

Portfolio

Jeremy Chen

Spring 2023

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Duplex

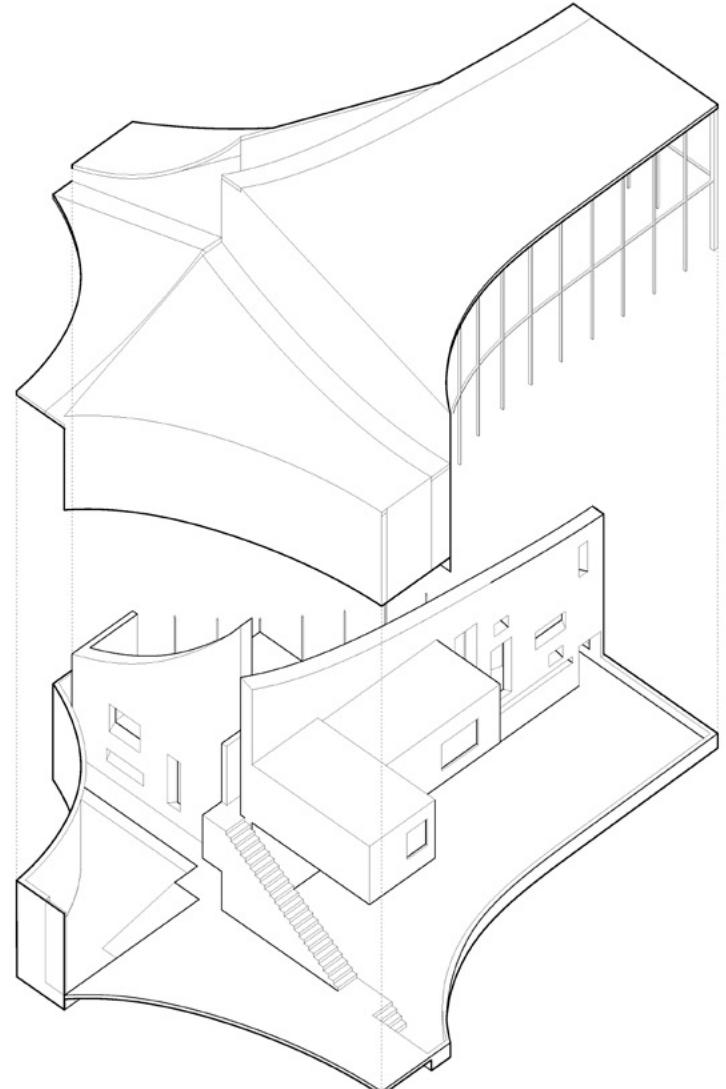
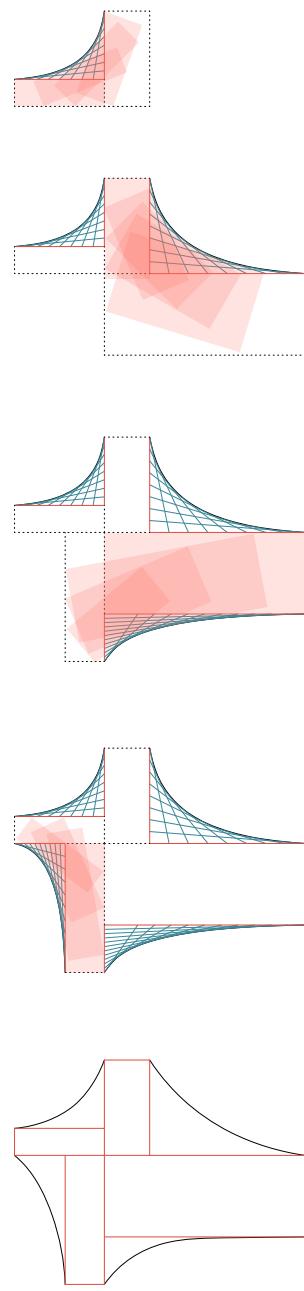
2021 / UC Berkeley / Instructor: Kristen Sidell

In collaboration with Grace Liang

Role: design proposal, physical modeling, geometry optimization,
photography, collaborate on digital modeling and drawings

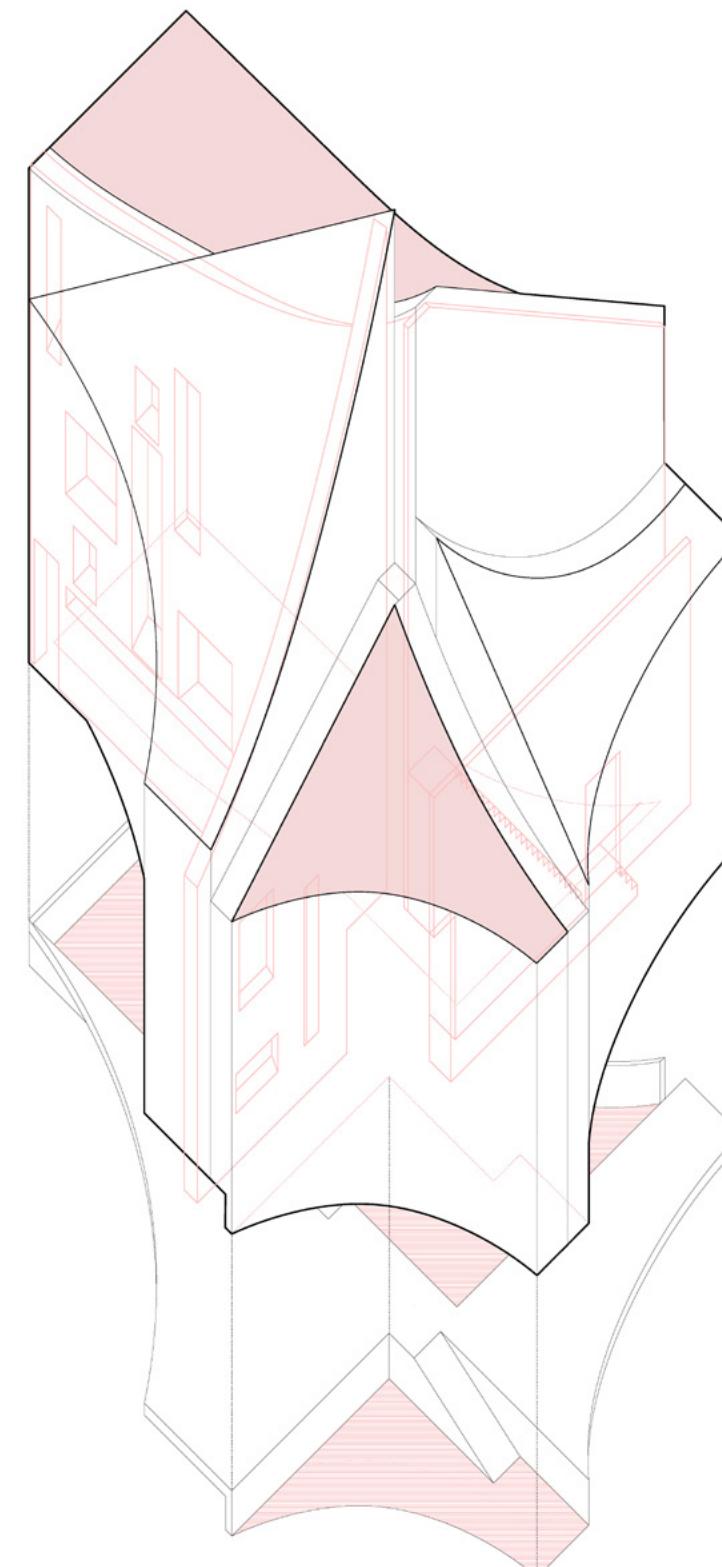
This is a house for a photophile (who loves natural light and needs as much as possible during the day) and a cook (who loves to make delicious meals to share with friends at different sized gatherings). They are good friends thus share most of the public spaces on the first floor.

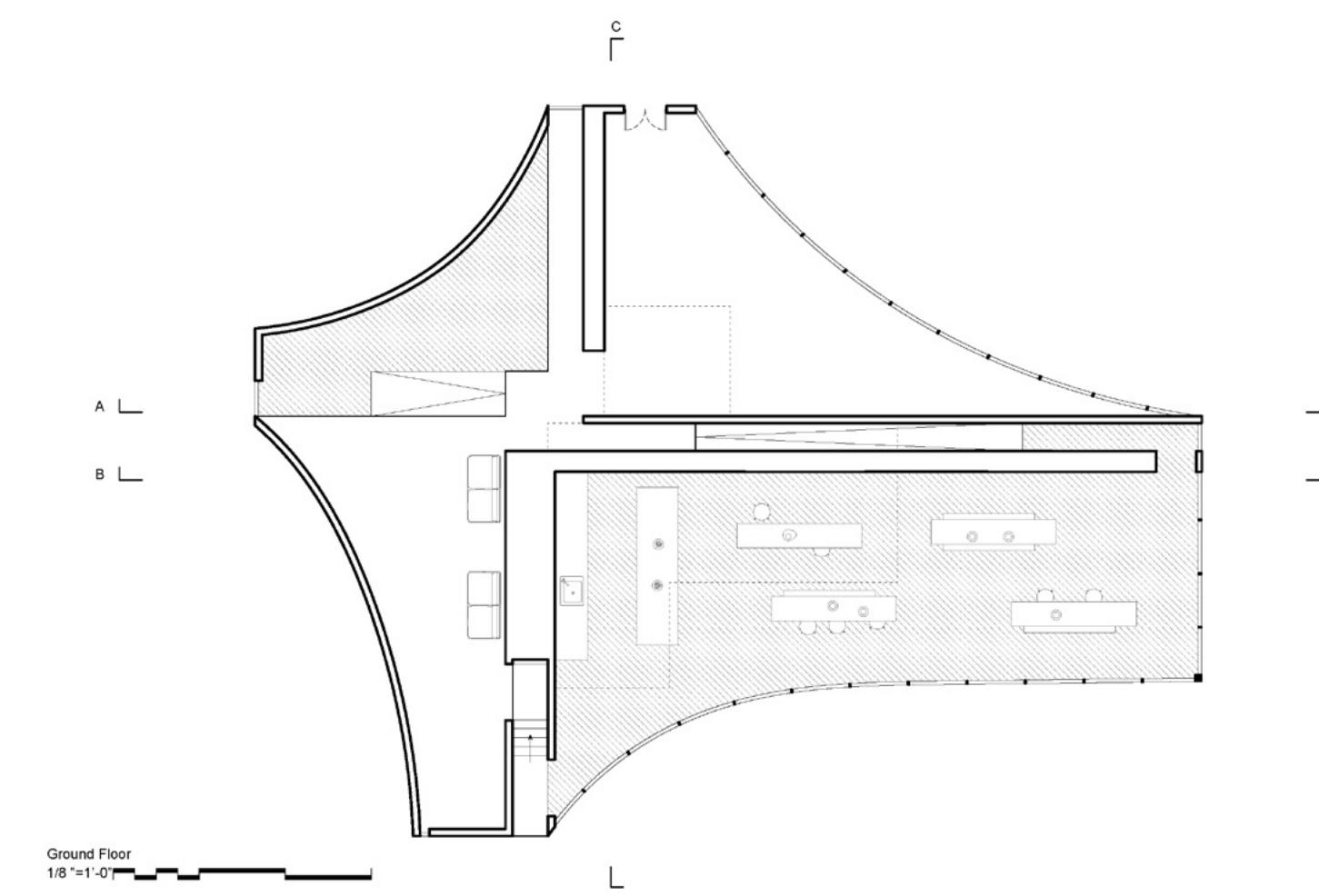
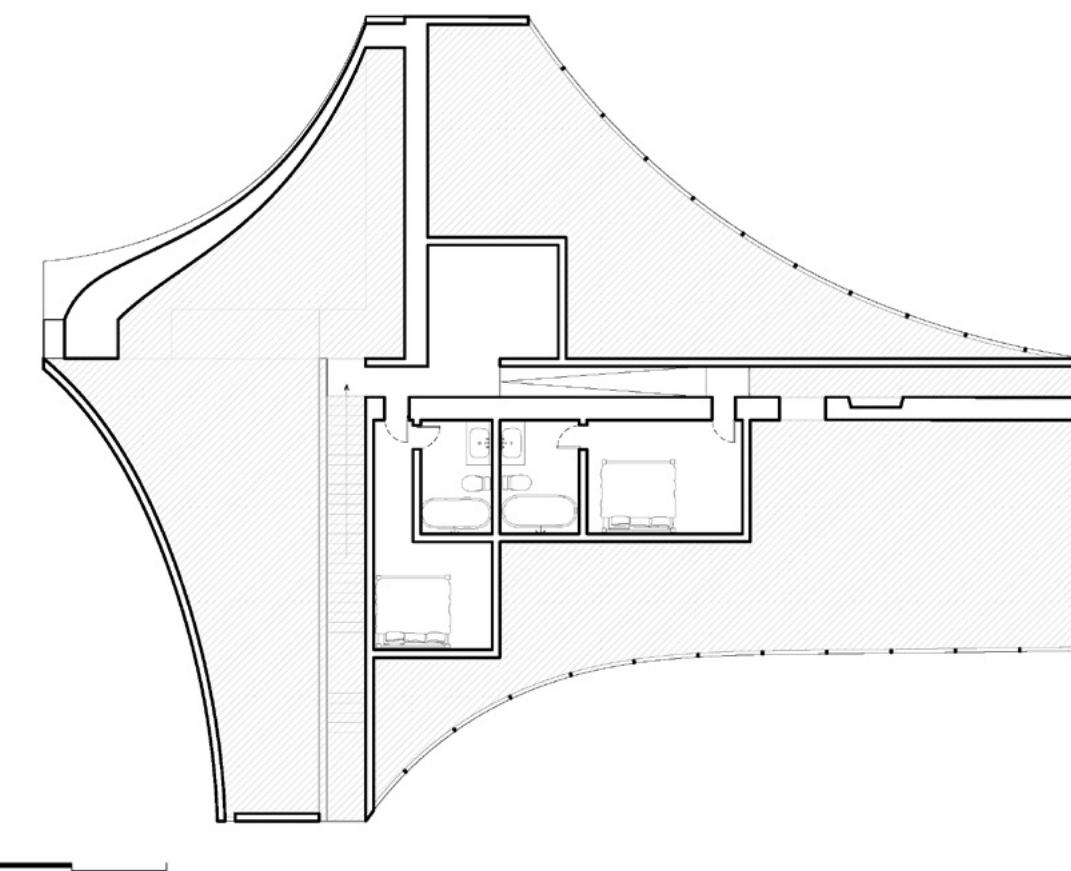
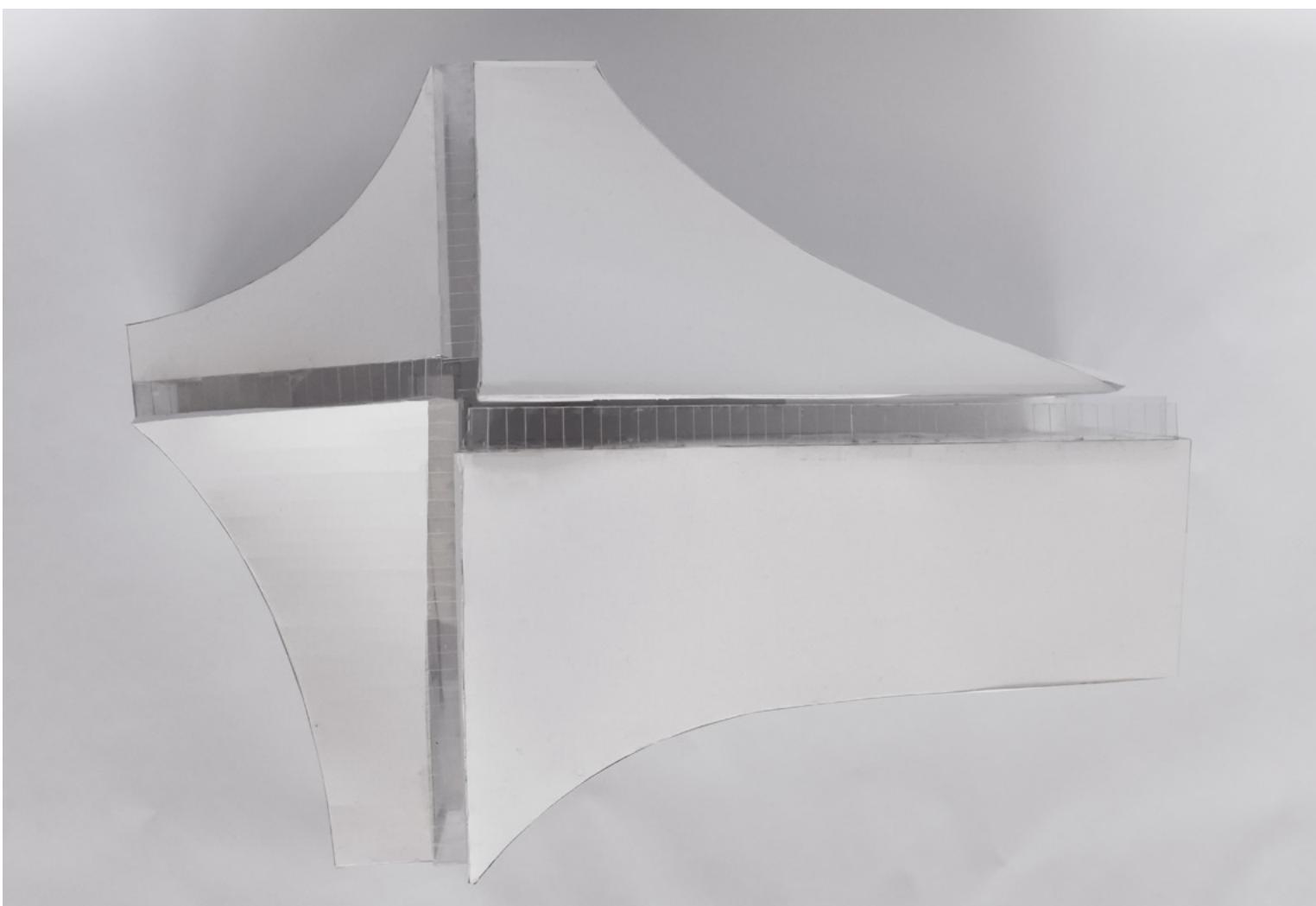
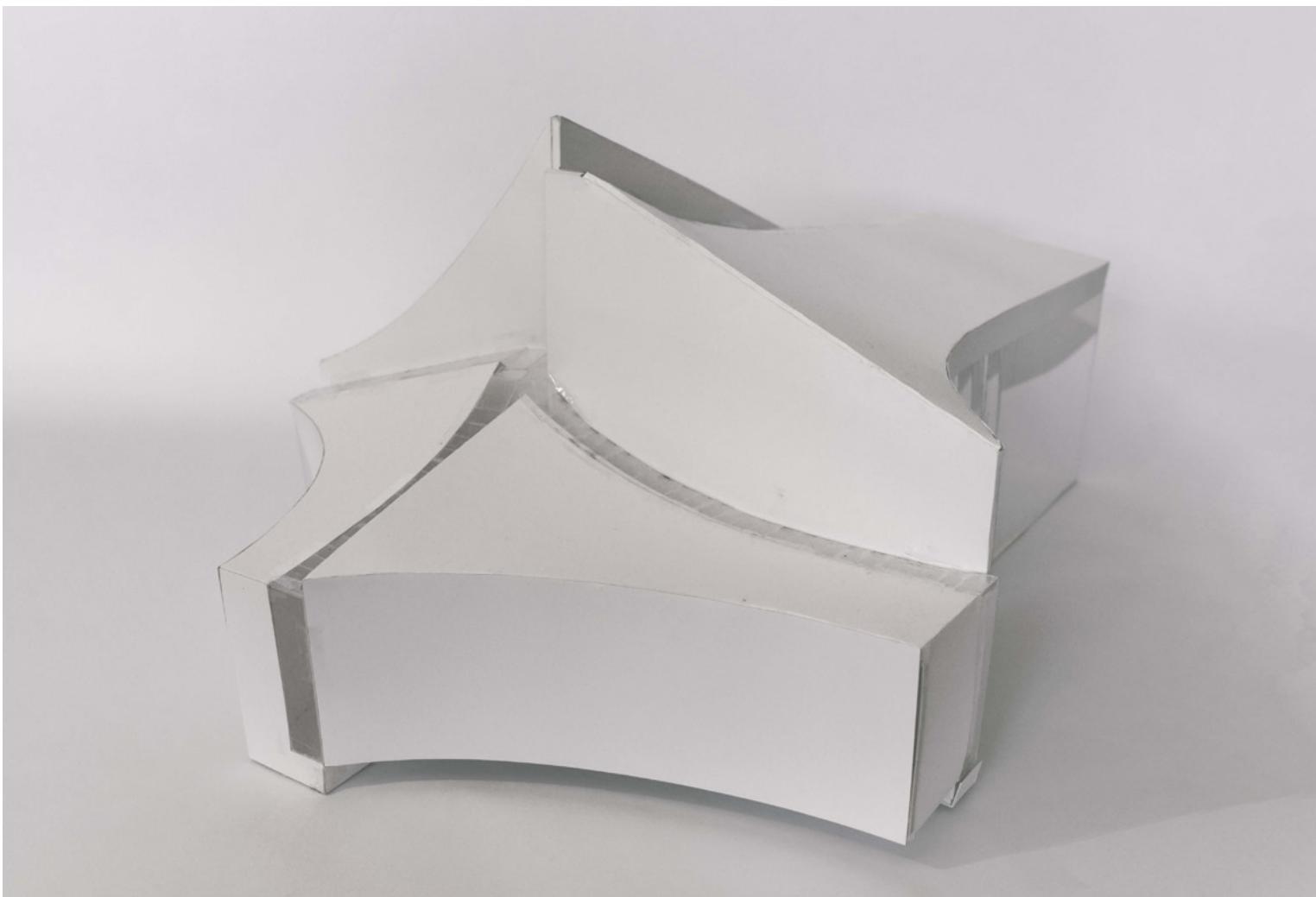
The operative terms of this project are rotating and layering. Private space is layered above public space. The difference in heights defines importance and the size of gatherings in each space. The pinwheel shape is the main circulation and where skylights were introduced.

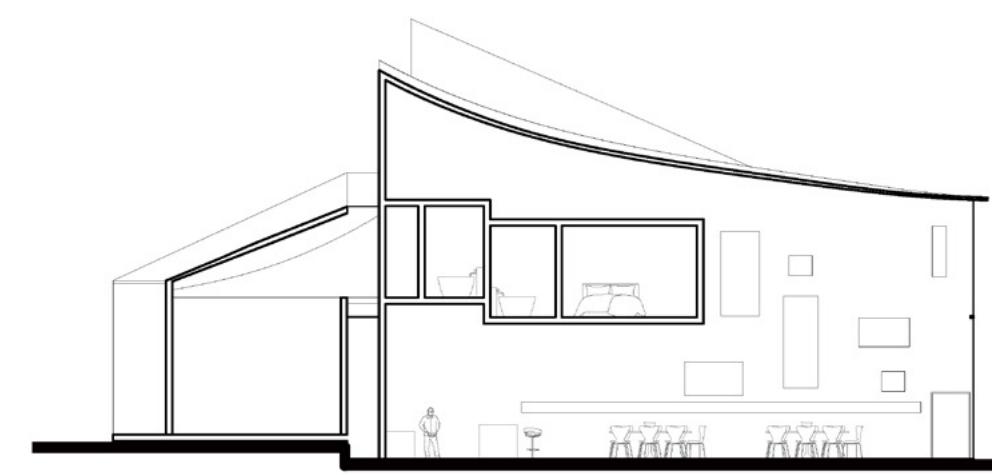
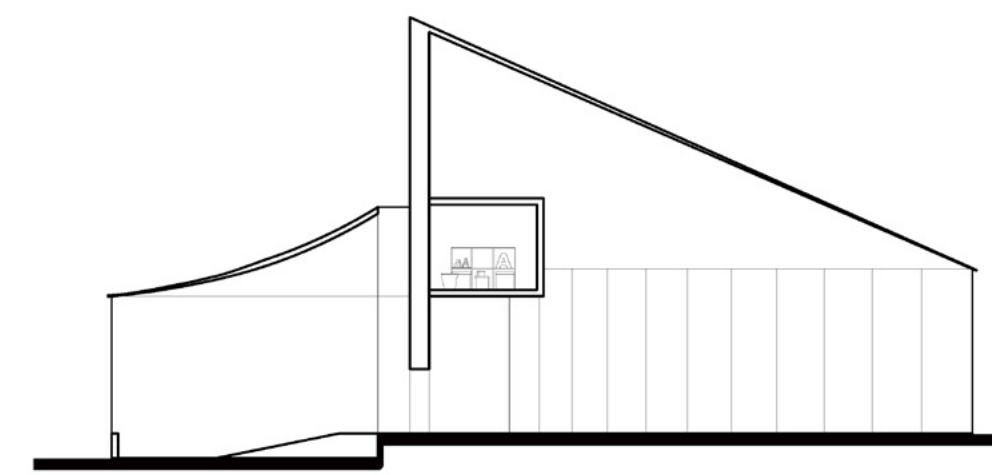
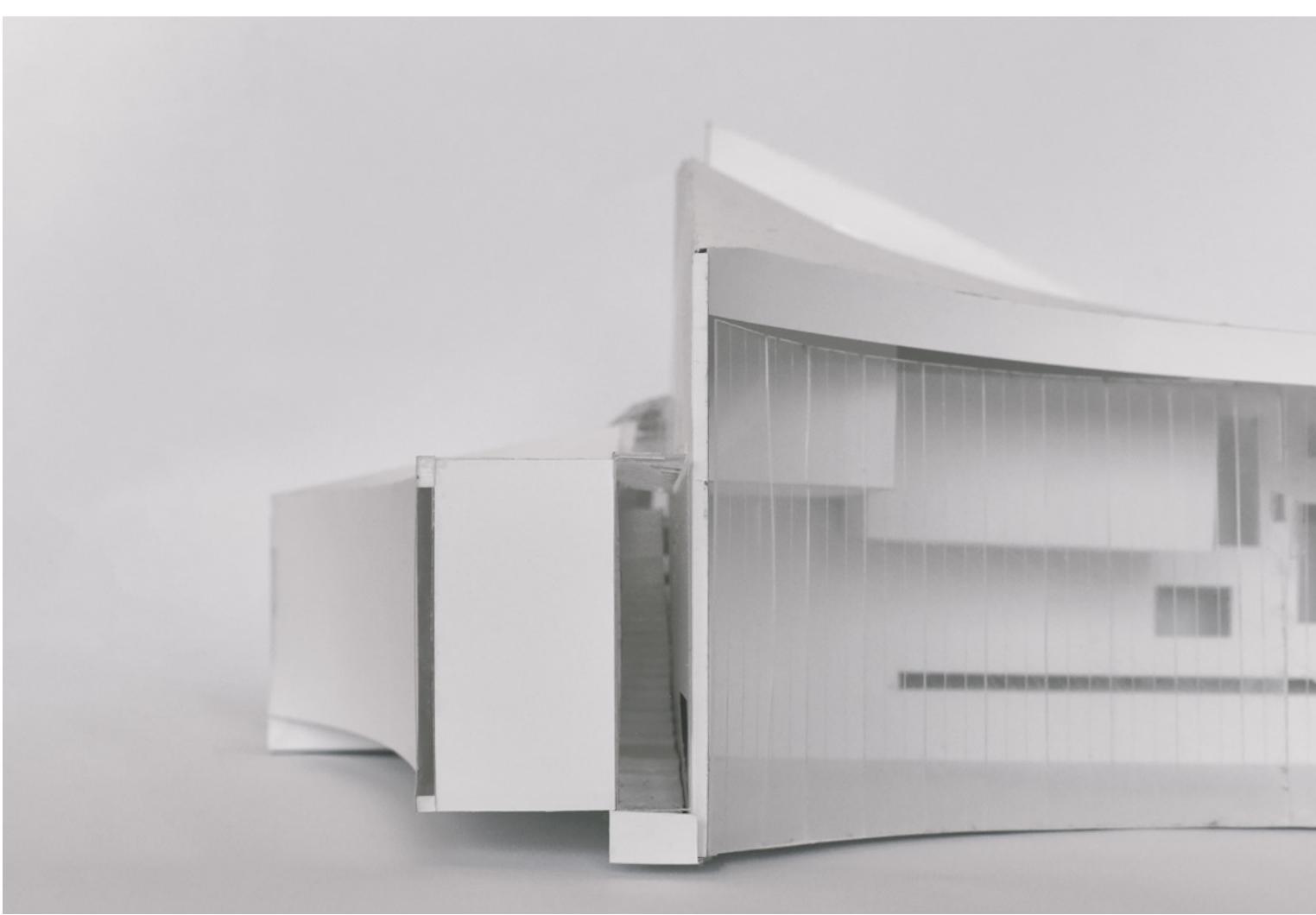
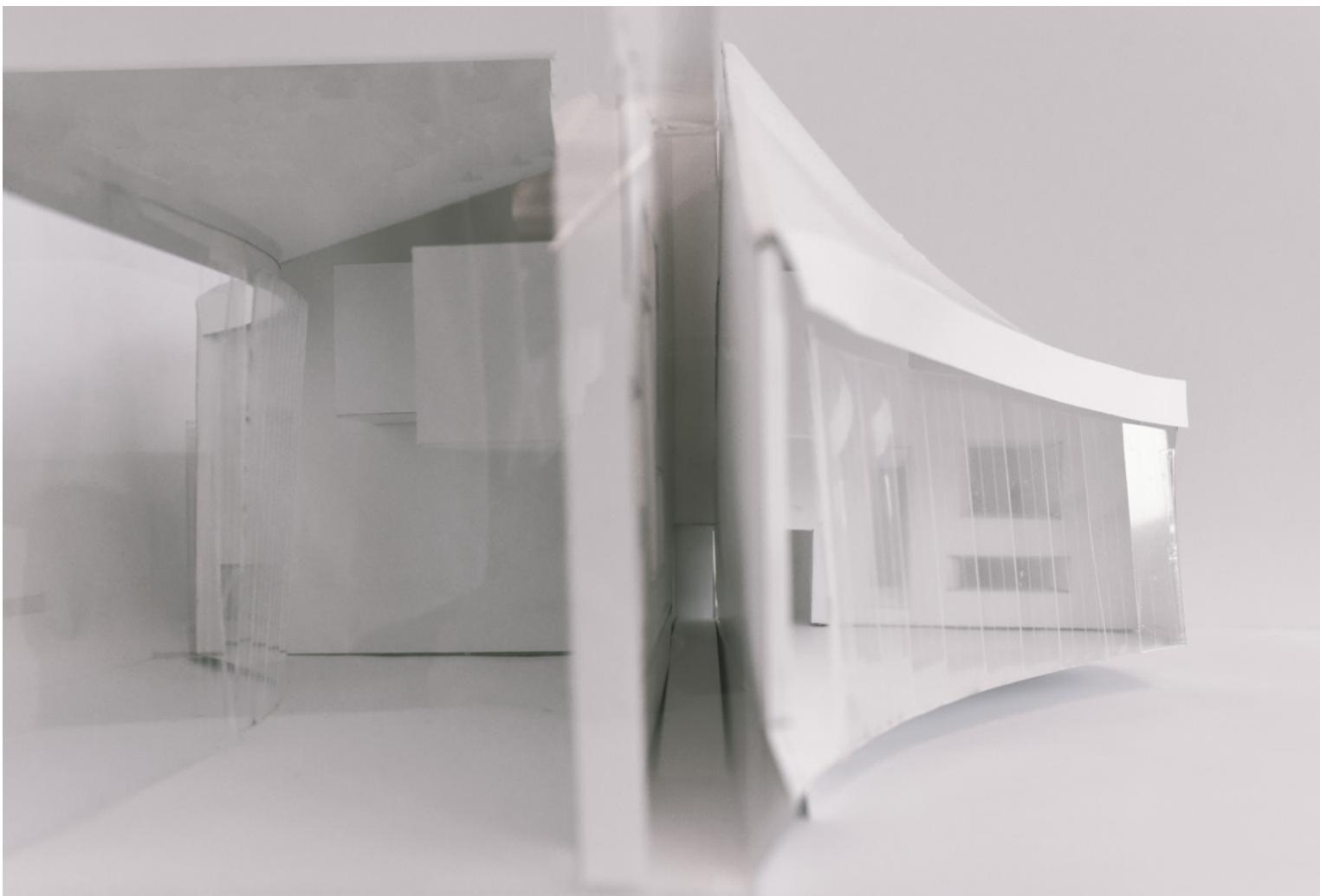


