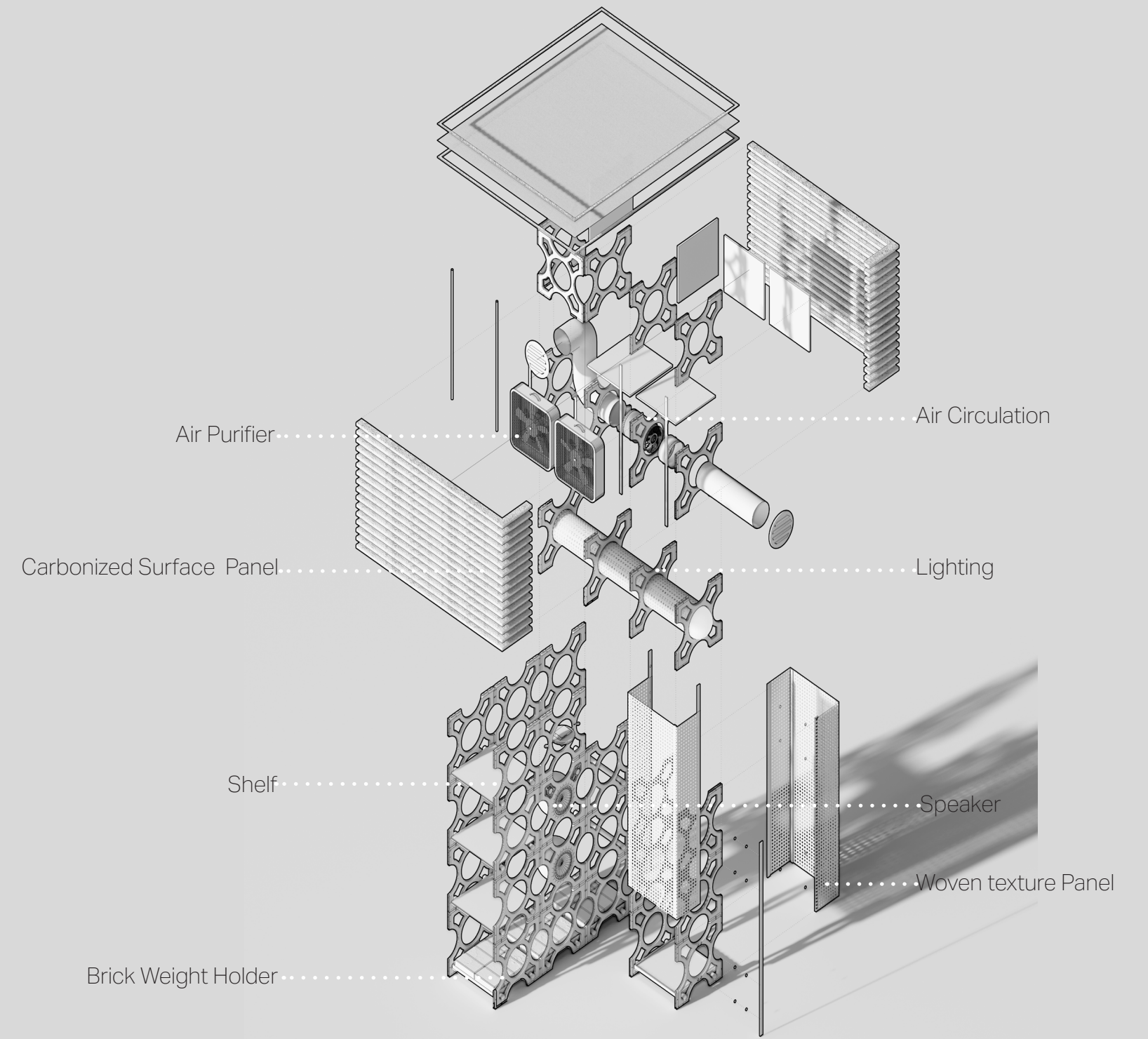
Case Study

This case, presented on a 12-foot by 9-foot wall, demonstrates the system’s versatility by lighting, cabinetry, openings, drawers, and various types of panels, highlighting its high adaptability and integrative capacity. The wall is constructed using a modular system with two distinct panel types: solid wood and perforated translucent panels, showcasing the system’s flexibility in both material and visual expression. Each unit is stacked and securely joined using customized connectors, allowing for easy assembly, disassembly, and reuse.

The design also integrates an embedded lighting system, with wall-mounted and internal fixtures working seamlessly together to offer users greater spatial and functional possibilities. The open window cutout and flexible drawer units further emphasize the configurability of the system in real-world applications.



Exhibition



Collaboration Statement



This thesis project is the result of a close and balanced collaboration between Baiqiang Zhang and Holden Rappuhn. From initial concept development to final execution, both authors contributed equally in research, design, fabrication, and writing. Throughout the process, we challenged each other's ideas, refined our shared goals, and made key decisions through open dialogue and mutual respect.

Our complementary skill sets strengthened the project: while one focused more on structural systems and modular design logic, the other emphasized spatial application and narrative framing. The project would not have reached its current depth and coherence without the constant exchange of ideas, iterative feedback, and collective problem-solving.



This collaboration has taught us the value of co-creation—how to listen, adapt, and push boundaries together. The final work reflects not only our individual strengths, but the synergy of our partnership.

“Our modular framework reimagines sustainable interiors by prioritizing adaptability, simplicity, and longevity. It empowers users to easily customize and evolve their spaces, bridging fast-paced demands with thoughtful, enduring design. Ultimately, it presents a practical path toward a more resilient, flexible, and environmentally-conscious built environment.”

ADAPTABILITY

MODULAR

DURABLE

CIRCULAR

SCALABLE