Axonometric

Plan Oblique





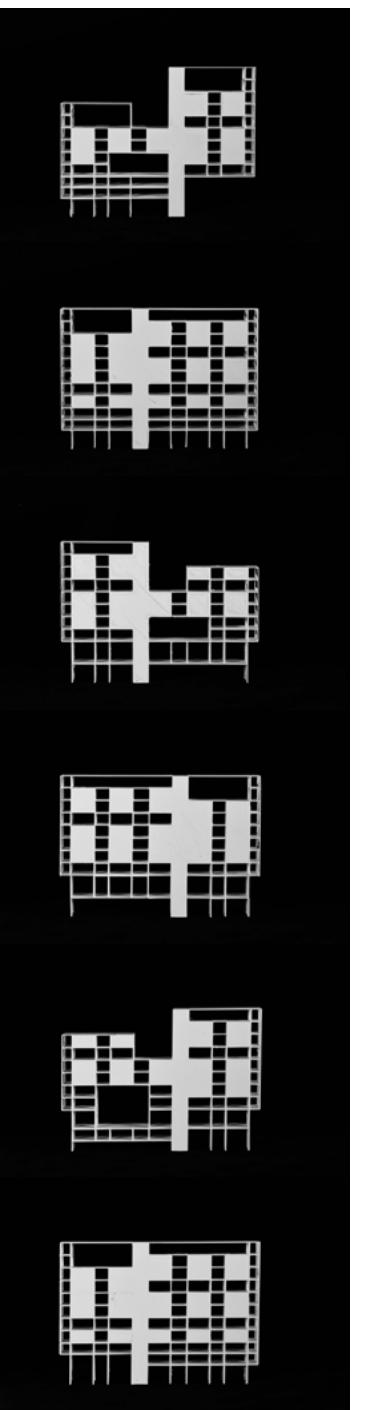
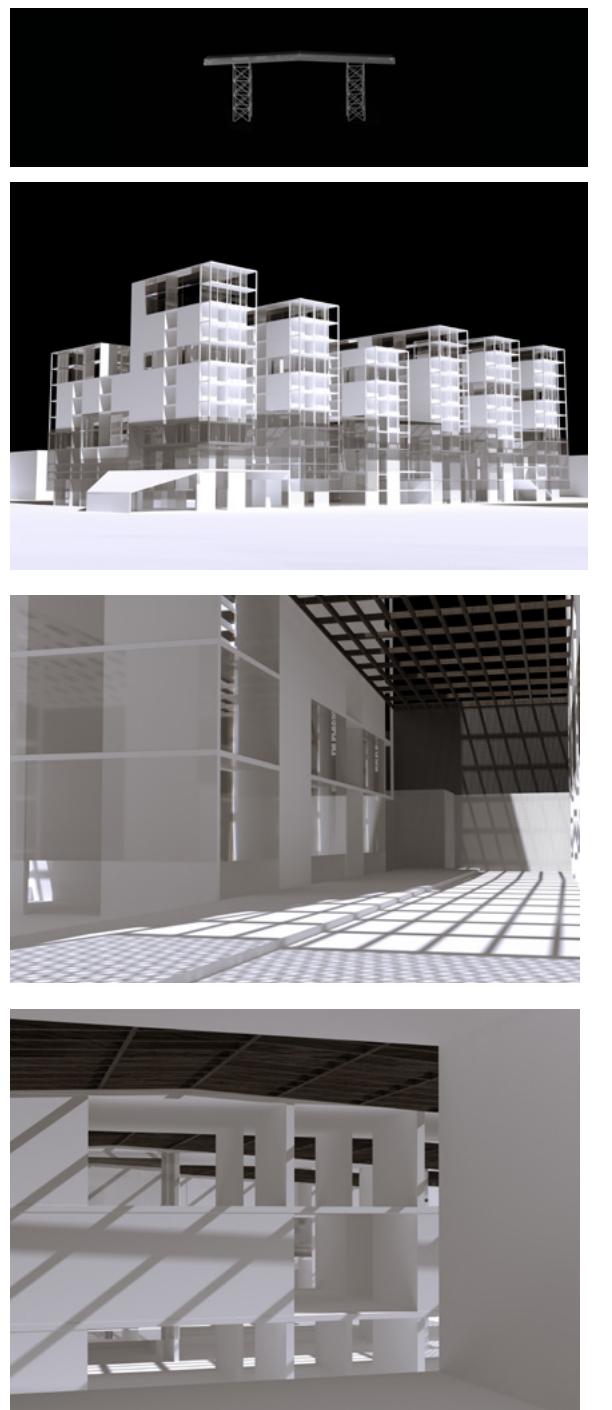


Assembled Living

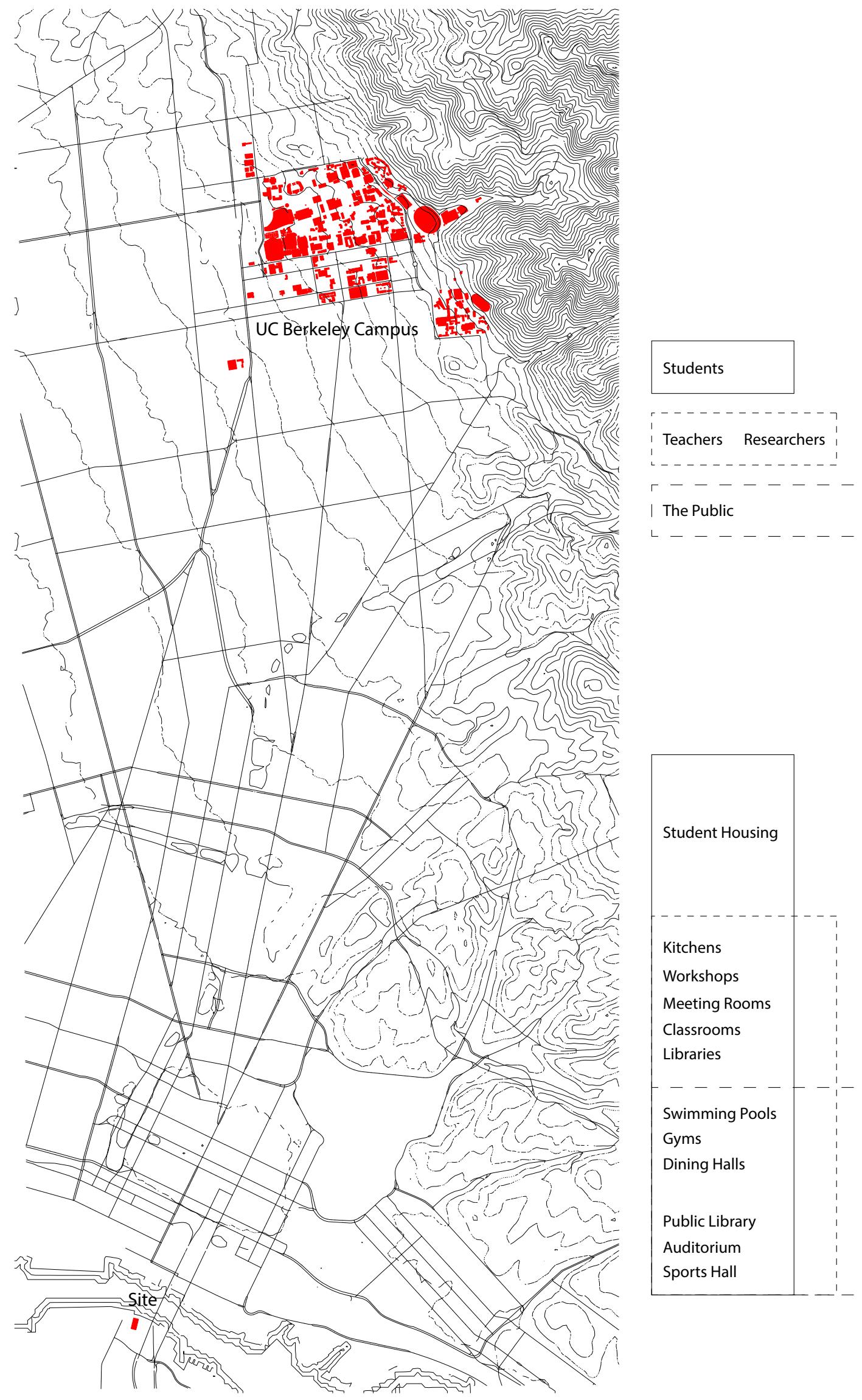
2022 / UC Berkeley / Instructor: Diego García Setién, Rodrigo Rubio Cuadrado

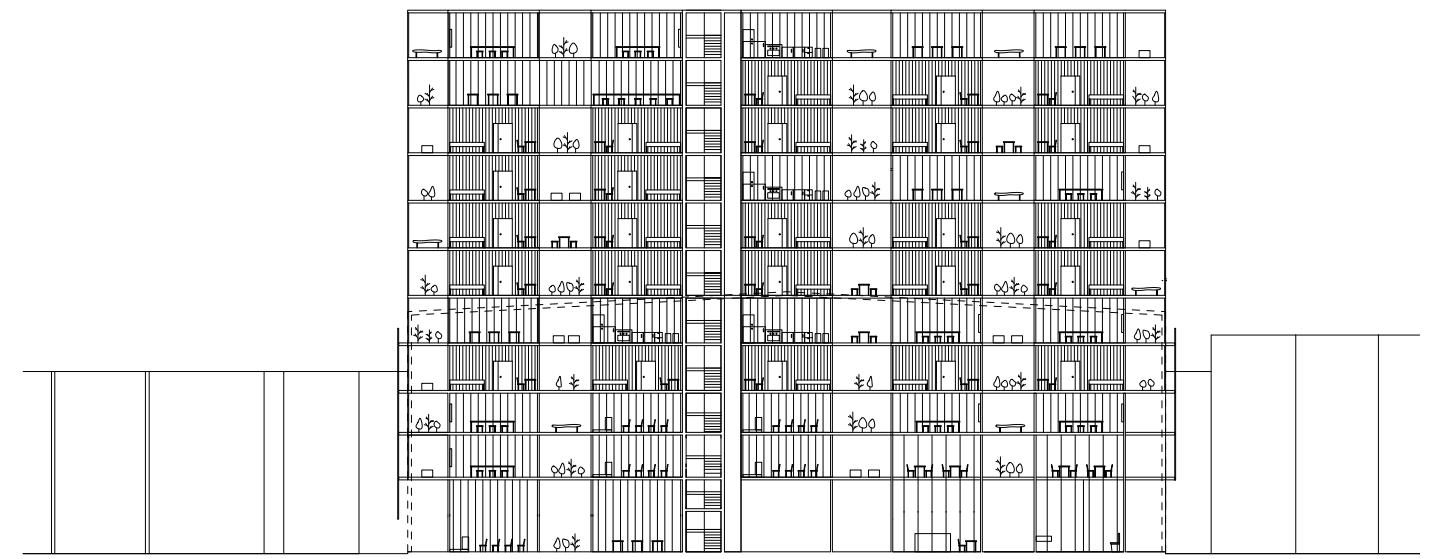
This is a vertical campus proposal for the renovation of an existing marina dry stack shed structure located in Alameda, CA. Programs on the ground floor are open to the public. Programs between the existing shed and the ground floor are semi-public and reserved for the campus community. Programs above the shed are private, which are the student housing units. The shifted patterns in both directions are for the sunlight and natural ventilation.

CLT panels connected with the existing shed truss serve as the main structural system. Concrete forms the solid foundation and the vierendeel truss was installed for the long-span area in this design.

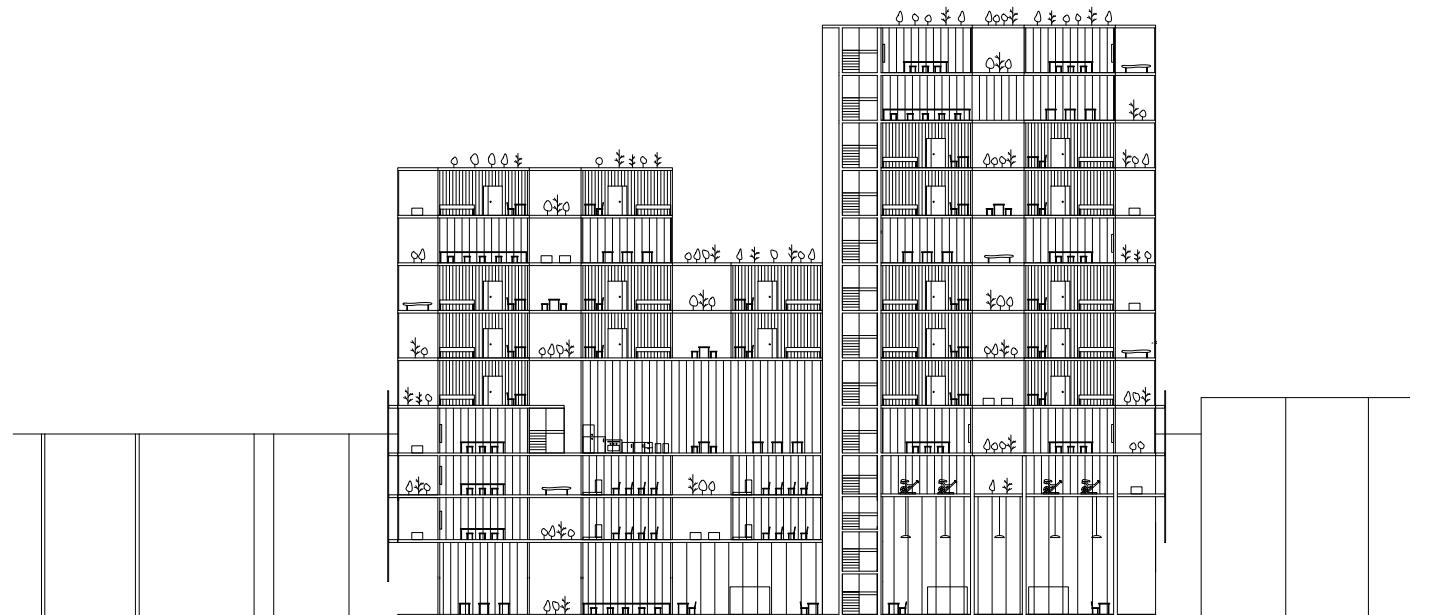


Perforated metal plates serve as enclosures for the lower levels, highlighting the existing shed and responding to urban context.





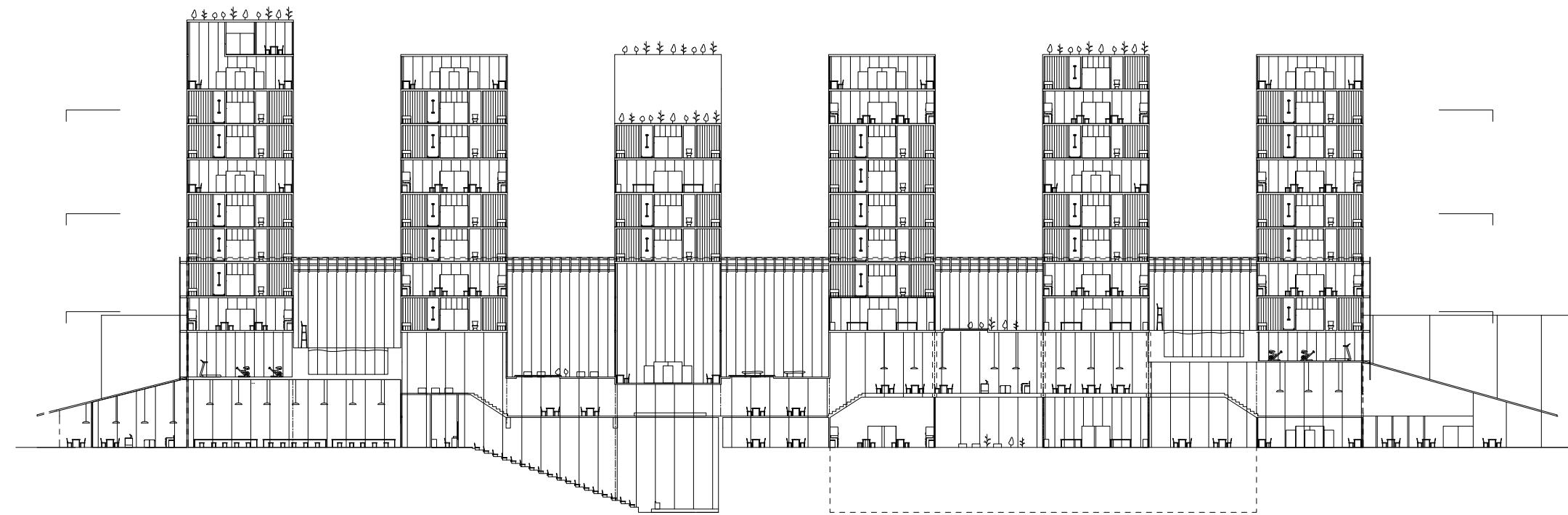
C-C' Section_1:200



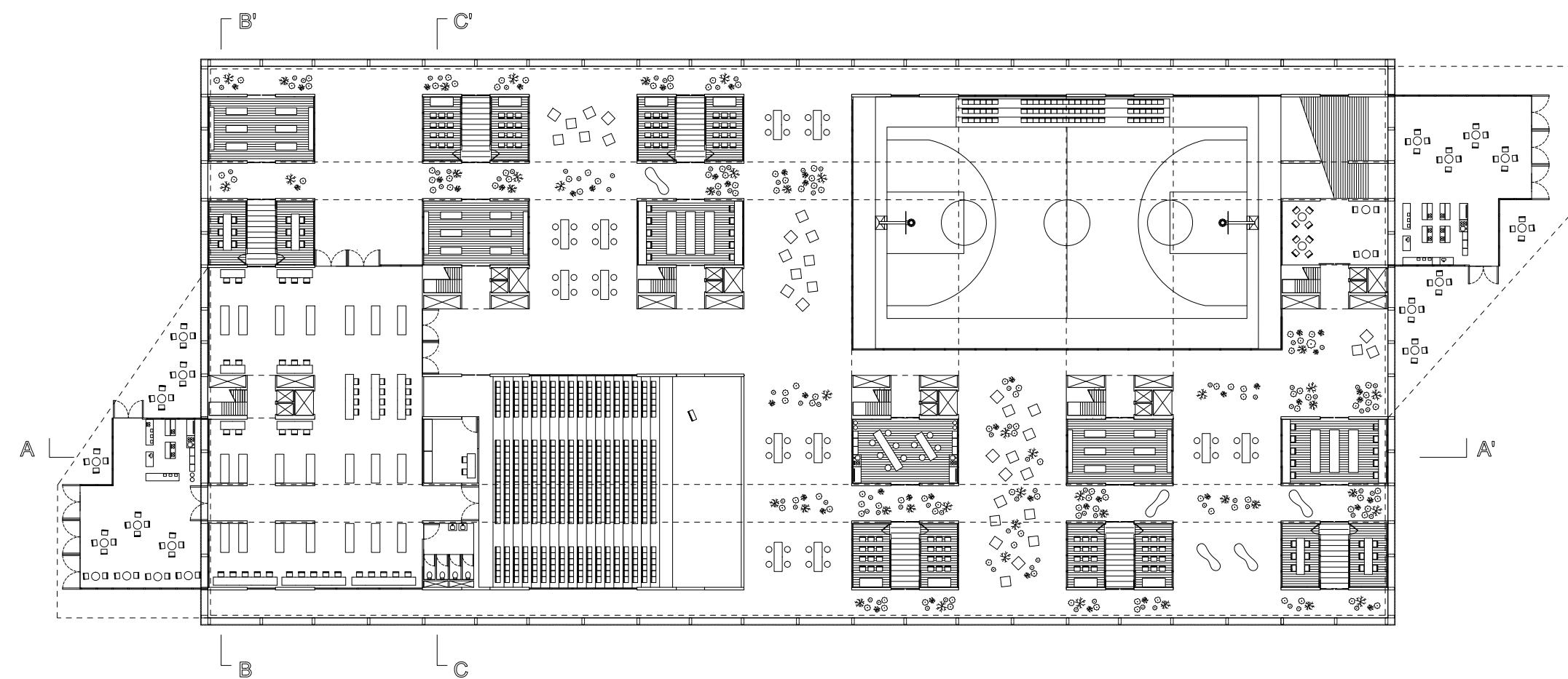
B-B' Section_1:200



Site Plan_1:500 ↑ N



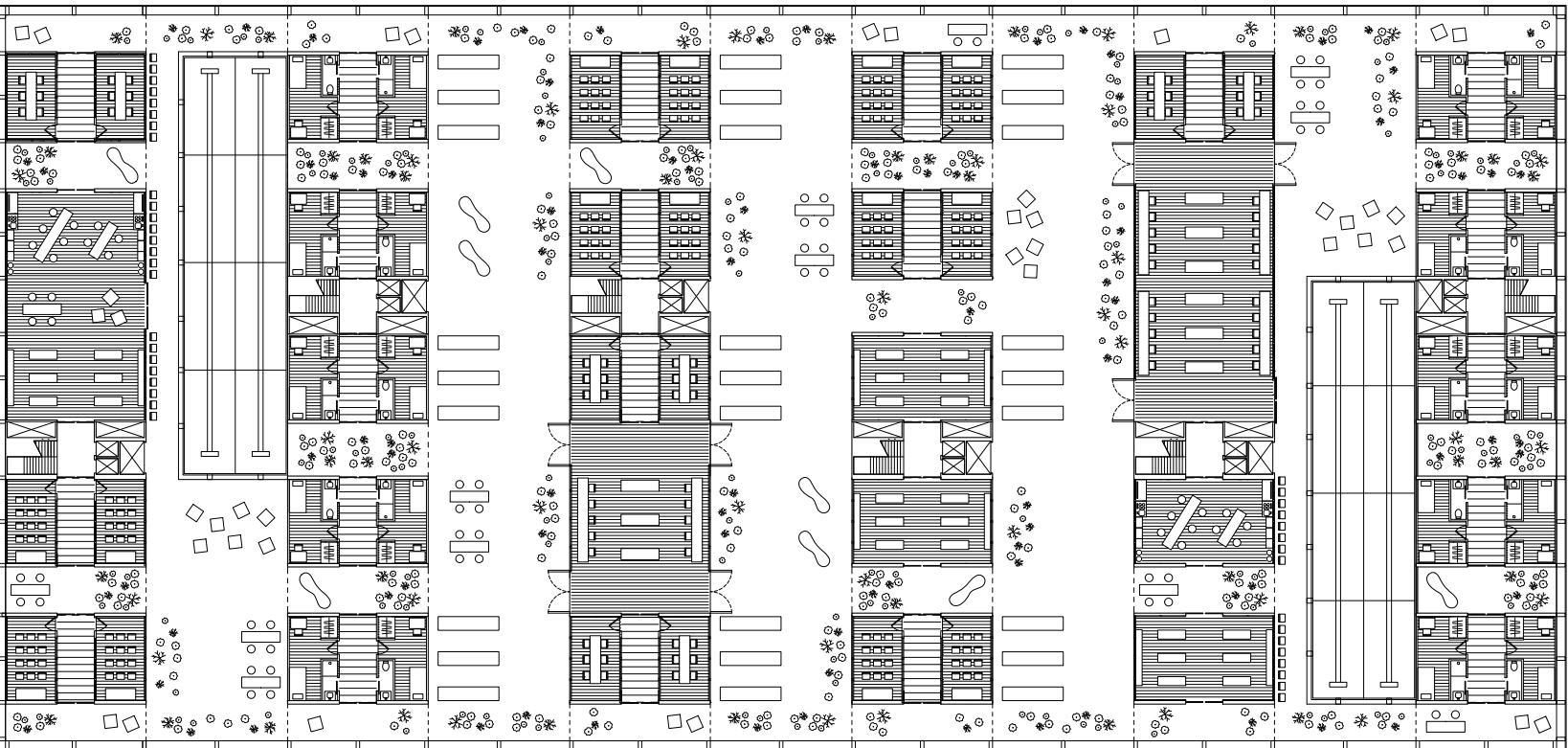
A-A' Section_1:200



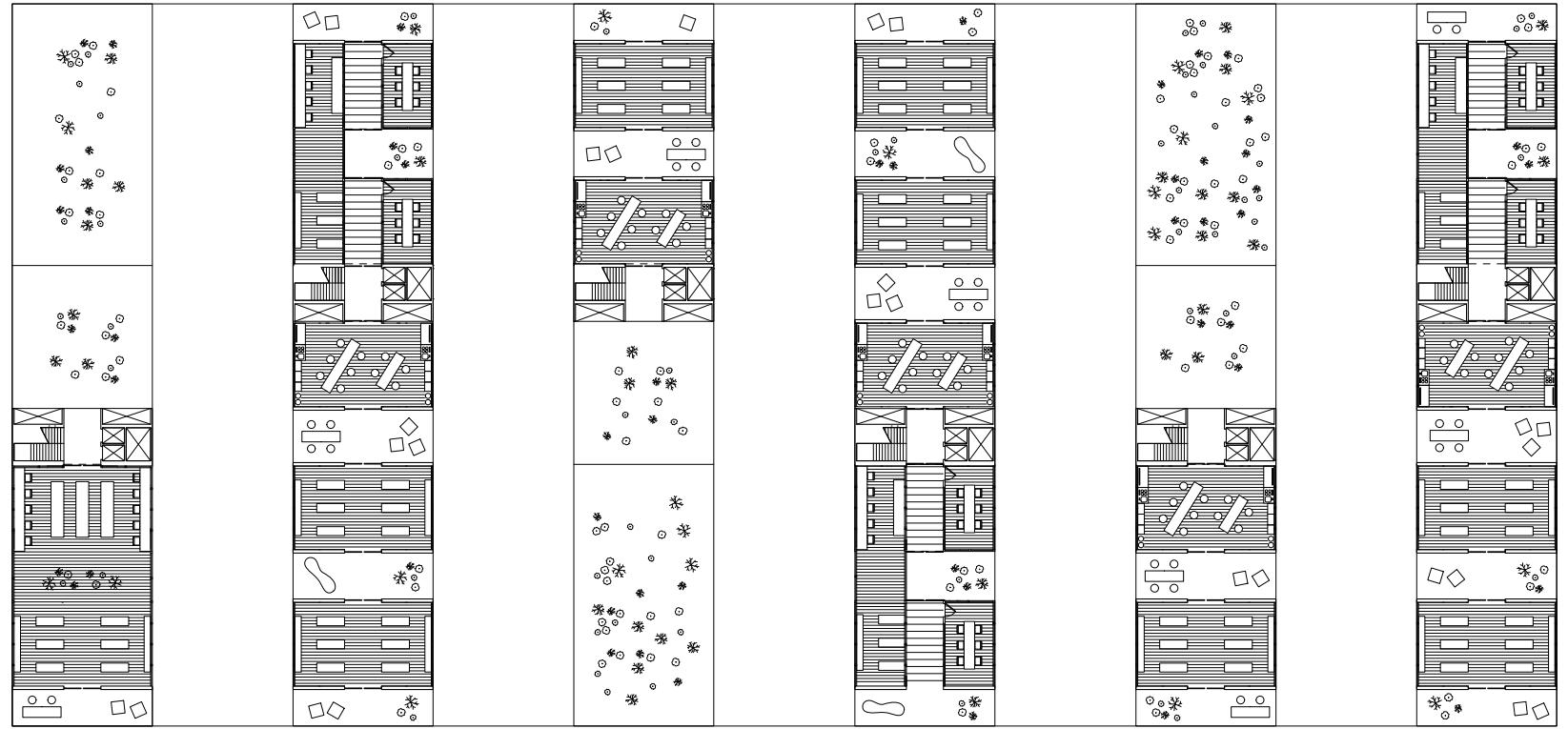
GL Plan_1:200



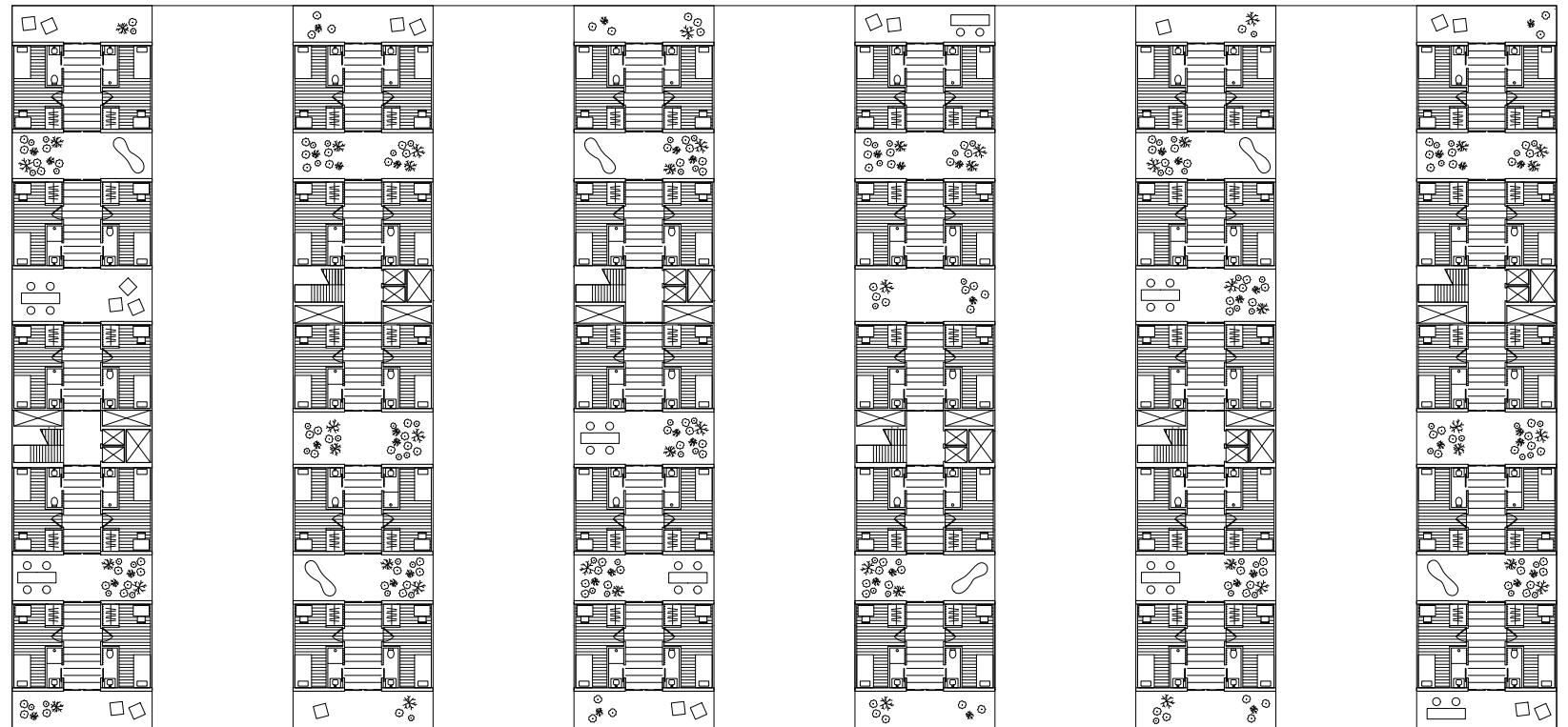
Typical Plan_1:200



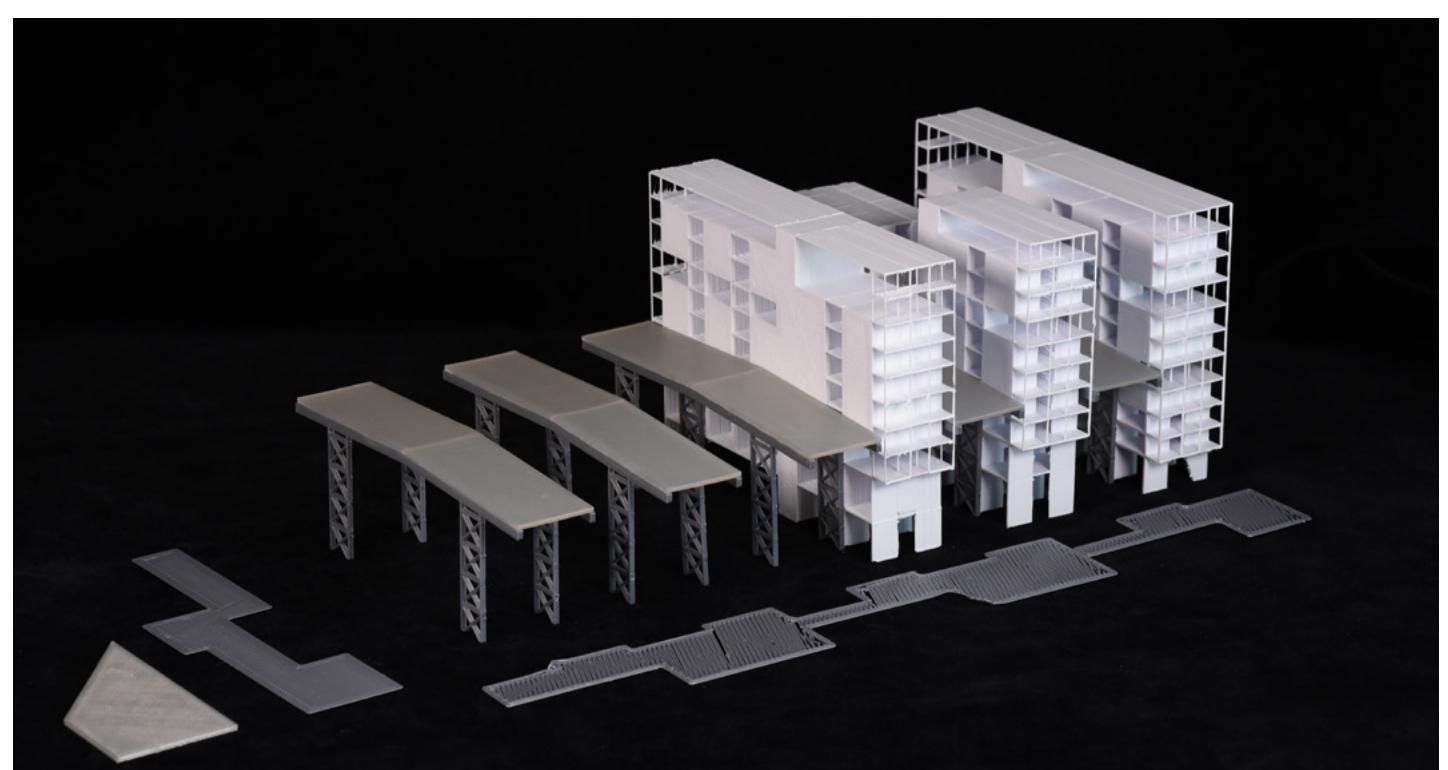
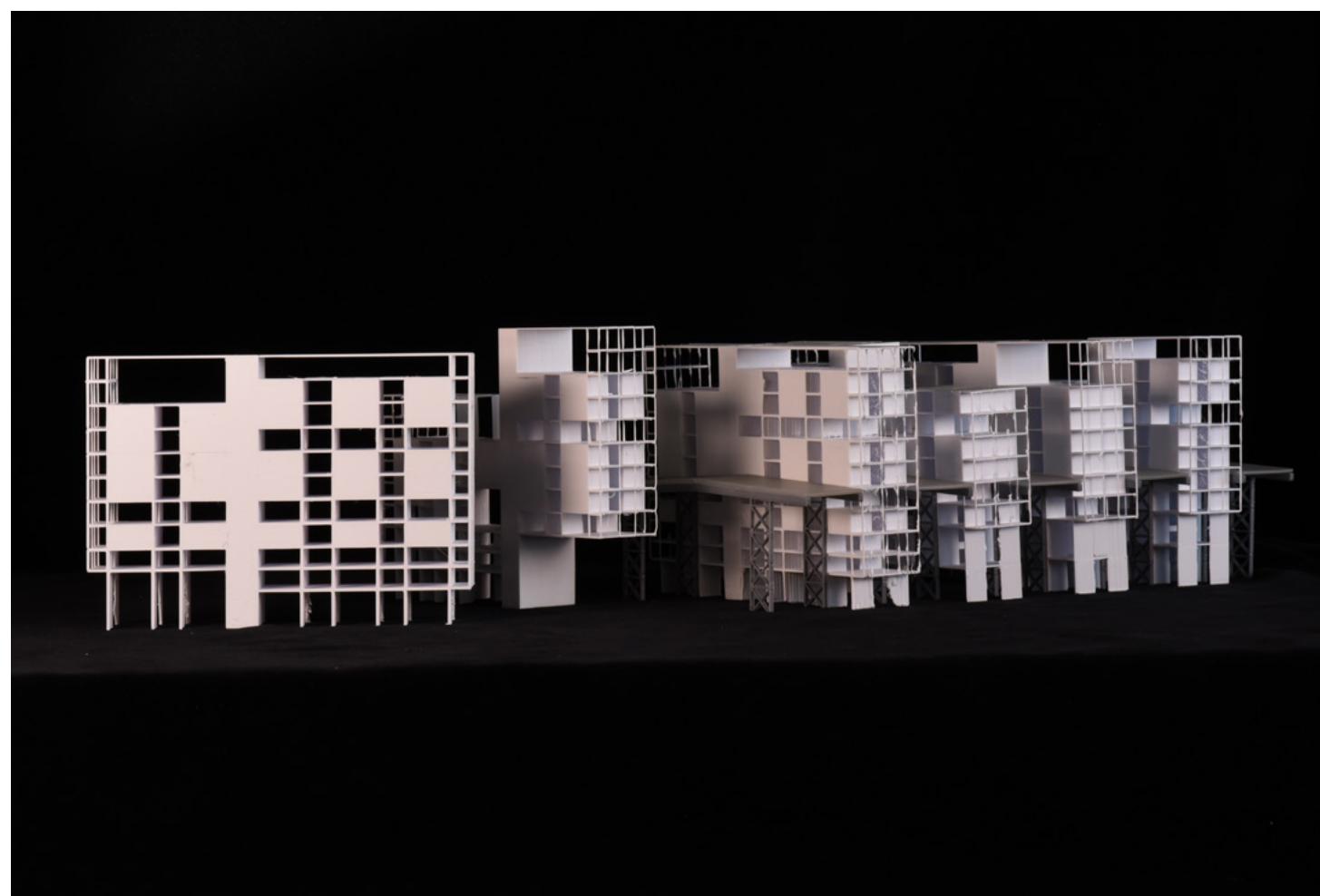
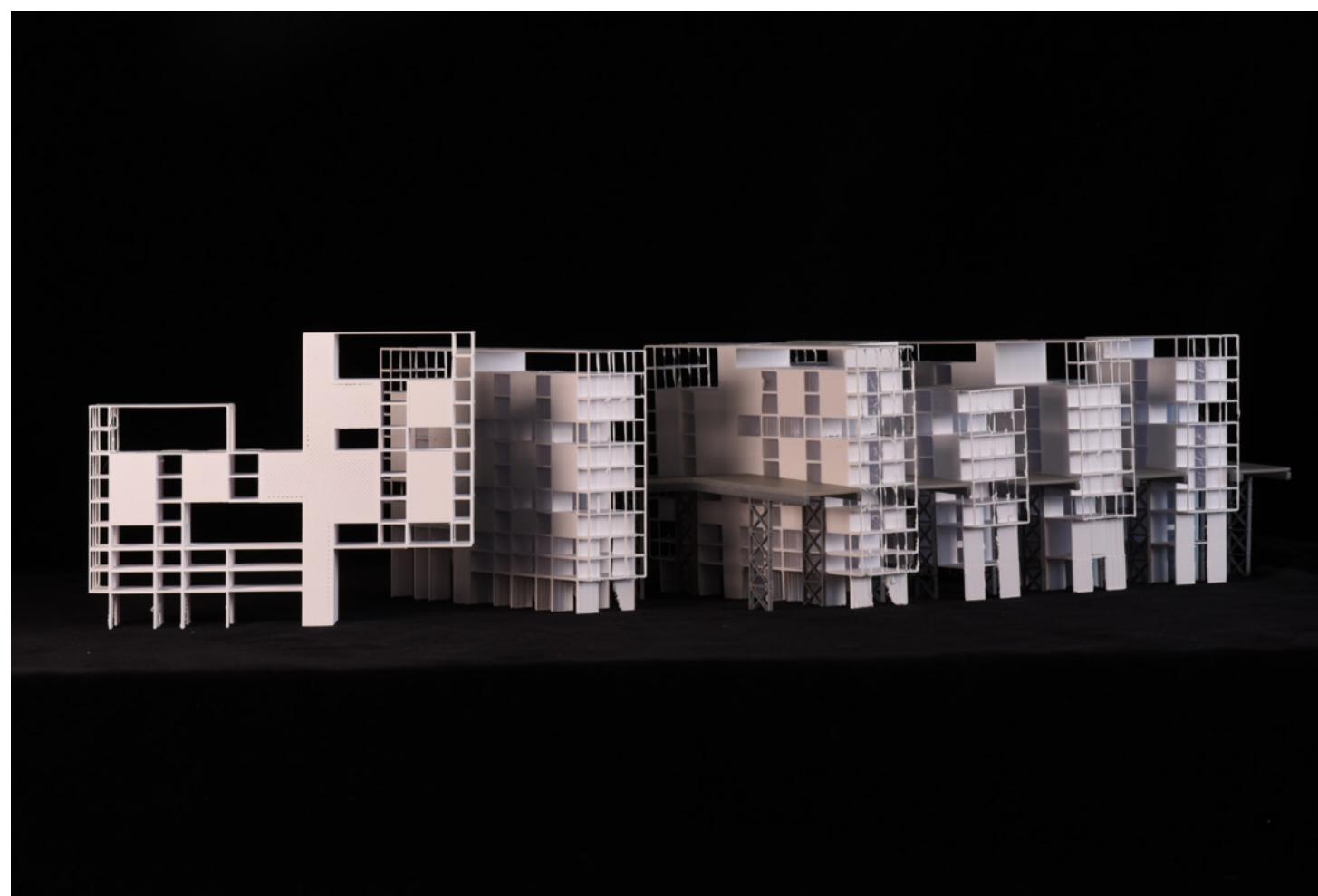
Community Plan_1:200



RF Plan_1:200



Typical Plan_1:200

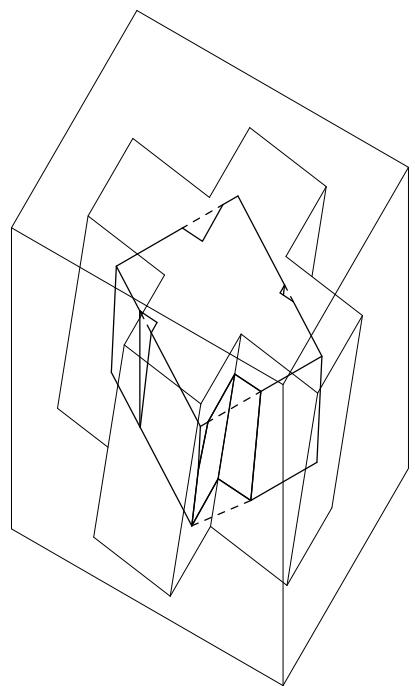
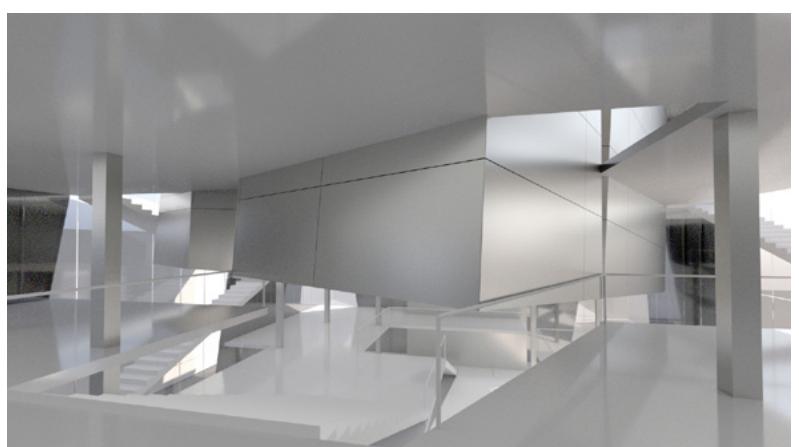


Boolean Auditorium

2022 / UC Berkeley / Instructor: Andrew Atwood

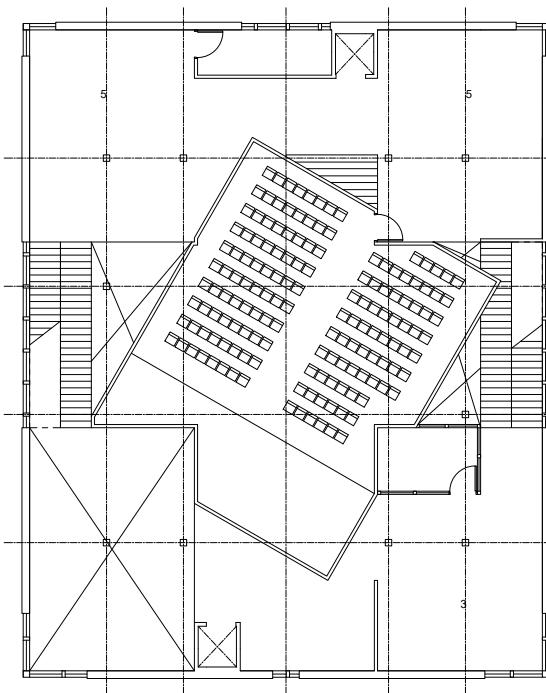
"Shape + Structure = Form"

This is an 8-story tall Regional Auditorium on a single lot in Oakland, CA. The space was developed by boolean operations of three nested forms that share no planar surfaces or coincident coordinate systems. Programs at the bottom levels are for the community. Programs and circulations at the middle levels were divided and defined by the boolean operations, including public (offices and visitors) and private (rehearsal, dressing rooms) programs. Programs and circulations merge again at the upper levels for commercial use.

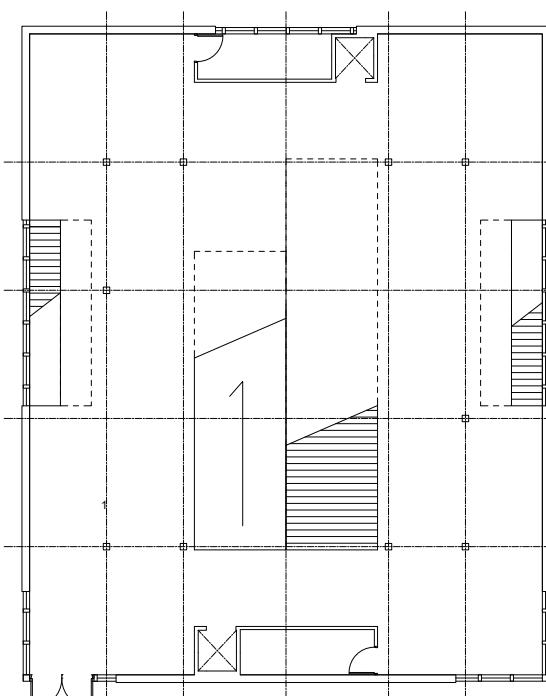


Form & Circulating Form:

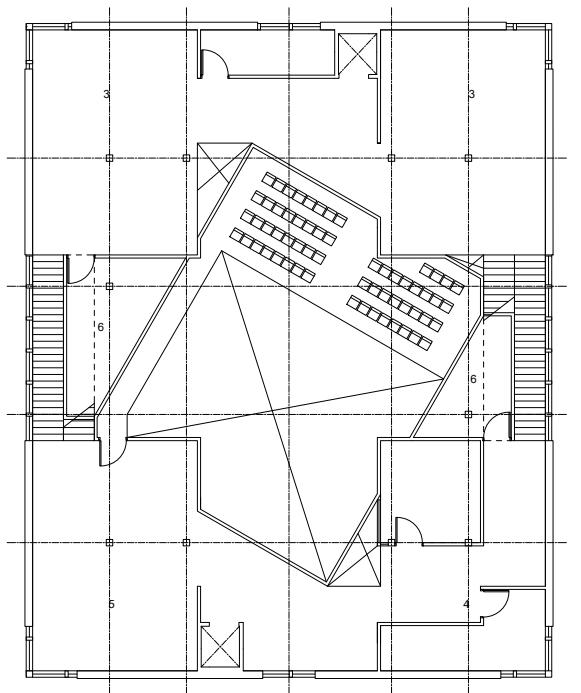
The largest shape is a Box of fixed dimensions that fills the buildable envelope. The other two shapes intersect to occupy the middle of the first volume. The inner shape forms the space of the auditorium. The difference between the middle and the inner shape defines circulation.



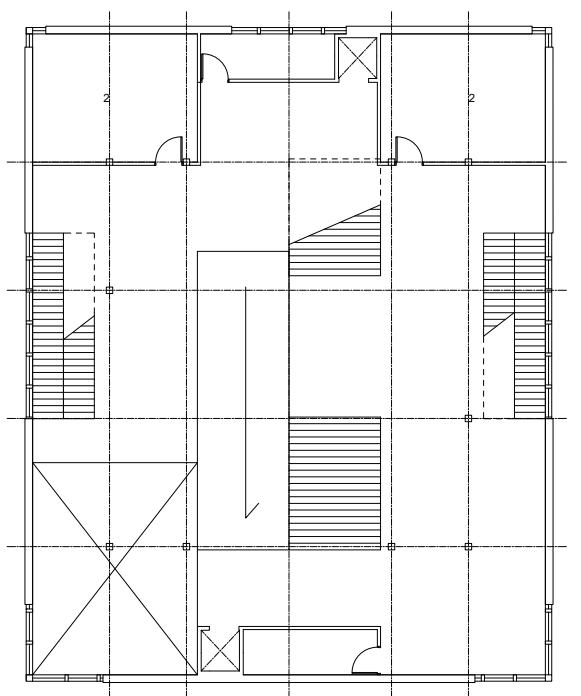
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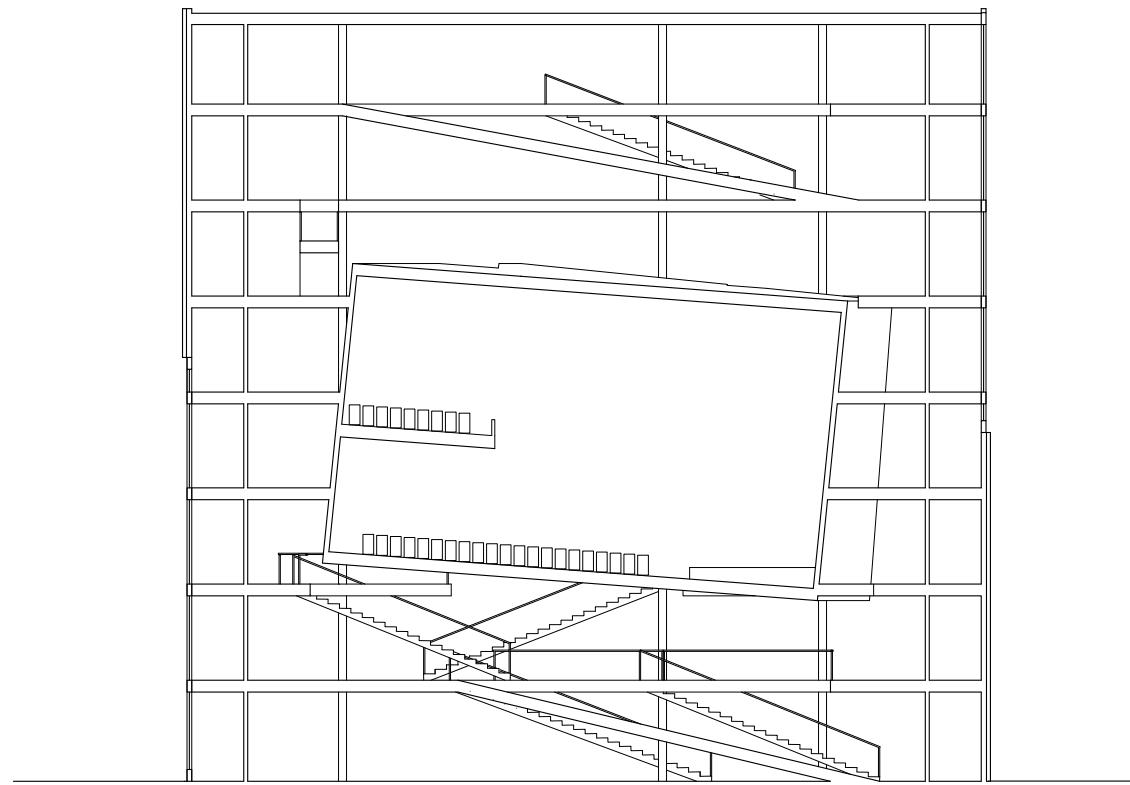
GF



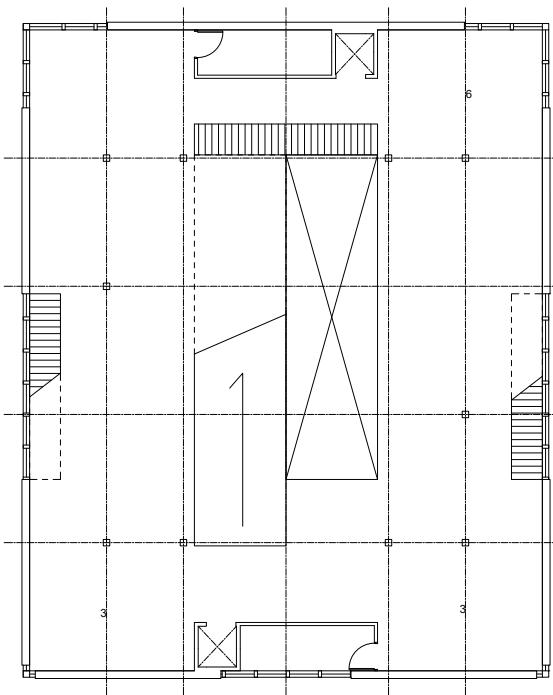
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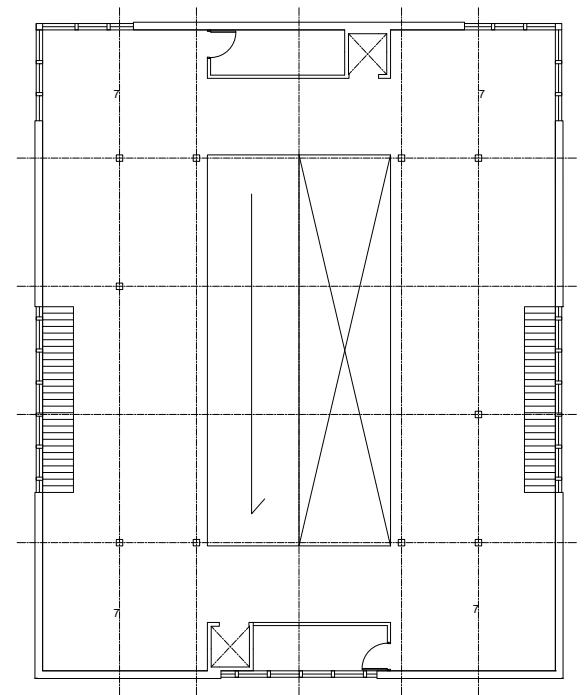
2F



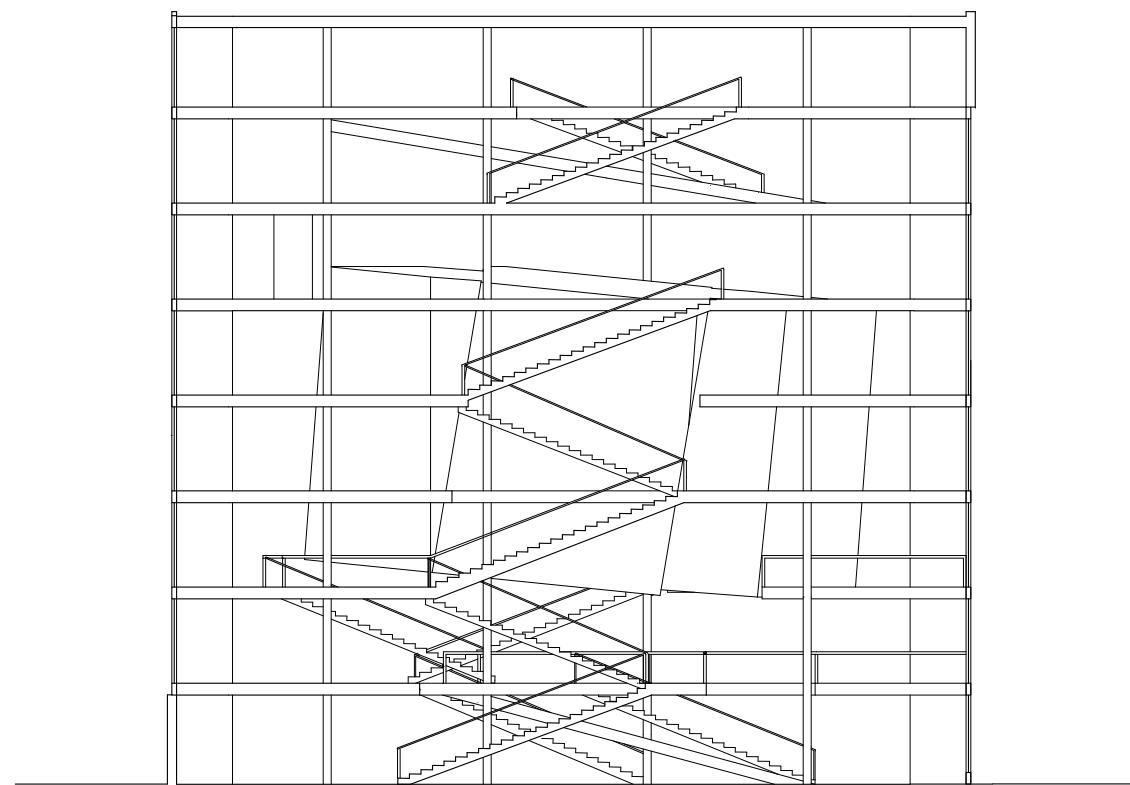
B - B' Section
1/8" = 1'



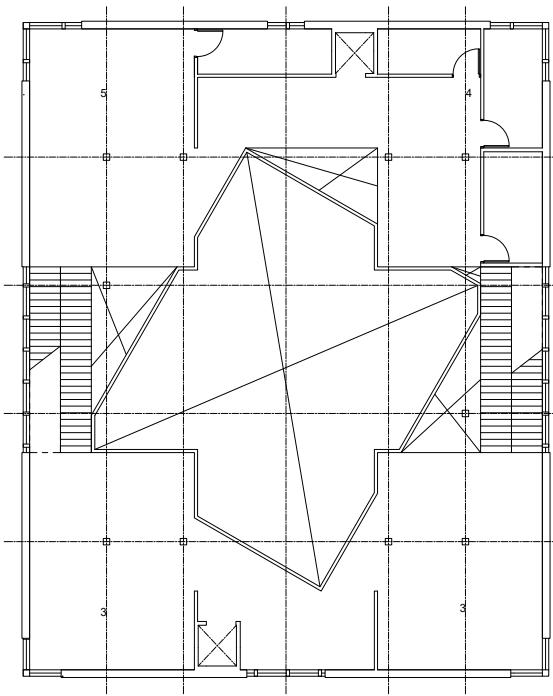
7F
3: Offices
6: Storage
3/32" = 1'



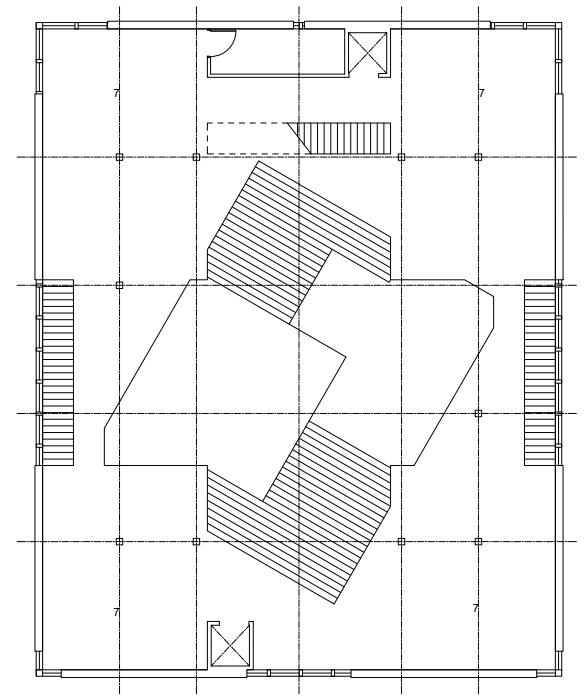
8F
7: Commercial Space
Restaurant
3/32" = 1'



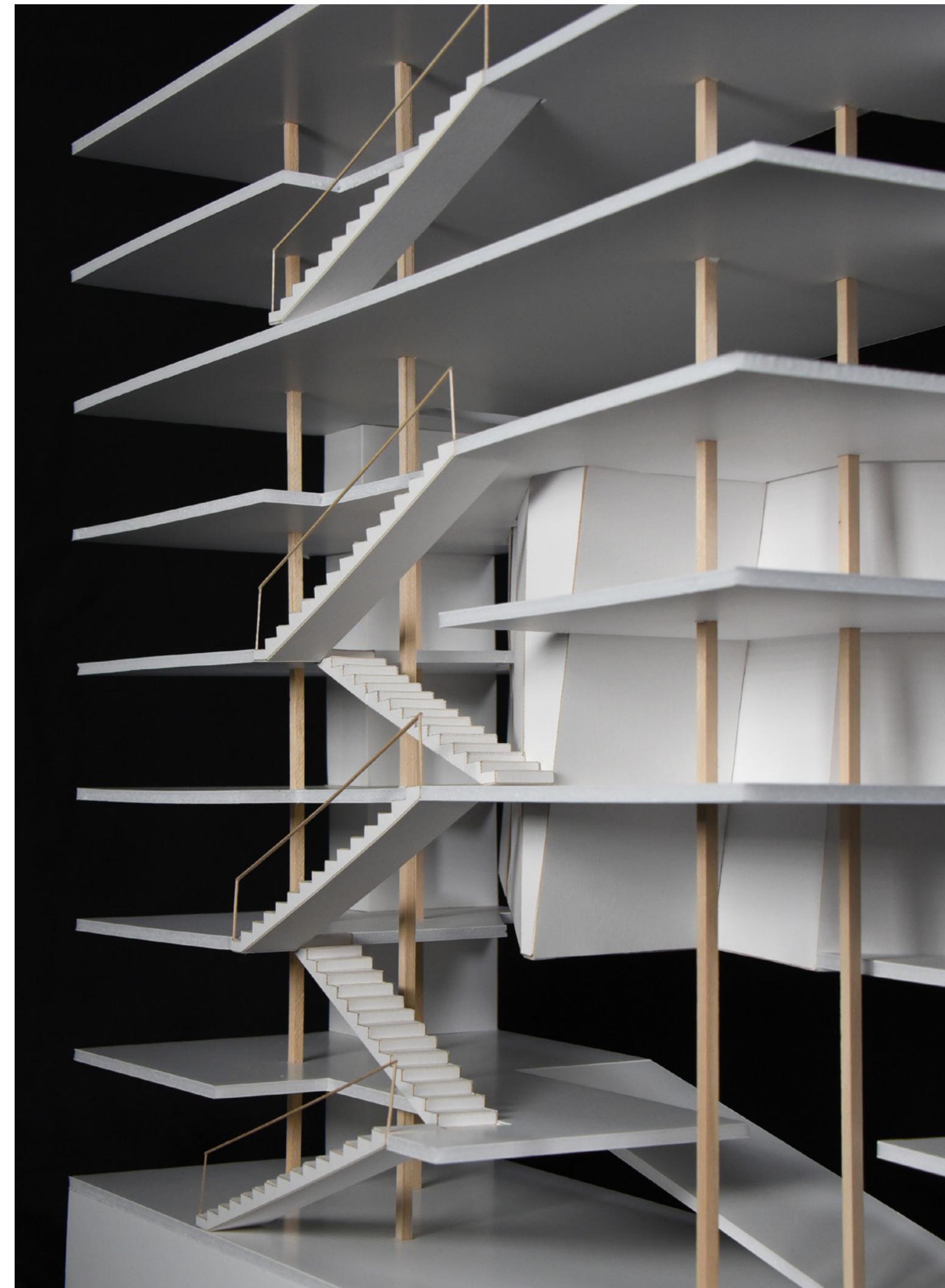
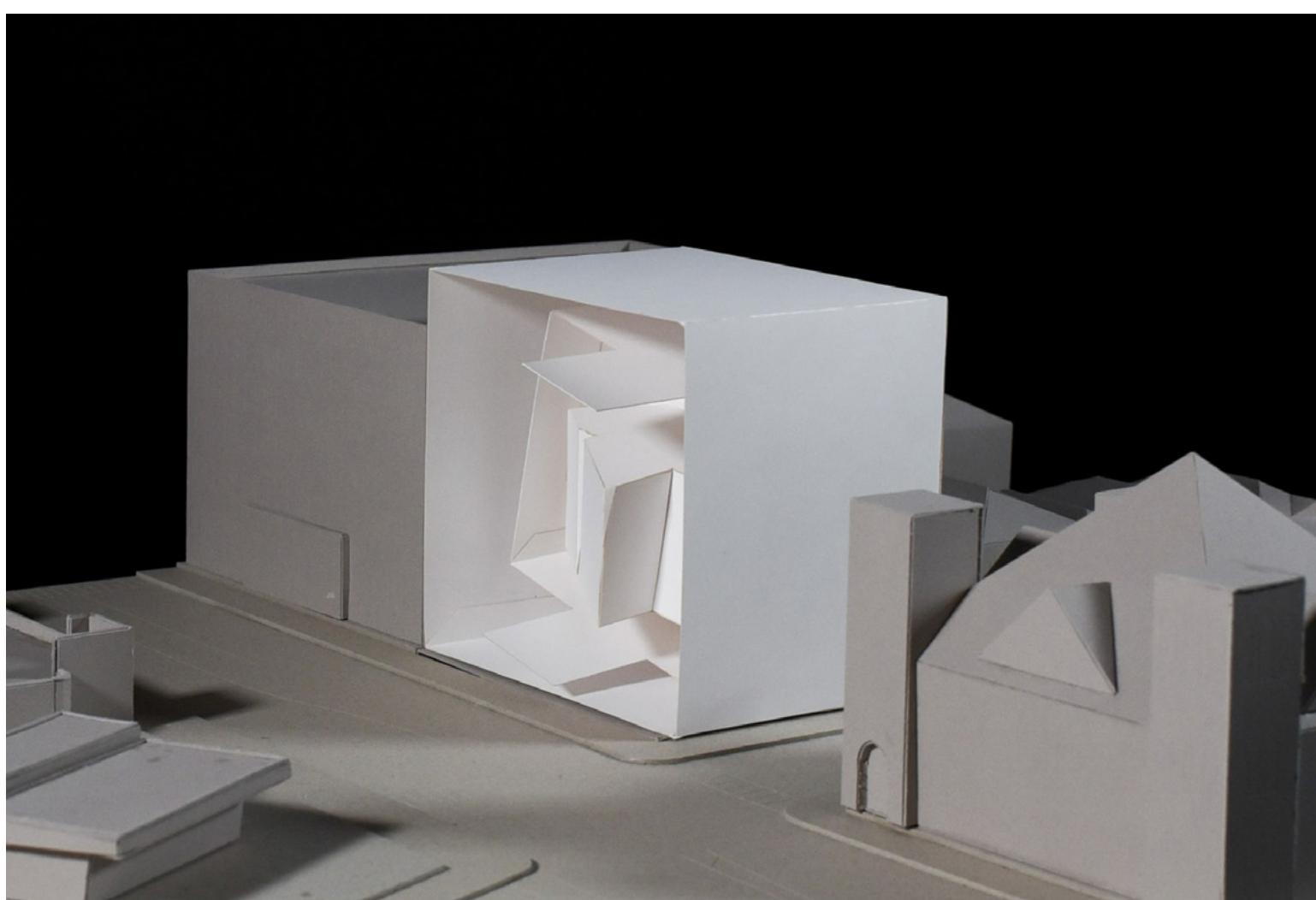
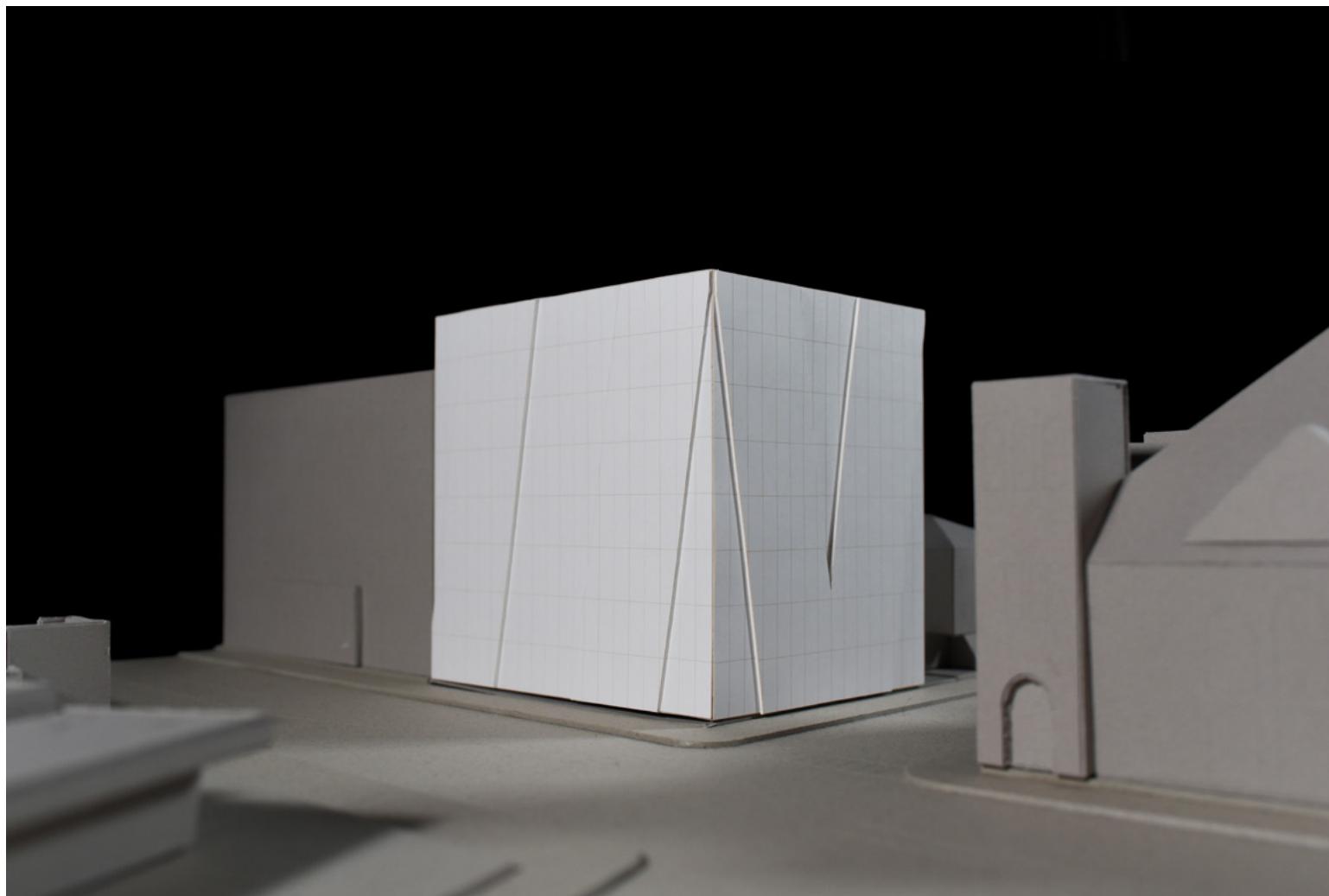
A - A' Section
1/8" = 1'

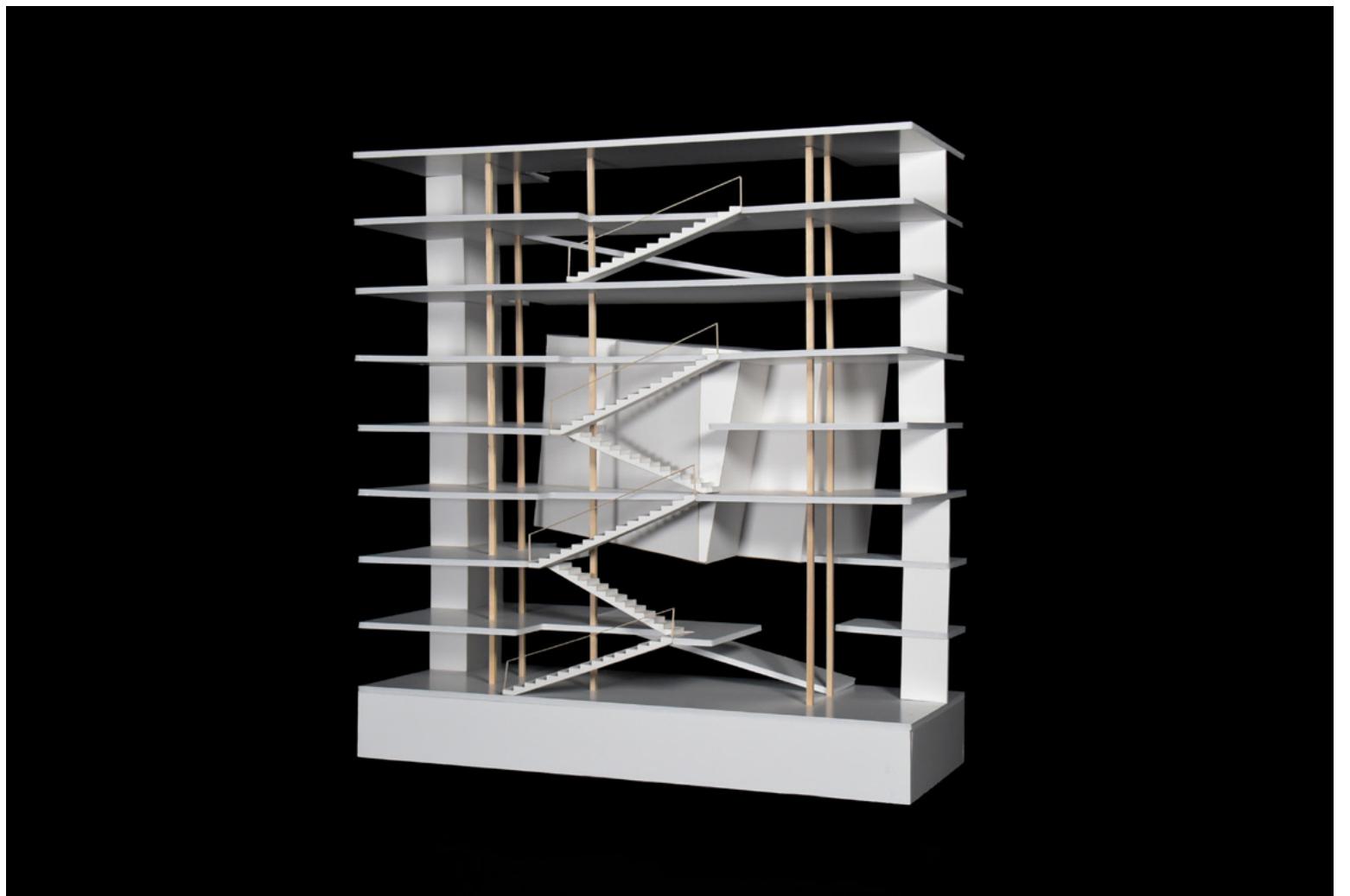


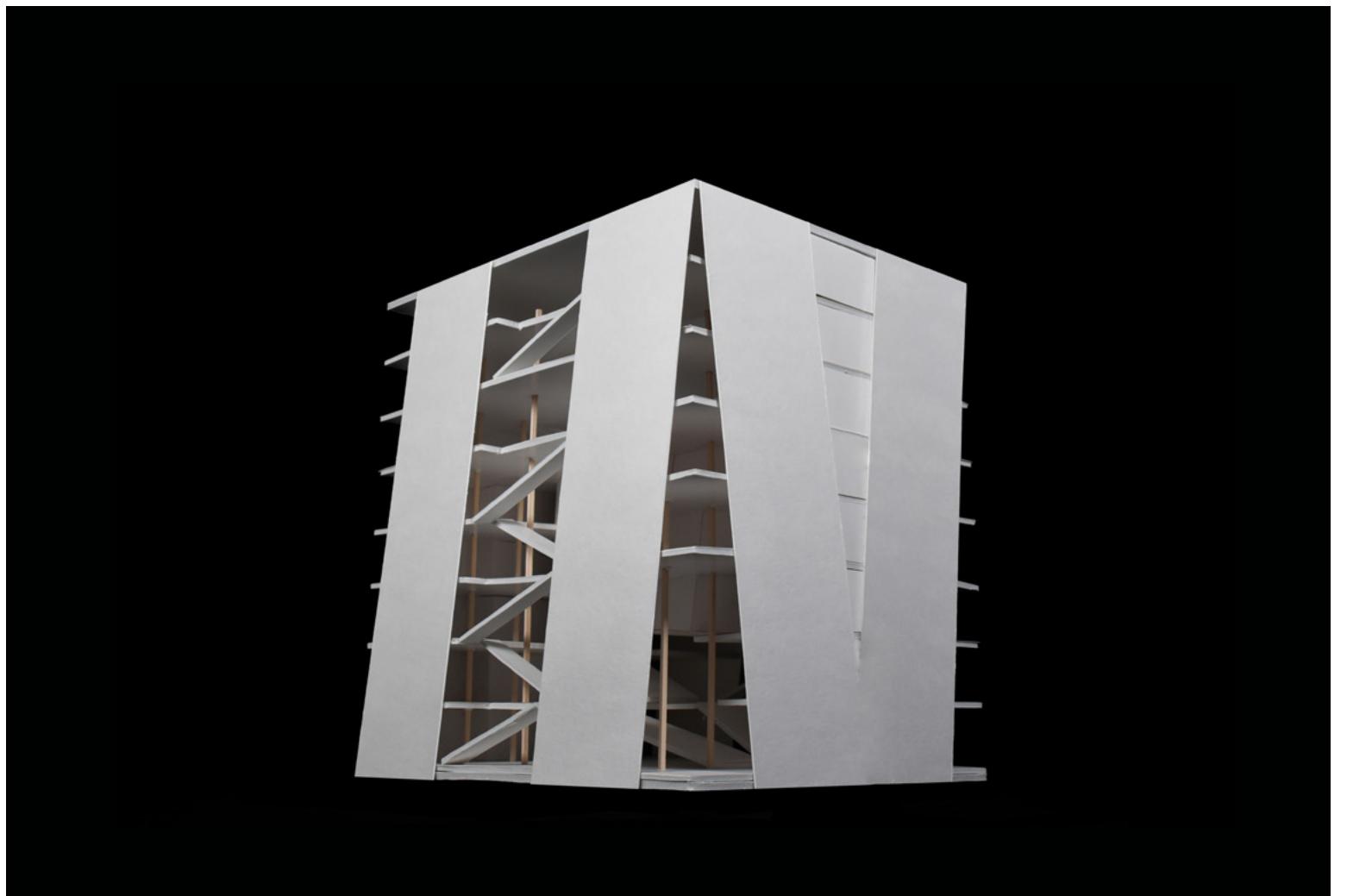
5F
3: Offices
4: Dressing Room
5: Rehearsal
3/32" = 1'



6F
7: Commercial Space
Restaurant
3/32" = 1'





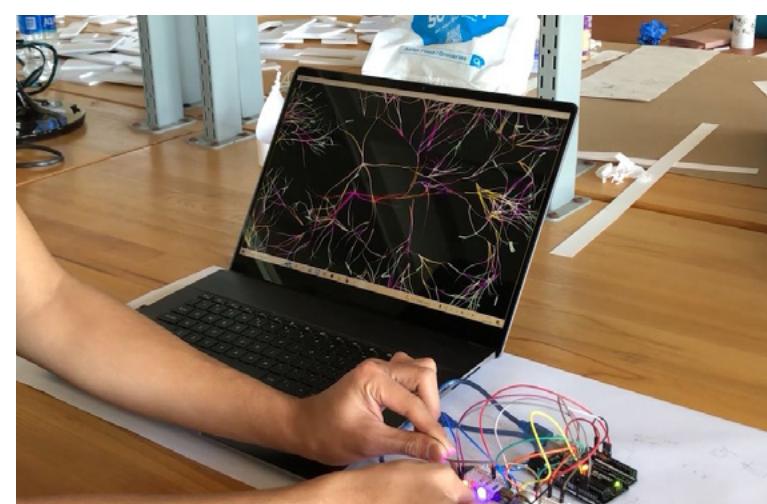
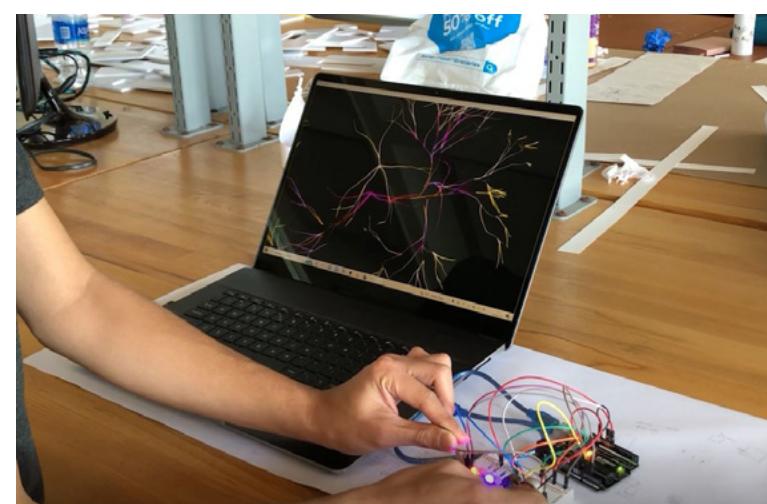
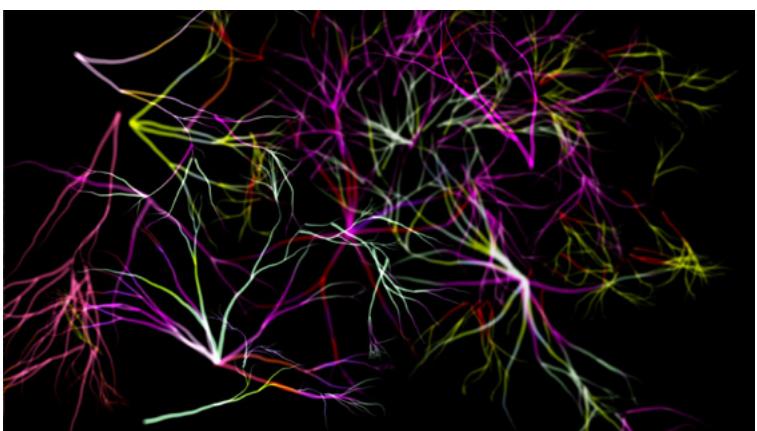
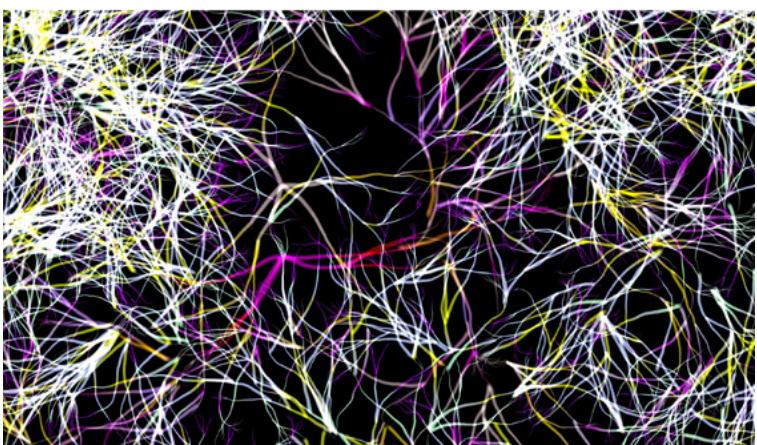
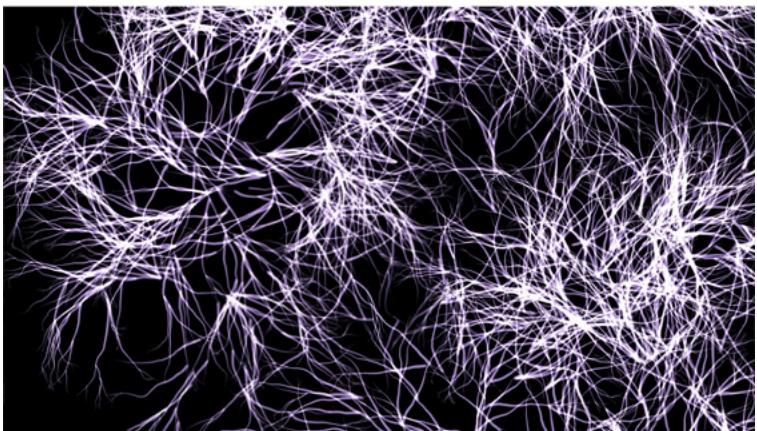
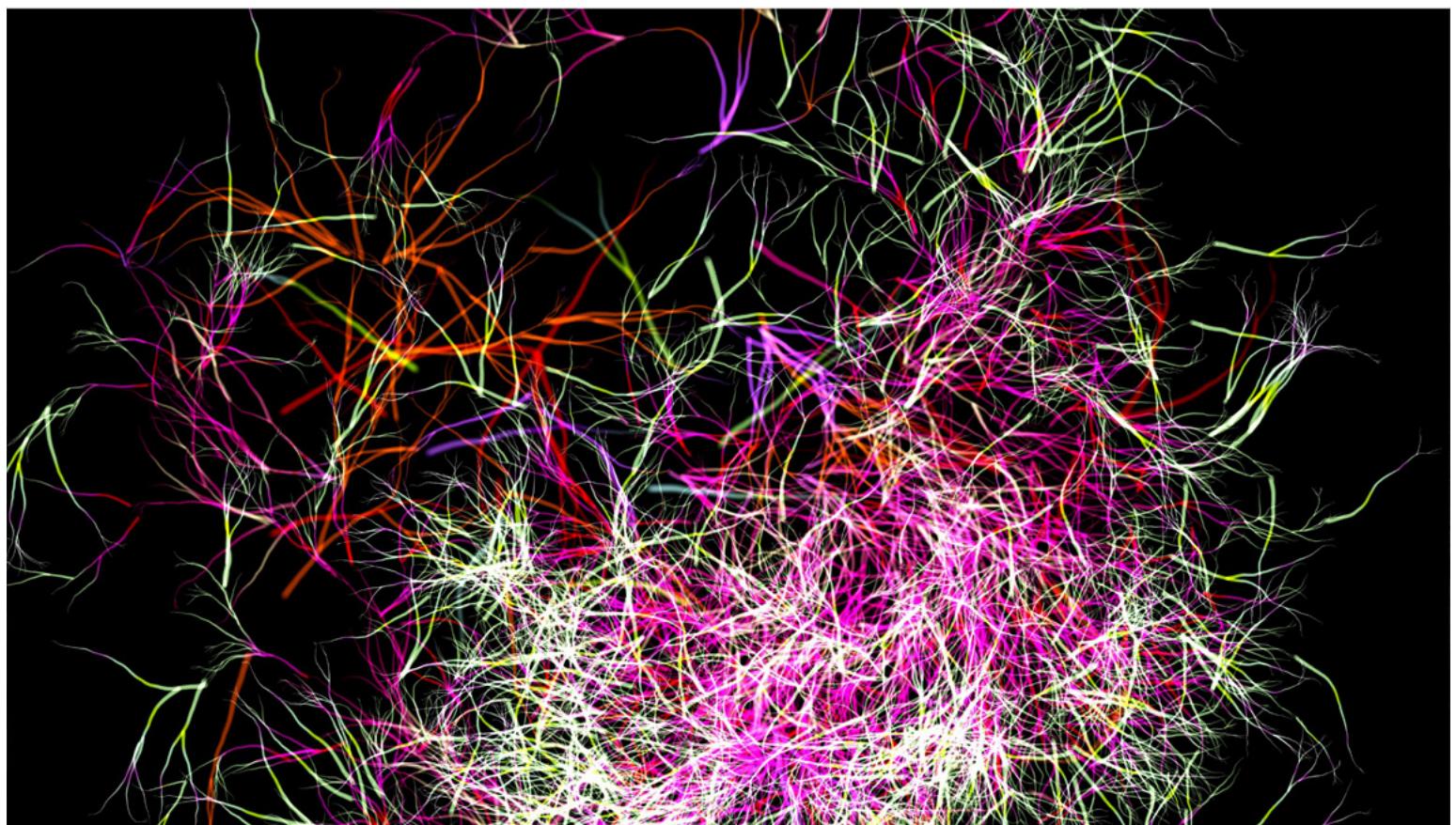


TangiGrowth

2022 / UC Berkeley / Instructor: Chris Myers

In this one-week project, users can create vibrant digital art by pressing and twisting (analog inputs). Users can generate new branches by mouse clicks on the canvas. When branches stop growing, users can also press the Force Sensitive Resistor to generate new branches from the end of the last branches. The colors of branches could be manipulated by two potentiometers that control G (green) and B (blue) in the RGB system. Actions could be done simultaneously in this work.

[Demo Video](#)

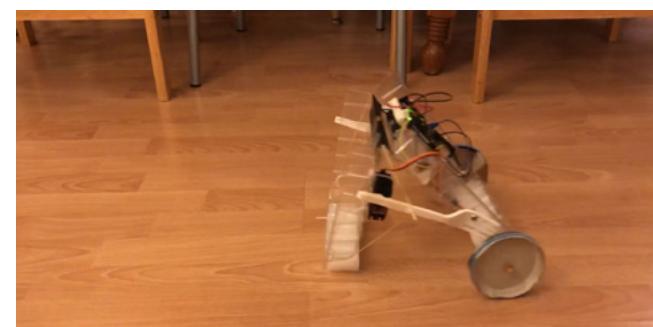
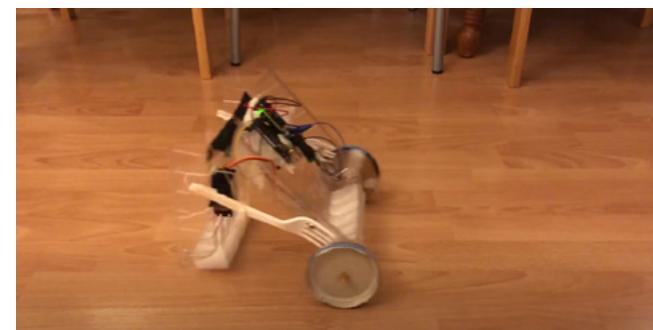
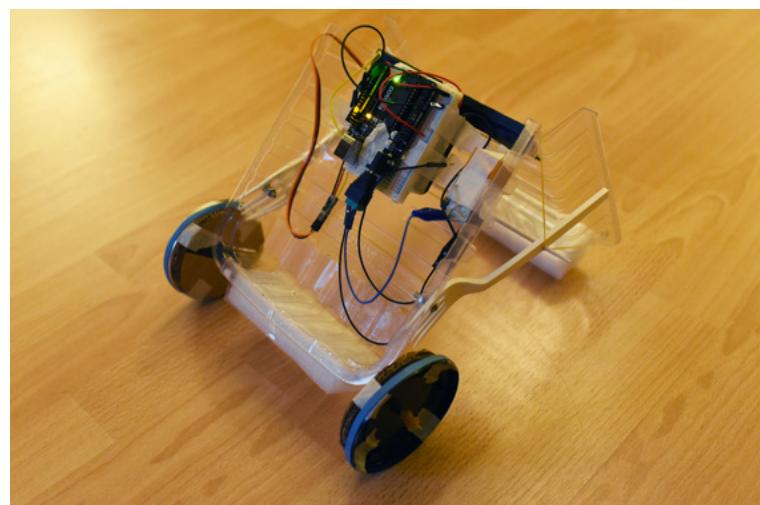
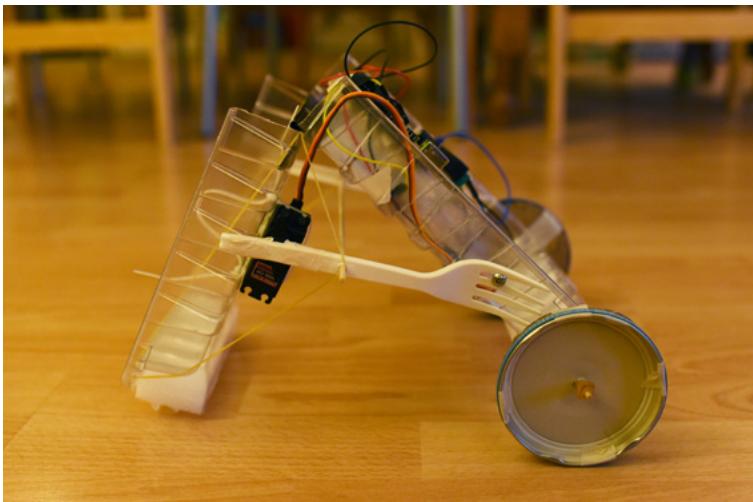
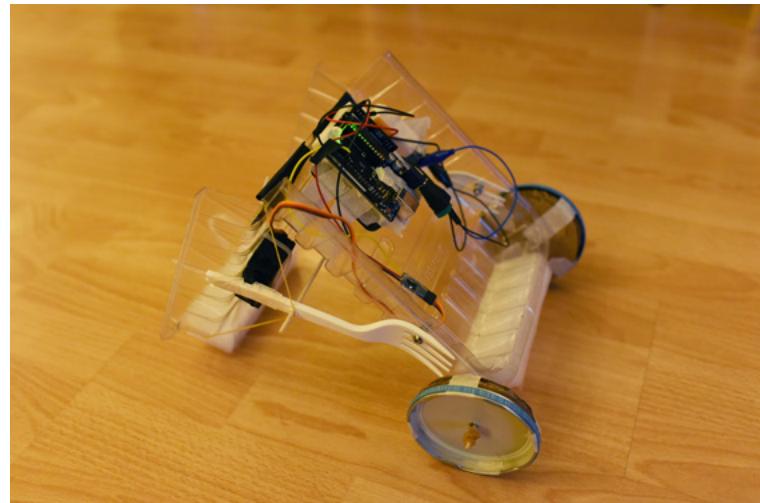


Recycled Crawler

2022 / UC Berkeley / Instructor: Chris Myers

In this one-week project, household recycled materials were assembled into a crawler and powered by a servo motor. Forks were used as components of the pin-slot constraints.

[Demo Video](#)

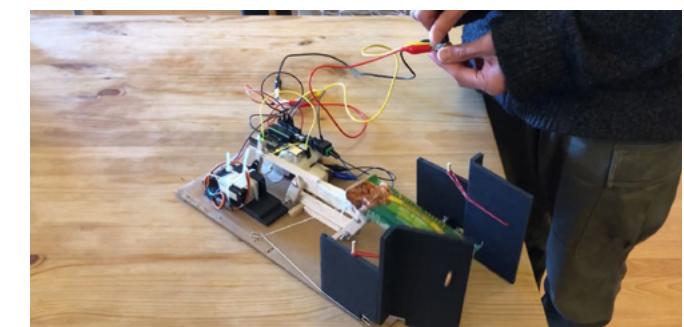
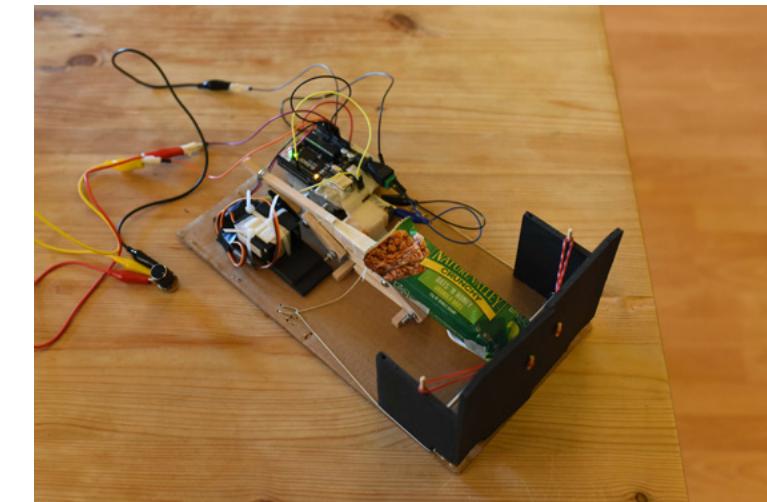


Granola Cuckoo Clock

2022 / UC Berkeley / Instructor: Chris Myers

In this one-week project, a simple cuckoo clock mechanism was designed with household recycled materials to serve users a granola bar.

[Demo Video](#)



MomentCube

2022 / UC Berkeley / Instructor: Chris Myers
Team: John Brechbill, Jeremy Chen, Tomas Garcia, Wonjoon Oh
Contribution: Designed and constructed the simulated micro-apartment,
Advised on the physical fabrication

"An Analogue Controller for Digital Space"

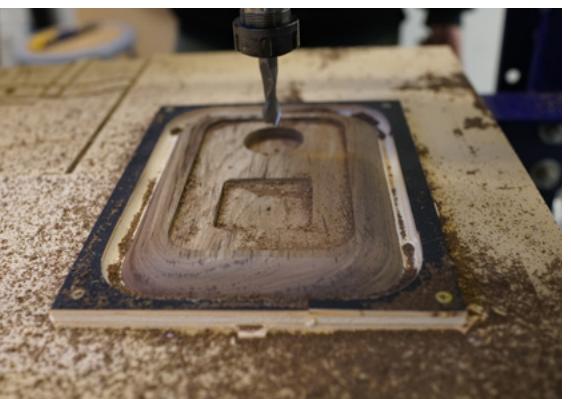
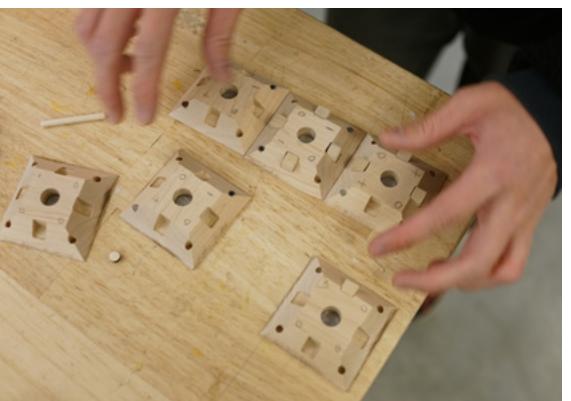
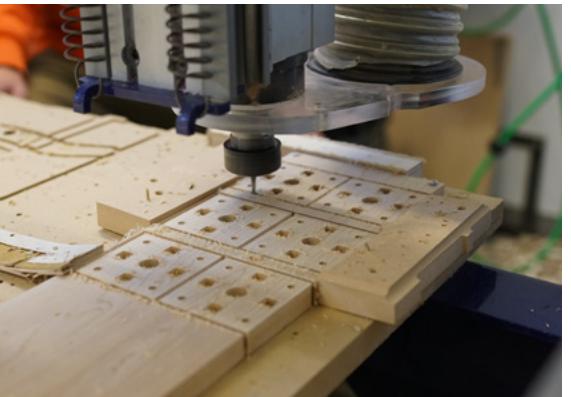
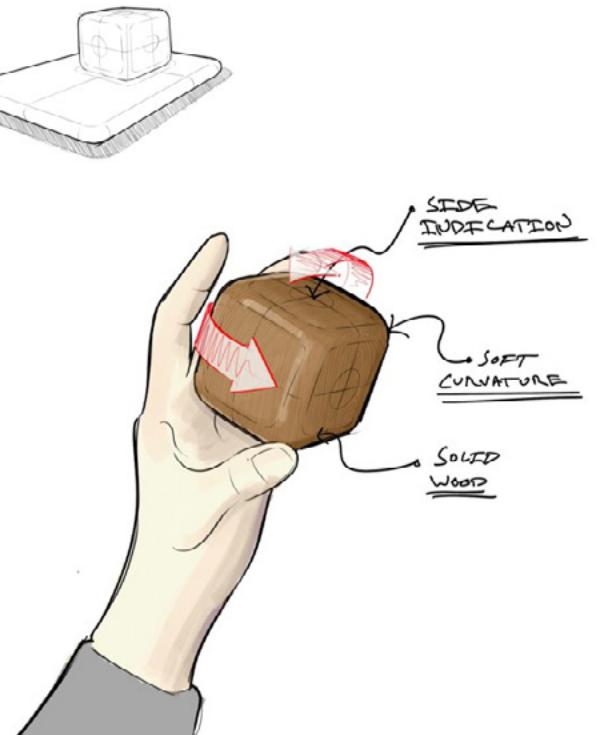
With MomentCube, we attempted to invent a solution to replace existing control devices for smart home systems, which are often overly complicated and aesthetically unpleasing. The initial concept for the MomentCube was rooted in the following three primary objectives:



- 1) The invention of a piece of technology that did not immediately reveal itself through traditional digital signifiers.
- 2) The design of a thoughtful analog mechanism that could control digital functionality.
- 3) The creation of a product that would forefront and celebrate tactility and touch.

The tray detects which side the cube is lying on using hall sensors and magnets. Users can change the room's mood to their preset 'Moment' by turning the cube to the respective side, and adjust the intensity of the mood by rotating the knob.

[Full Paper](#)
[Demo Video](#)



By creating a model micro-apartment, wired with multicolored LEDs, servo-controlled furniture and curtains, and ambient music, we were able to convey the connection between the hardware controller and the surrounding environment without the need for fullscale replication.

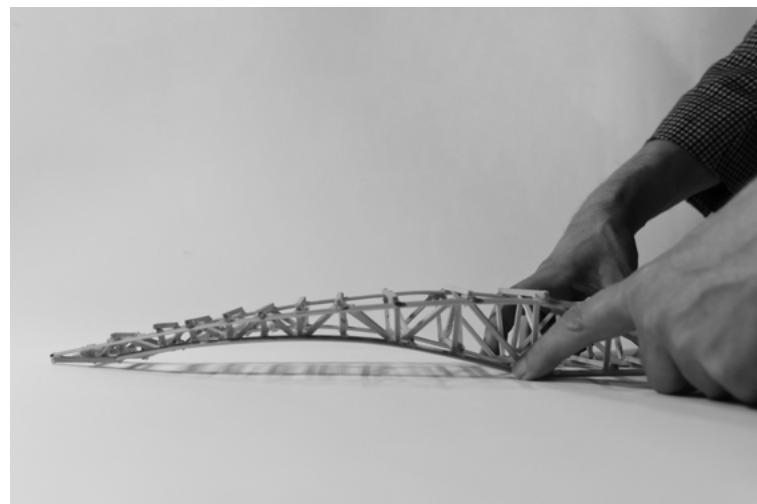
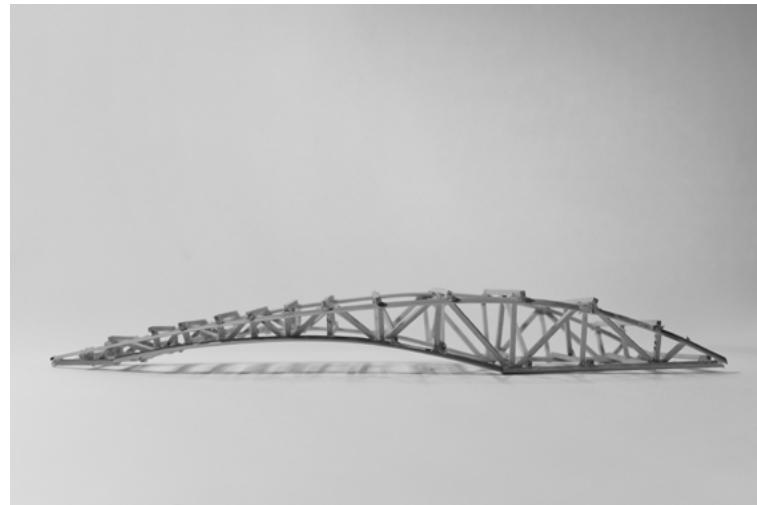


Bridges

2017 / Civil Engineering Keystone (Team of 13 people)
NTU Civil Engineering + USC Architecture joint workshop
Instructors: Hervé Capart, Li-Huang Lu

Role: group leader, collaborate on design and fabrication, collaborate on physical modeling, construction layout, structural design, 3D modeling, photography, presentation

The goal of this workshop is to design a bridge for a new landscape on campus under construction.



Two arches restrain mutually.



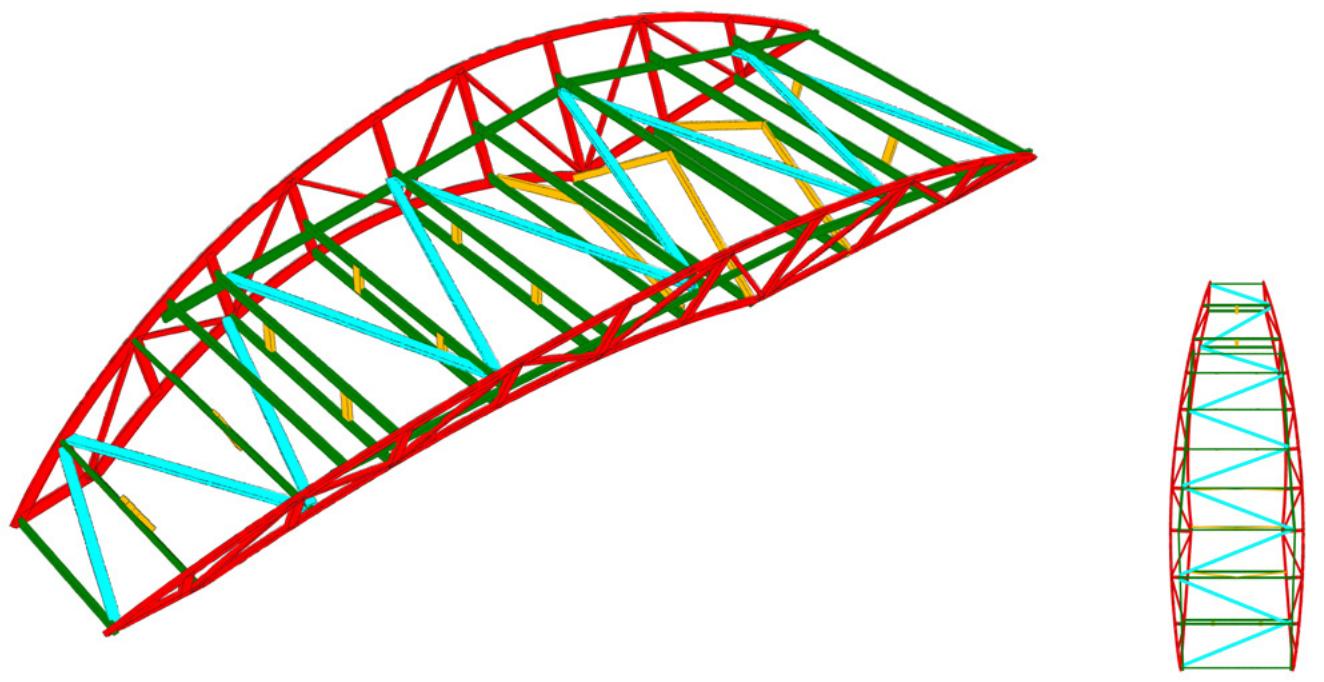
Free End (Roller)



Pinned End

Usually, people go to the bridge because they want to go over it.

This project aims to make "go on the bridge" as a purpose. It is a place in the center of the campus for gathering, for people to stay.



The bridge was designed as a rigid body due to the limitation of constructing the foundation on-site and transportation.



On-site construction and the final review.

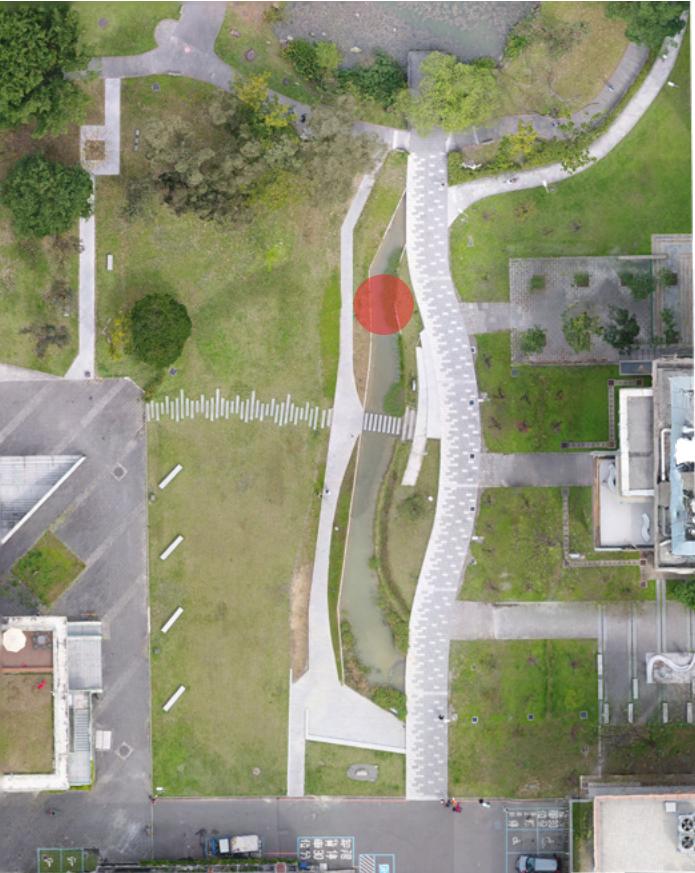
Our final work was chosen among 6 bridges built in the workshop. (2017)

Bridges

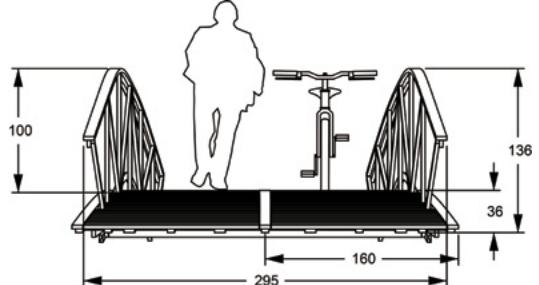
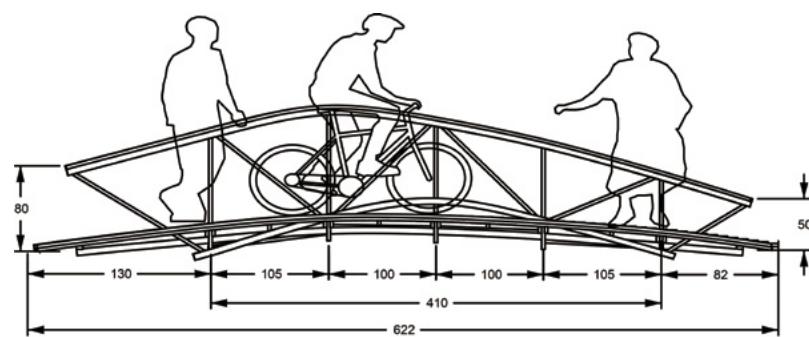
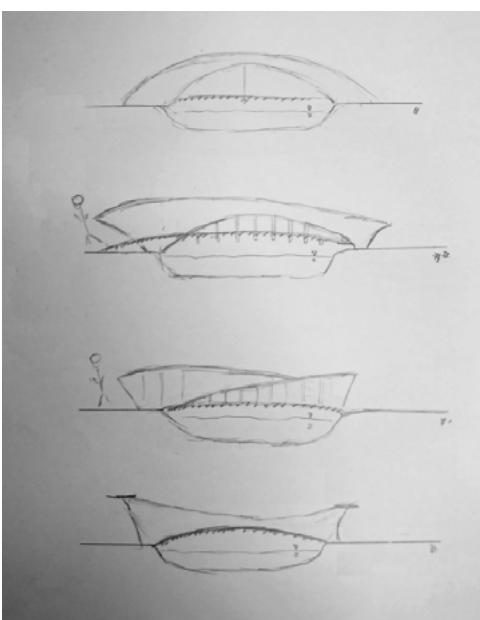
2018 / Civil Engineering Capstone (Team of 8 people)

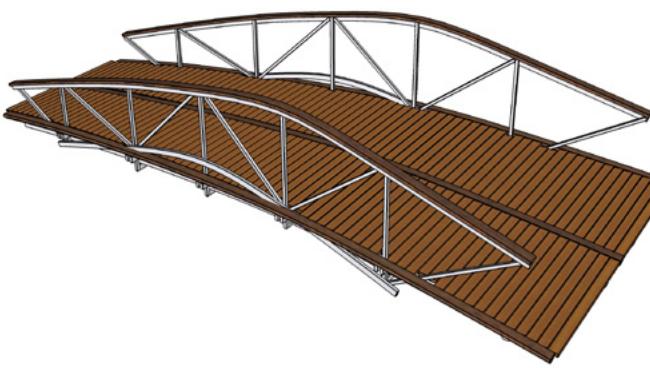
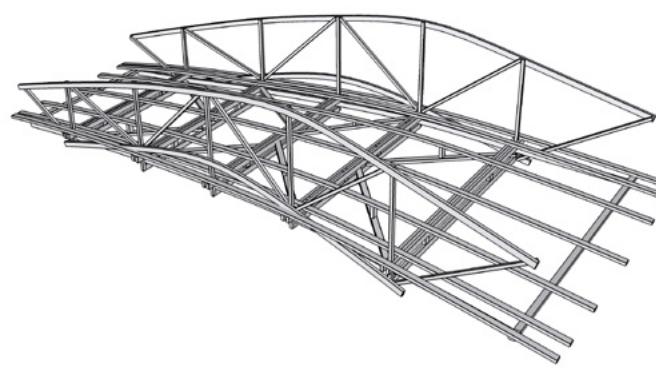
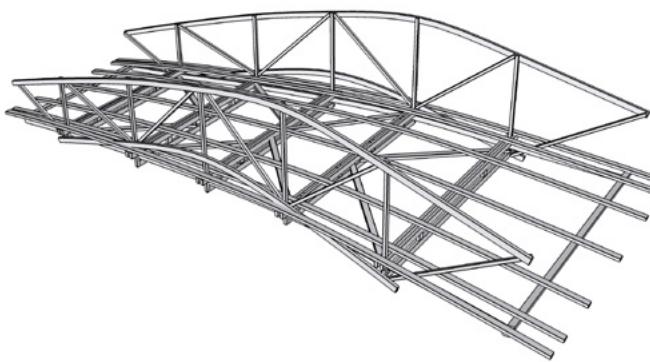
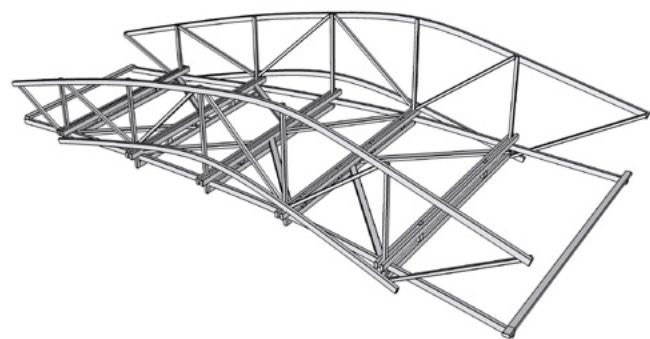
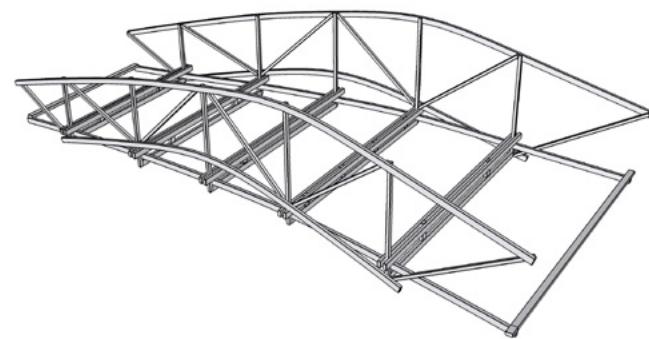
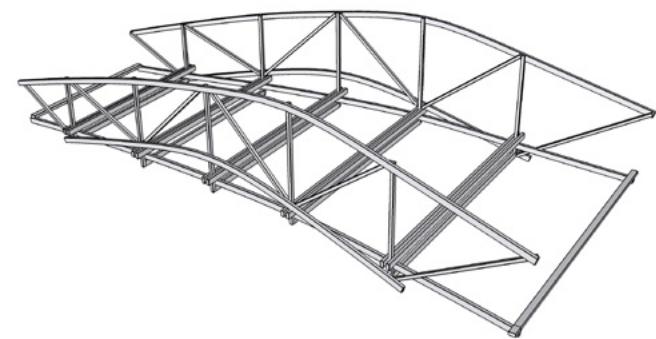
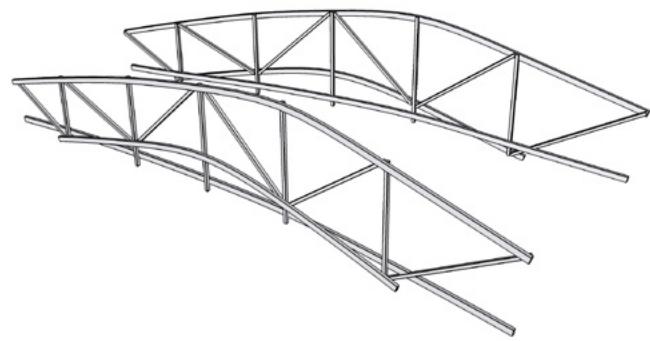
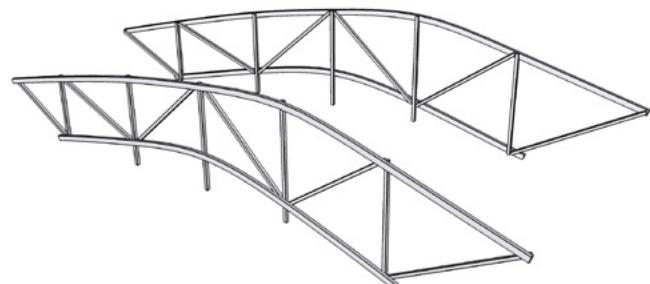
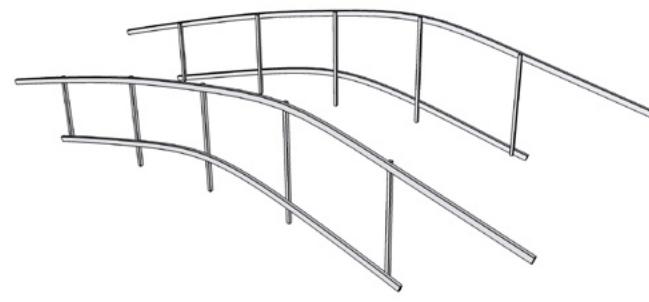
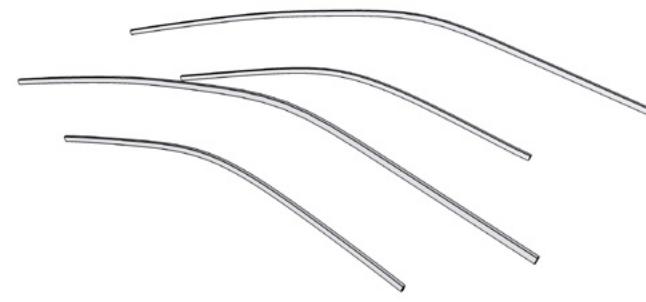
Instructors: Hervé Capart, Chia-Ming Chang

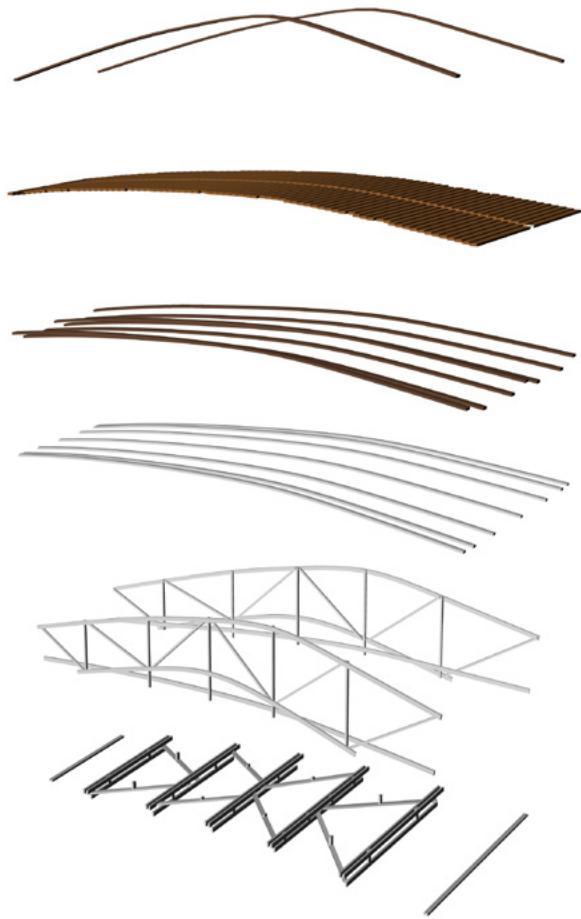
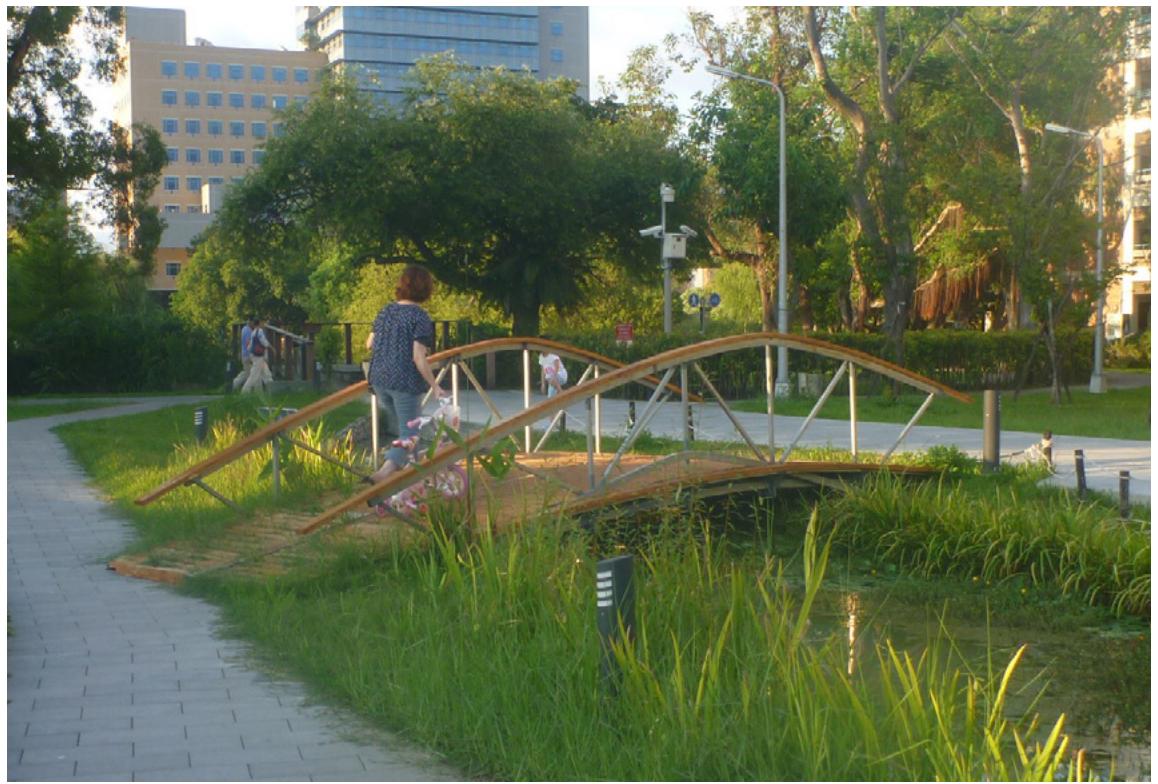
Role: group leader, designer, physical modeling, 3D modeling, collaborate on fabrication, photography, presentation



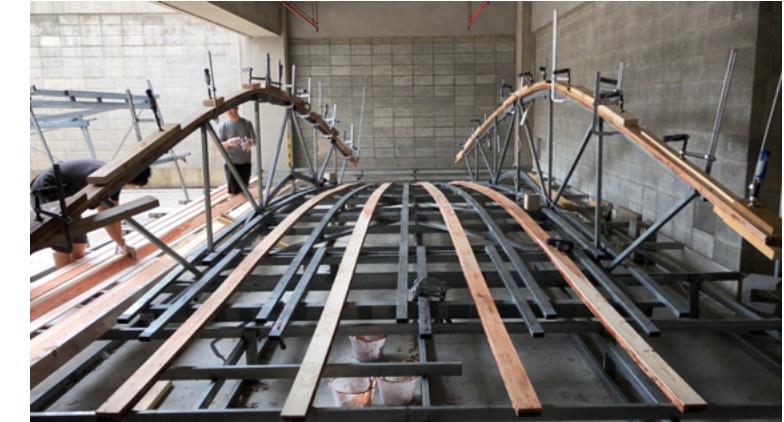
Starting with safety and functionality for public use, this bridge integrates handrails, structures, a bike-friendly facility, and furniture design philosophy in the design process. The handrail not only serves as the main structure but the outdoor furniture that welcomes people to lean on and to sit. The curved and gradient shapes in elevation and plan responses the landscape, traffic flow, and activities that happen on-site. Structure details were designed based on feasibility during the construction process and prevention of the overturning effect of handrails.







My design was chosen and built among 20 students this semester. (2018)



(Top) Handrail Fixed End Detail
(Bottom) Decorative Trim from the Side View



We use glulam to make the curves smoother.

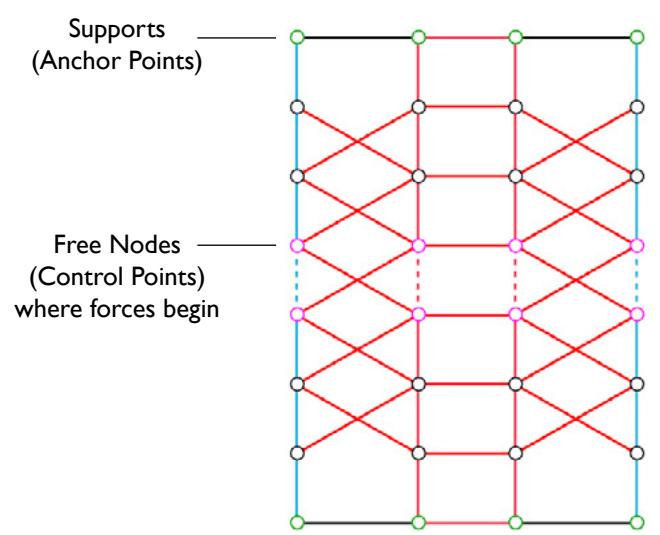
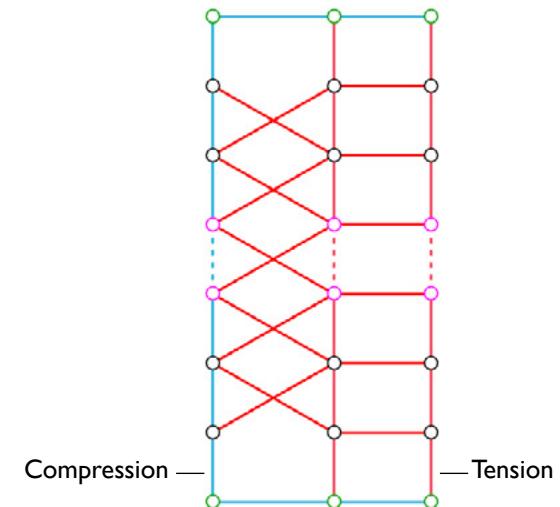
Bridge X

2021 / Personal Interest / Advisors: Pierluigi D'Acunto,
Patrick Ole Ohlbrock, Jean-Philippe Jasienski, Federico Bertagna, Yuchi Shen

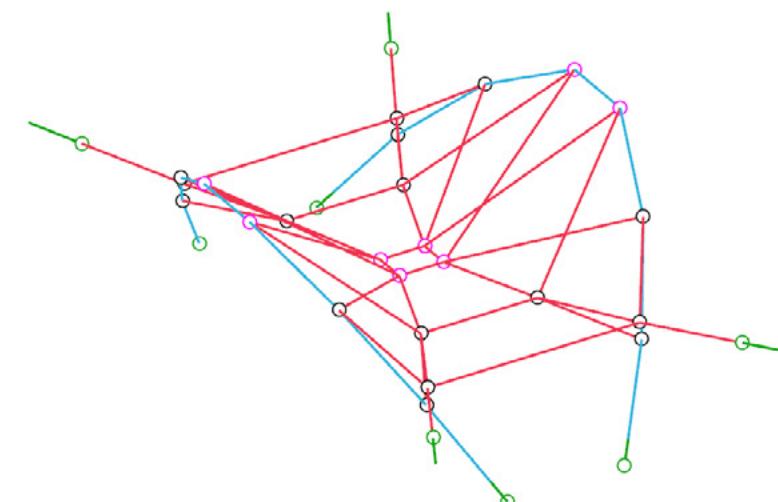
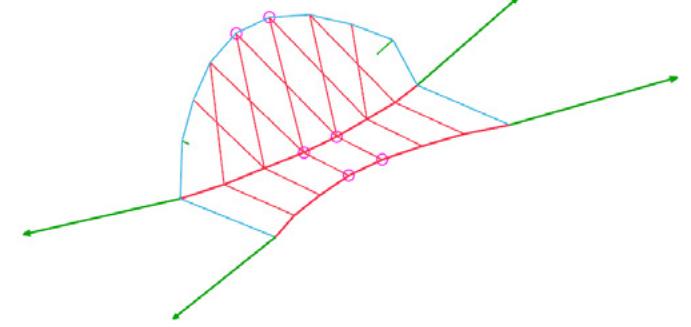
How do we engage structural thinking in the early design process?

Vector-based Graphic Statics, graph theory and Combinatorial

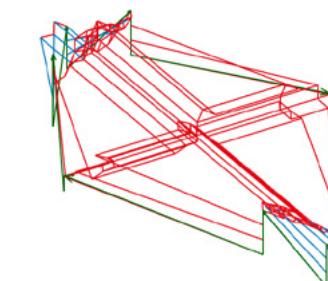
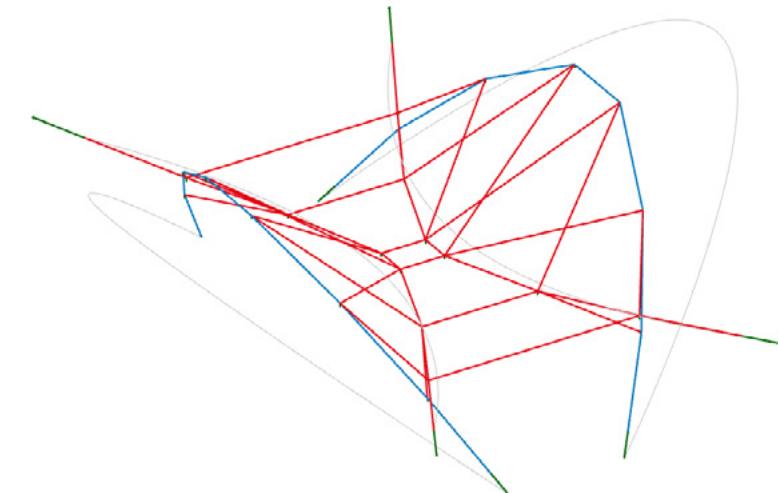
Equilibrium Modeling were introduced to exploit the potentials of equilibrium-based modeling in the conceptual design process. This project aims to design a 20 meters span pedestrian bridge in the interplay between graph, form, and force diagram.



Form Diagram

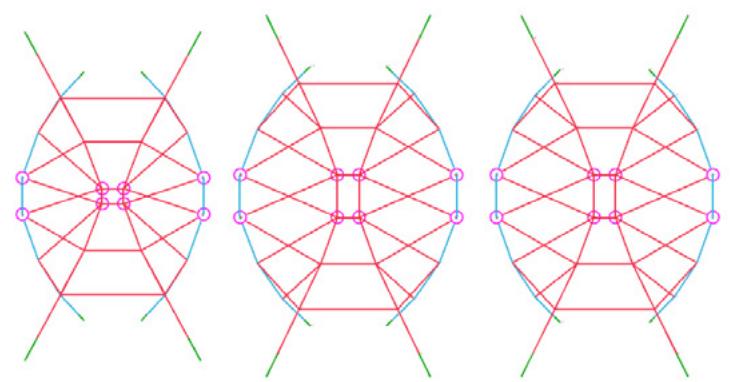
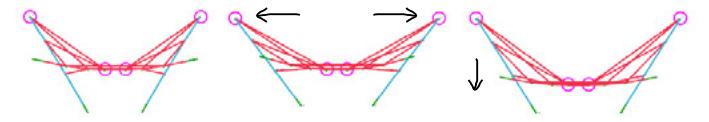


Force Diagram

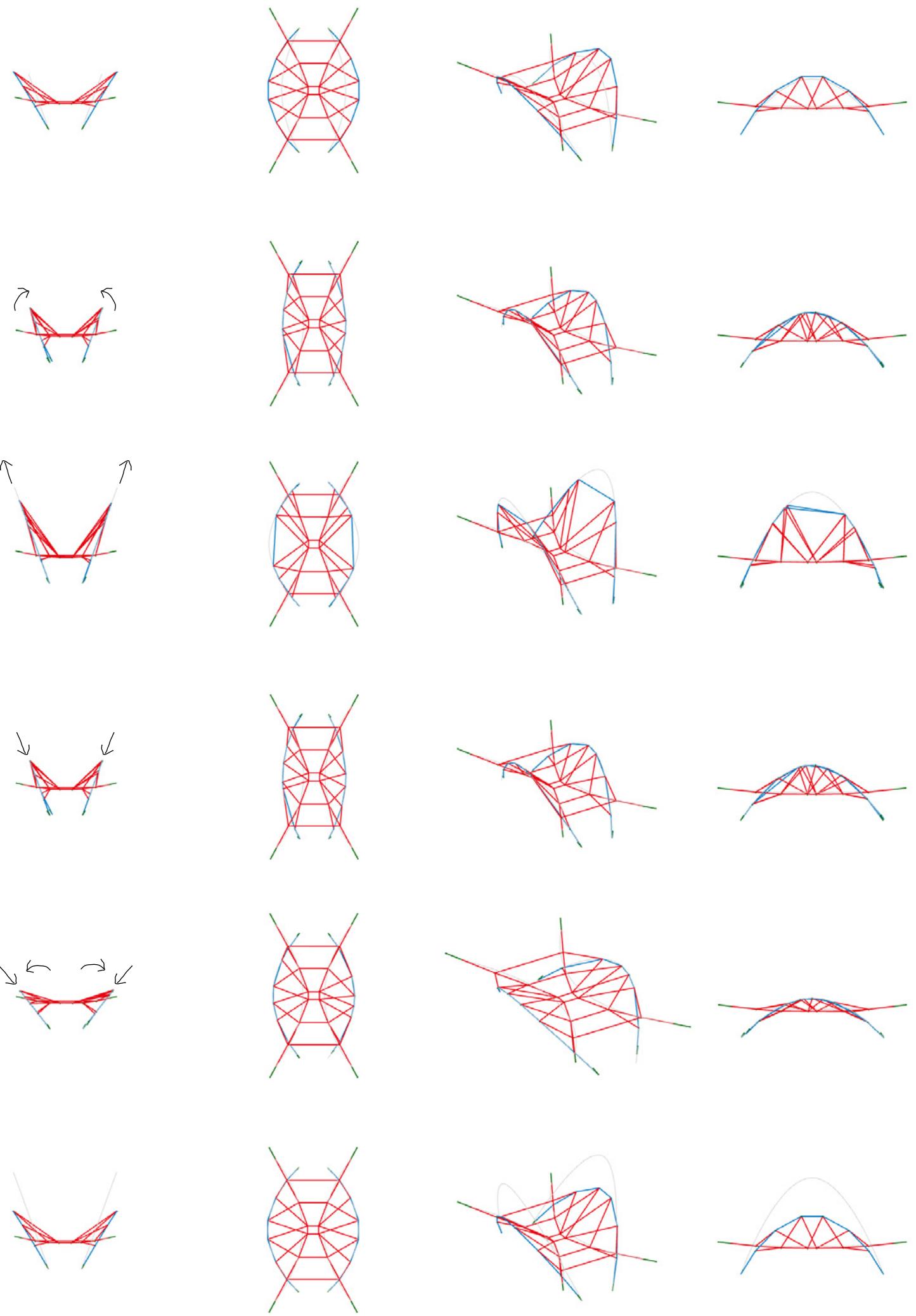
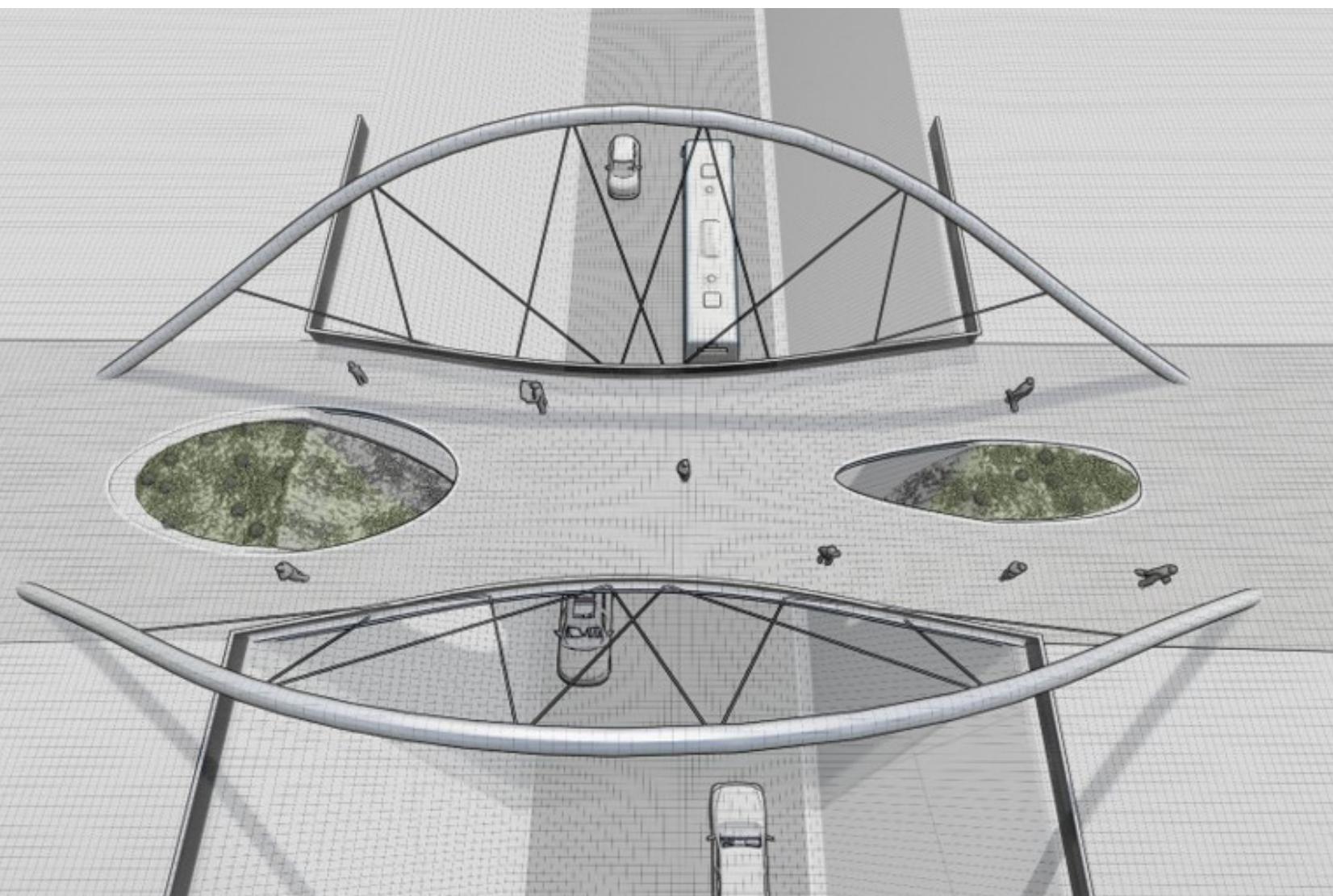
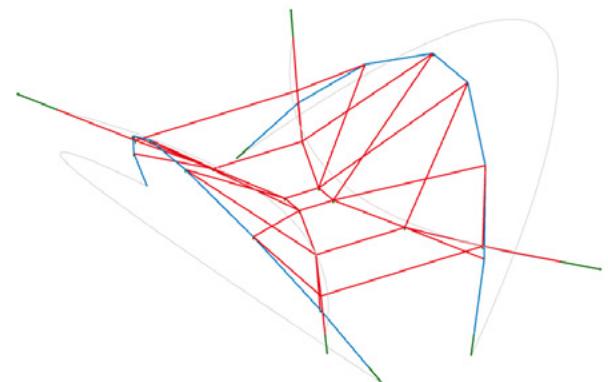
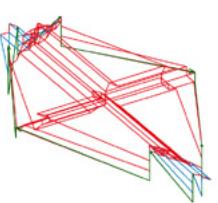


Graph

Free Nodes Manipulation



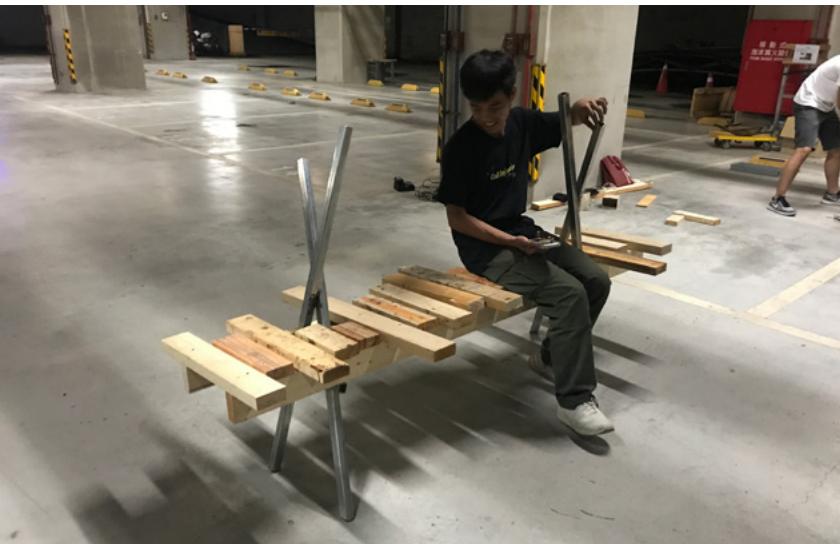
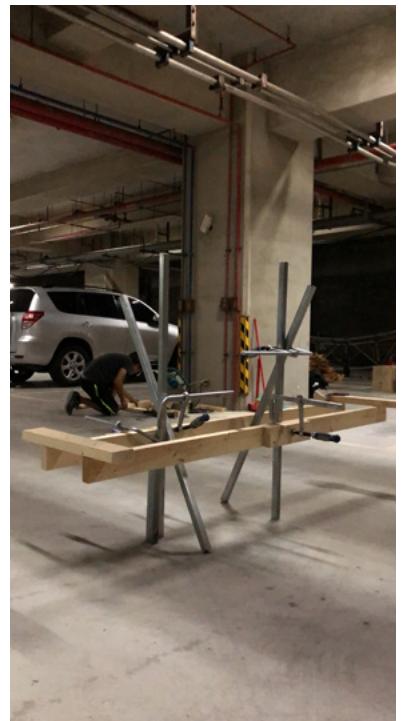
Boundary / Form & Force Manipulation



Interlace

2018 / Fundamentals of Architectural Design

Instructors: Ying-Chieh Chan, Fu-Yuan Su

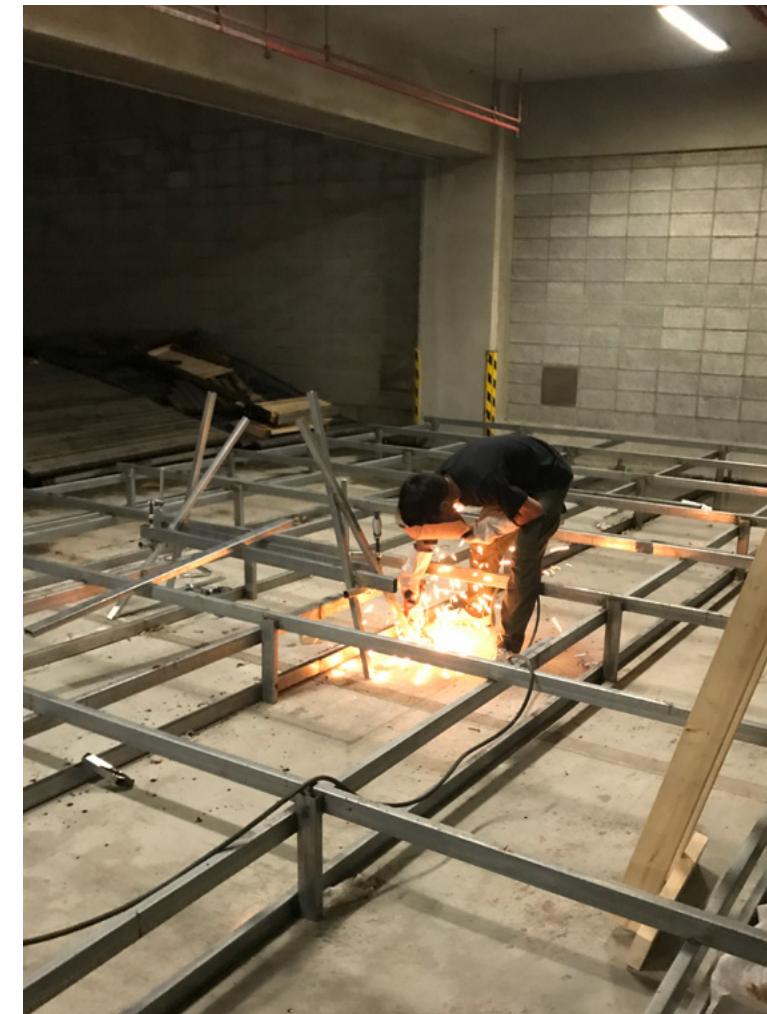
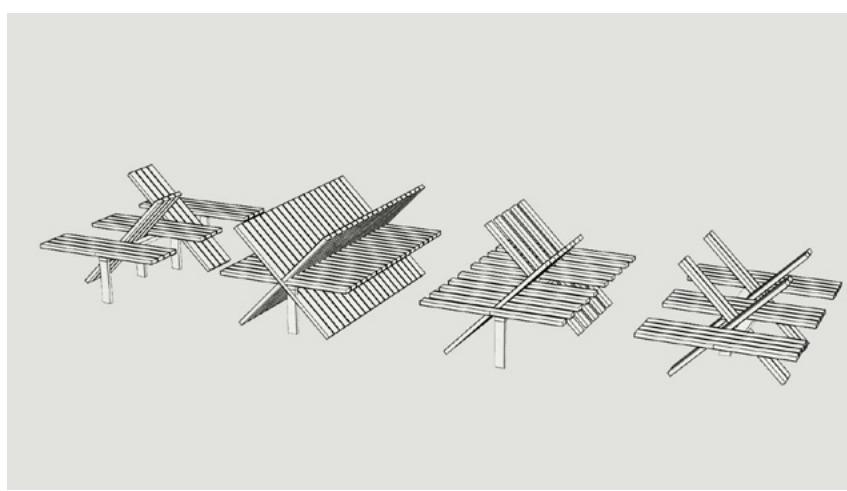
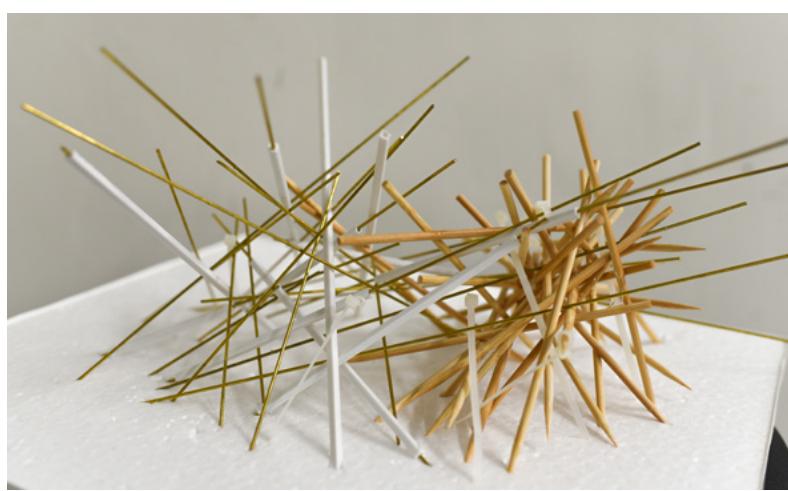


A bench can be an object for people to meet or to relax. When we sit together, can we always stay ourselves? Or we cover ourselves and even lose ourselves?

Reality and fantasy.
Heavy and light.

We need to strike a balance in the way we live our lives.

Exploration on materiality and structures.



Rectangular hollow section stainless steel is the material to make four legs and the girder of an 80" span, for their weights enough to create a solid foundation, and also their bending and torsion resistance.



Four legs were tilted longitudinally to prevent the overturning effect when people sit on two ends or unevenly.

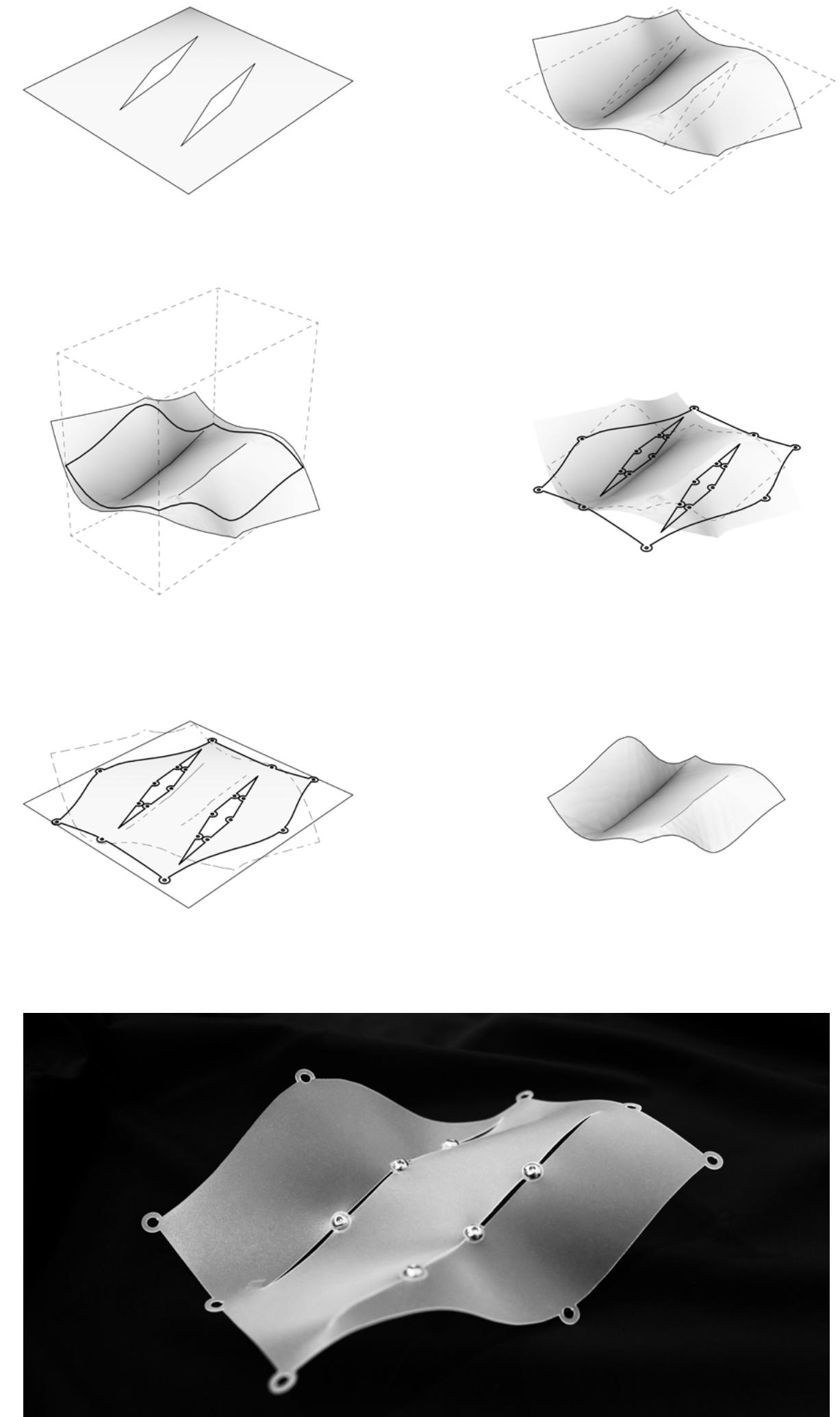


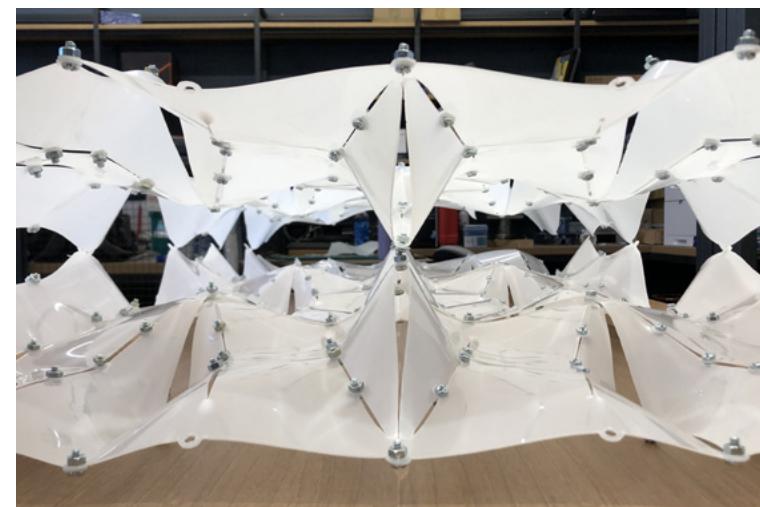
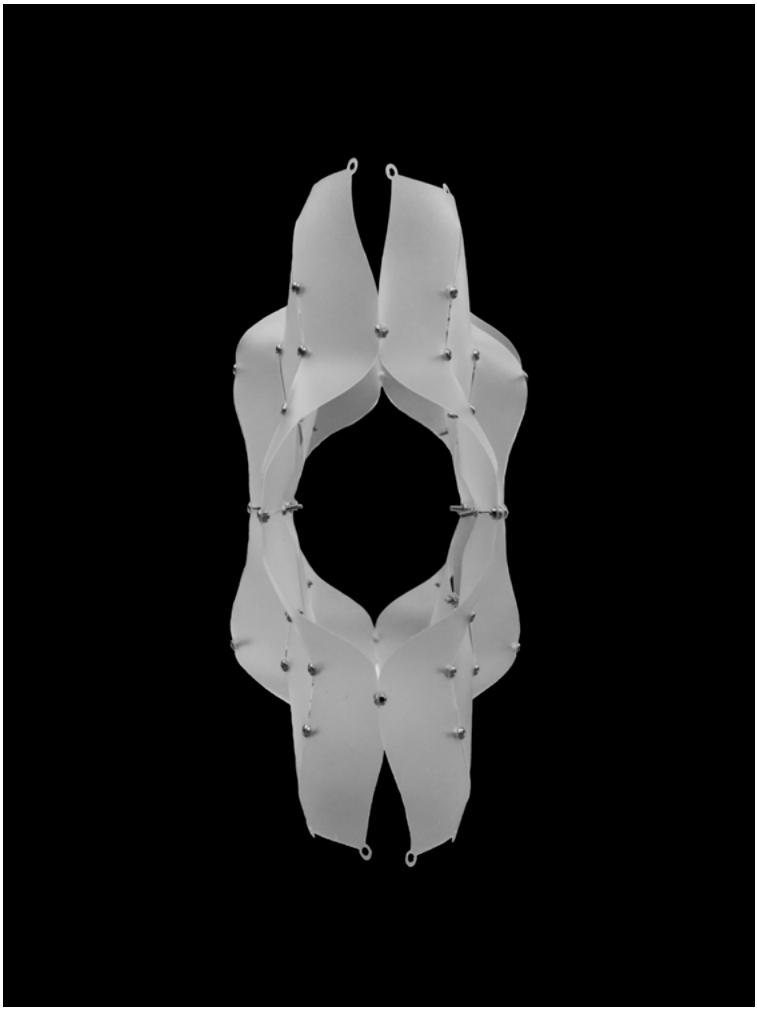
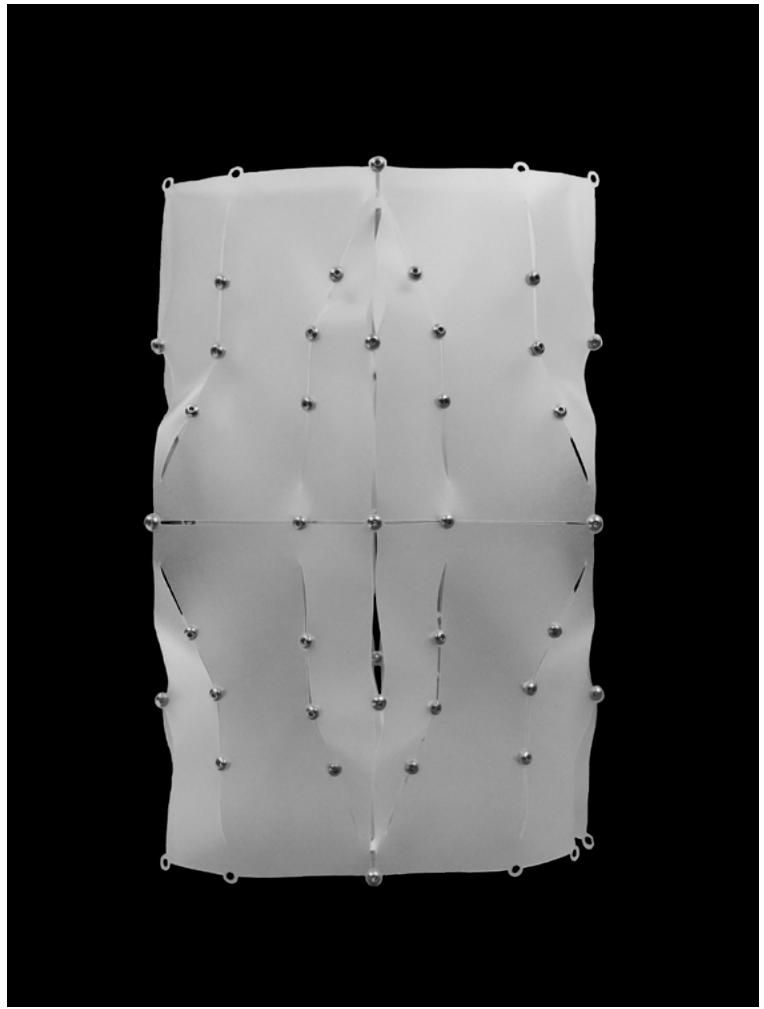
Form Force Matter

2021 / UC Berkeley / Instructor: Greg Castillo

This project aims to build our own canon by designing a book (broadly defined) that displays our skill and imagination at integrating our own manifesto text and its images.

My manifesto titled "Form Force Matter", which combines material interests of architecture and engineering at the scale of material properties.





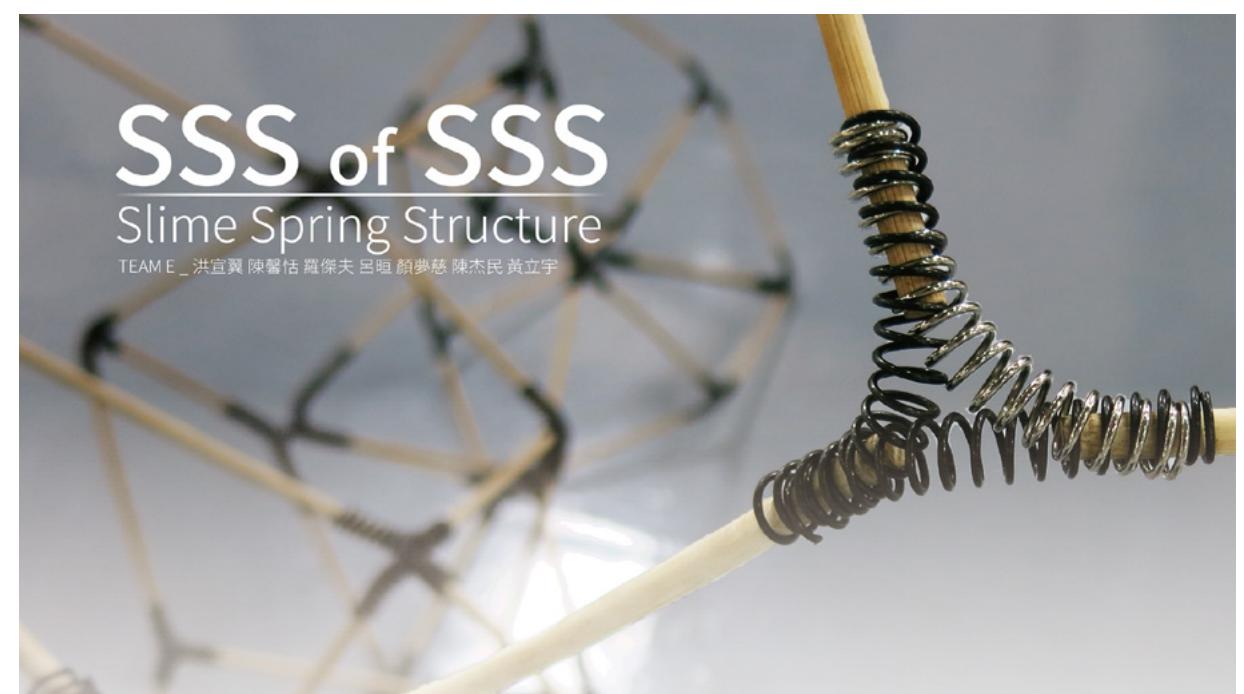
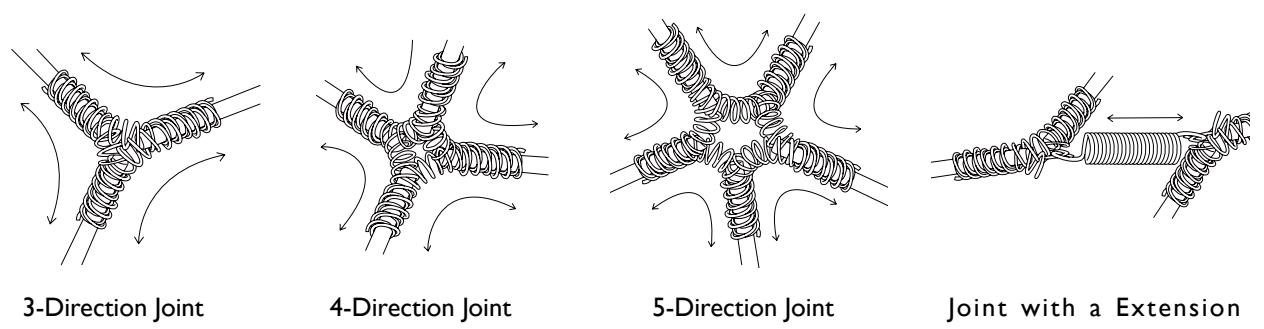
Extension of the work.

Slime Spring Structure

2018 / Department of Architecture, NCKU
Structural Art of Accumulation or Transformation workshop
Group Project (7 people) / Advisor: Yi-Hsuan Tu
Role: material proposal (spring), joint design (semi-rigid), system design, structural design, 3D modeling, collaborate on fabrication, photography, presentation

How can elastic and rigid materials joint together without adhesives or other components? This project uses springs to form a series of multi-dimensional semi-rigid joints, for the elasticity, toughness, and geometry of springs. Connected with bamboo rods, the joints play a crucial role in forming a bending-active structure.

Amazingly, the structure can go back to the ground state automatically after flattening or pushing it due to the elastic potential energy stored inside the system.



The main goal of this workshop is to design and make a structure art that can be easily carried, assembled and demolished. The material, connection details, and boundary conditions are considered in the model manufacturing.

Budget: 100 US dollars.

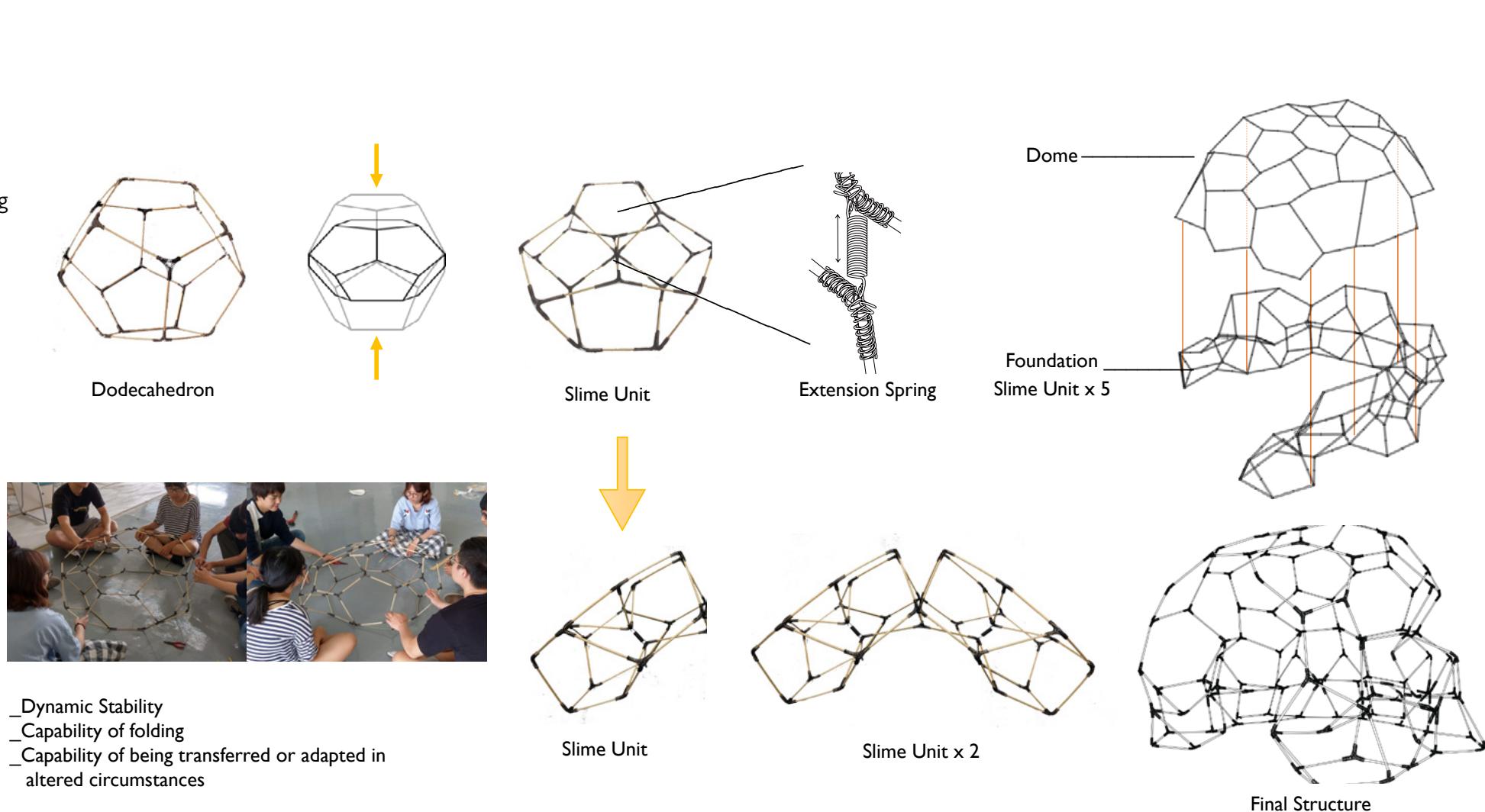
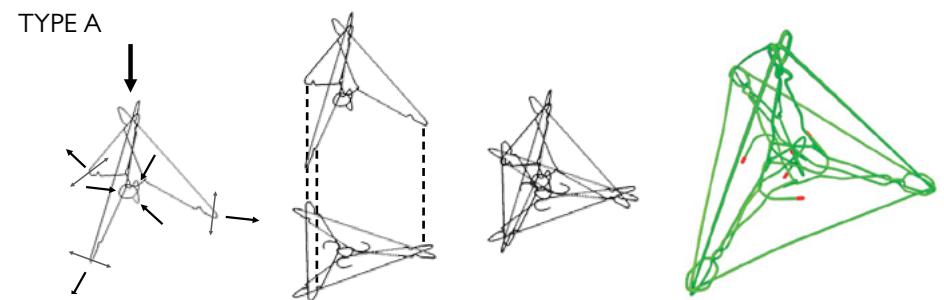


Image by Shin Tian Chen

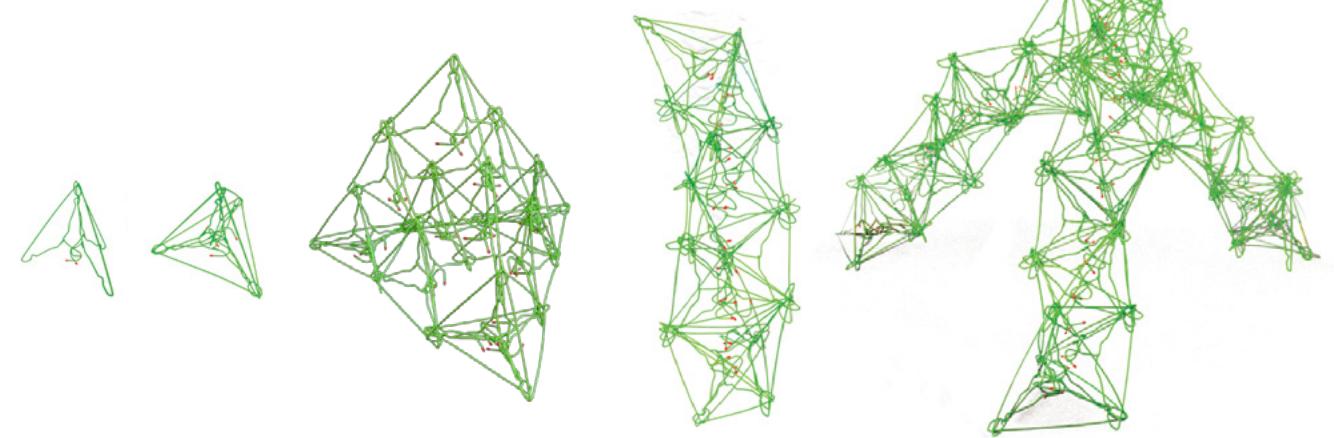
Hanger Games

2019 / Structural Art of Accumulation or Transformation workshop
 Group Project (5 people) / Advisor: Yi-Hsuan Tu
 Role: type A & B unit design, joint design, system design, structural design, 3D modeling, collaborate on fabrication, photography, presentation

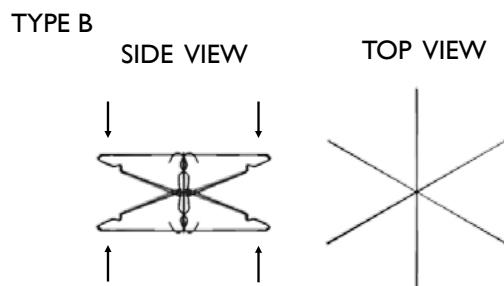
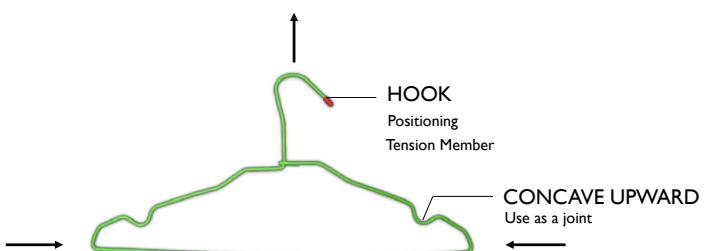
How can we use single material without processing to build a structure? Moreover, what is the maximum solid or void space we can create? This project aims to use hangers as the only material, trying to utilize the mechanical properties of hangers and assemble them into units with new structural characteristics, achieving different structural purposes efficiently.



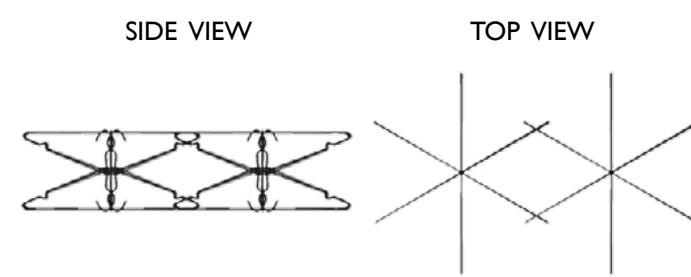
Six hangers form a stable regular tetrahedron structure.



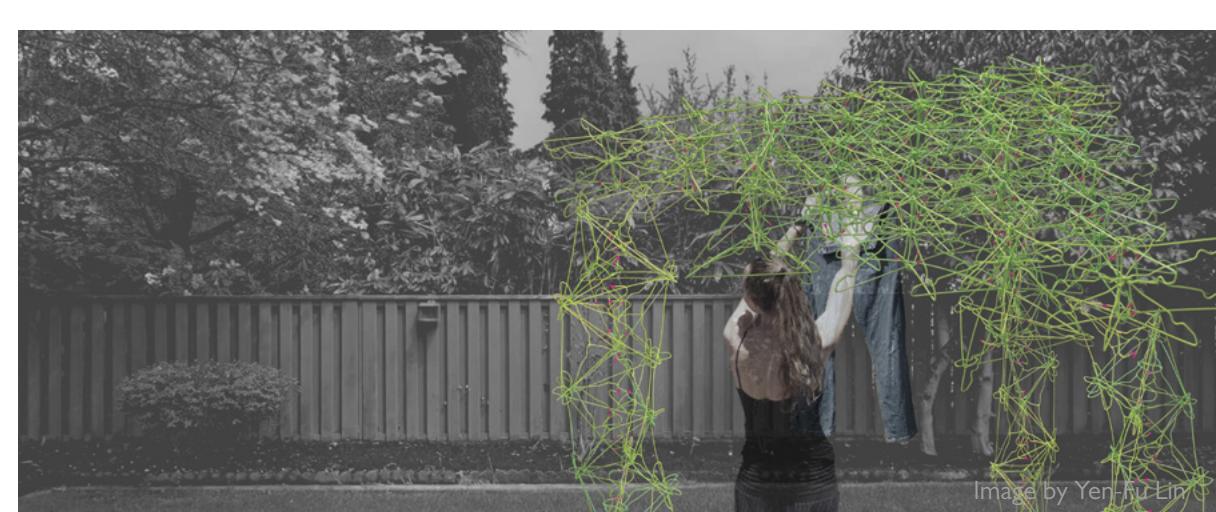
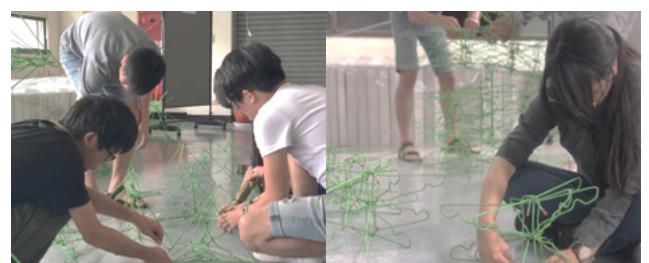
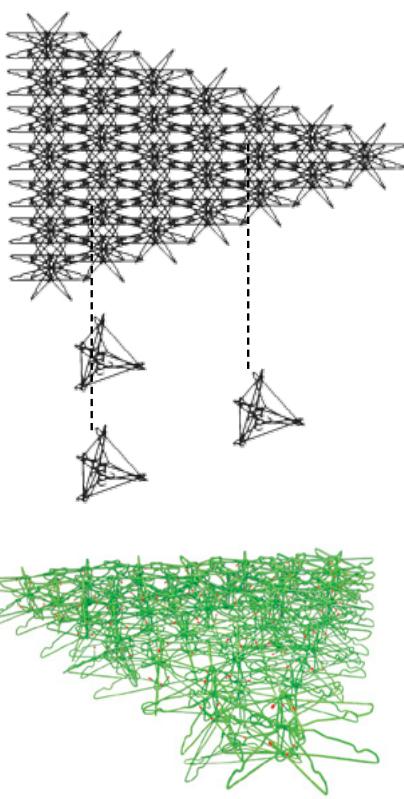
Hanger shows the harmonious use of compression and tension when hanging clothes in our daily life.



Six hangers form a hourglass-like structure unit.



Unit cells can be infinitely extended to form a Vierendeel truss or even a stable slab.



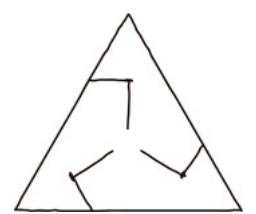
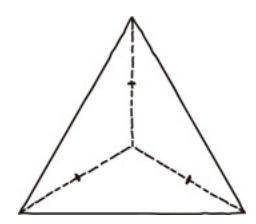
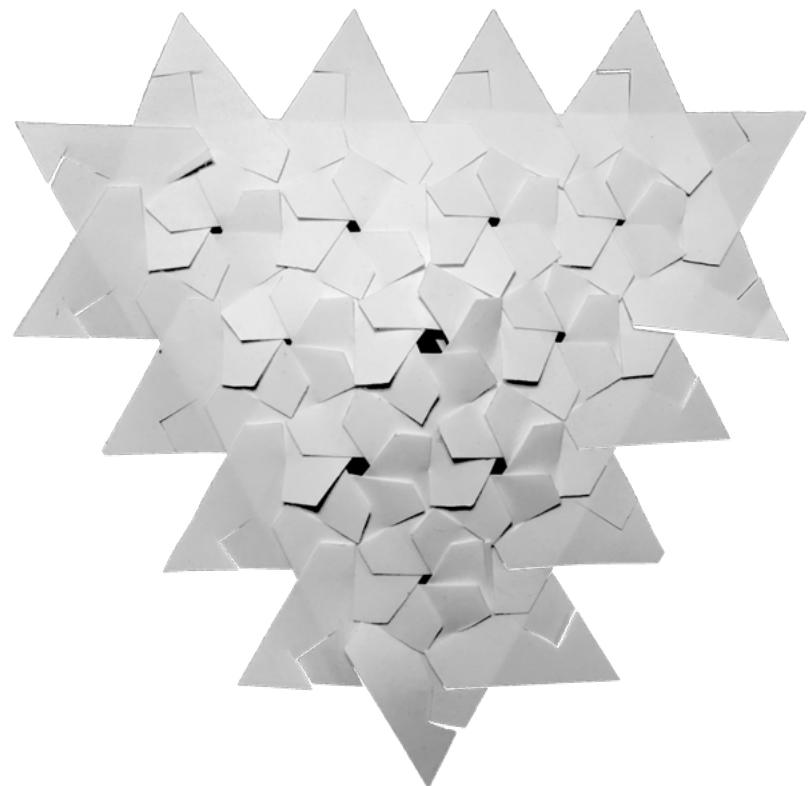
Sacred Light

2020 / Foundation Design (I) / Instructor: Ling-Li Tseng

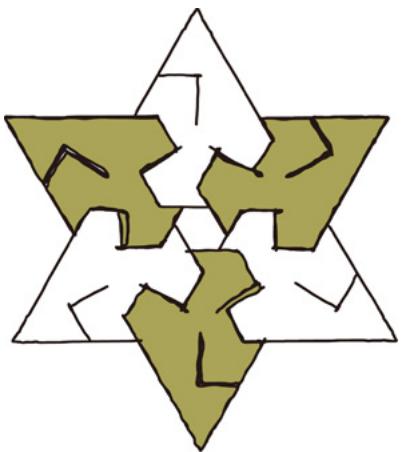
This project is an exploration of light and geometry.

Inspired by apertures (openings through which light travels) and puzzles (games of geometry), this project weaves semi-transparent triangular units together, creating a translucent curved surface with a unique pattern. The curvatures of the curved surface dominate the size of each opening on it.

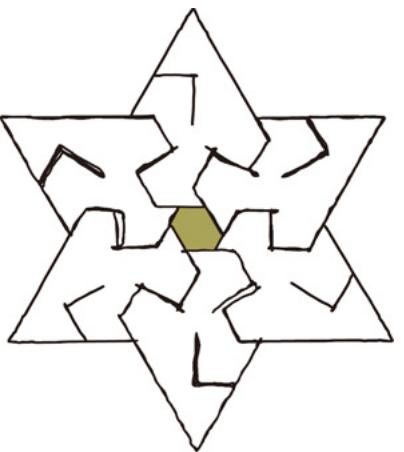
The holes are small enough to create the “pinhole imaging” effect when light travels from different distances and angles.



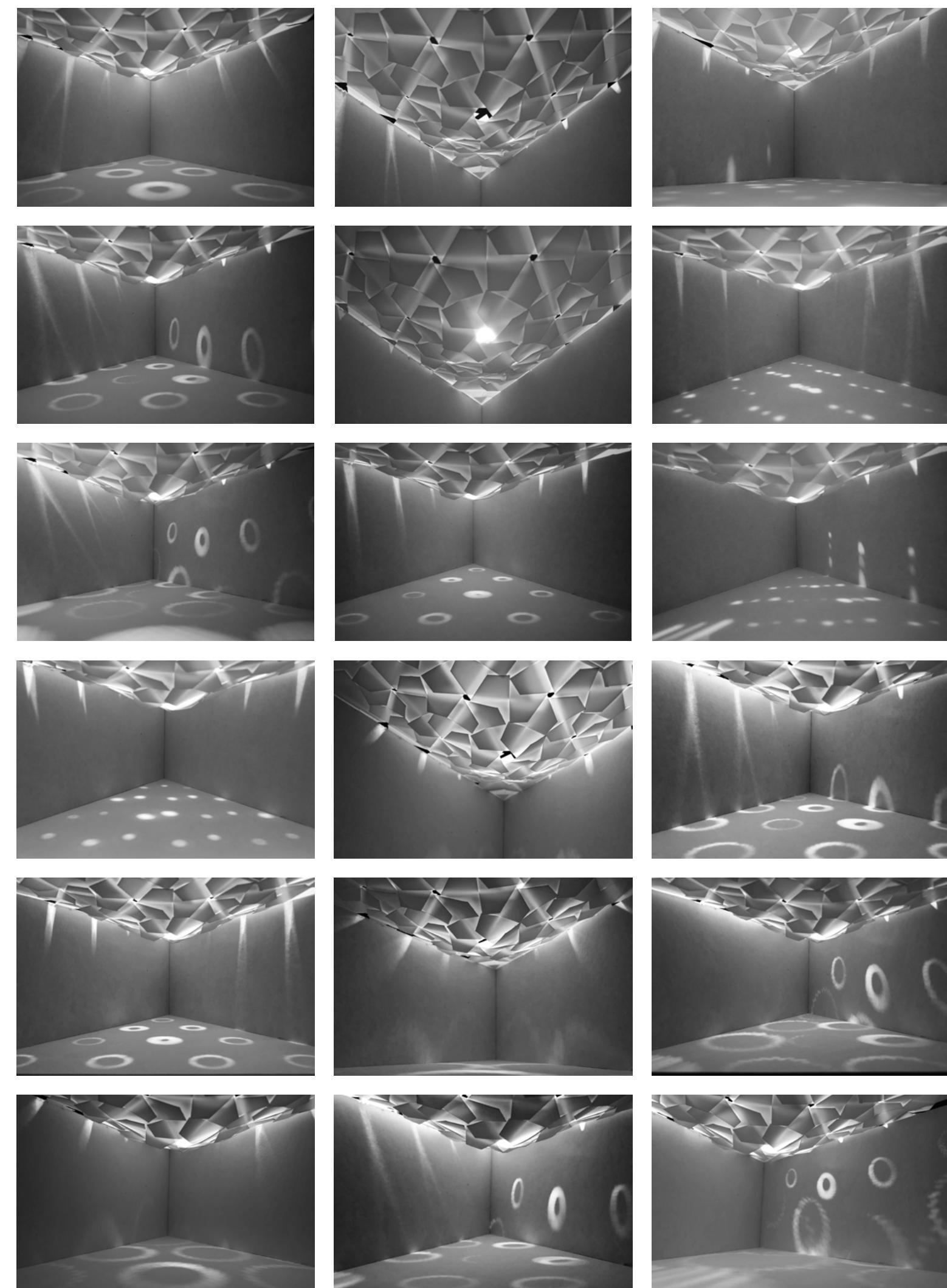
Triangular Puzzle Unit



Weaving Logic



Aperture



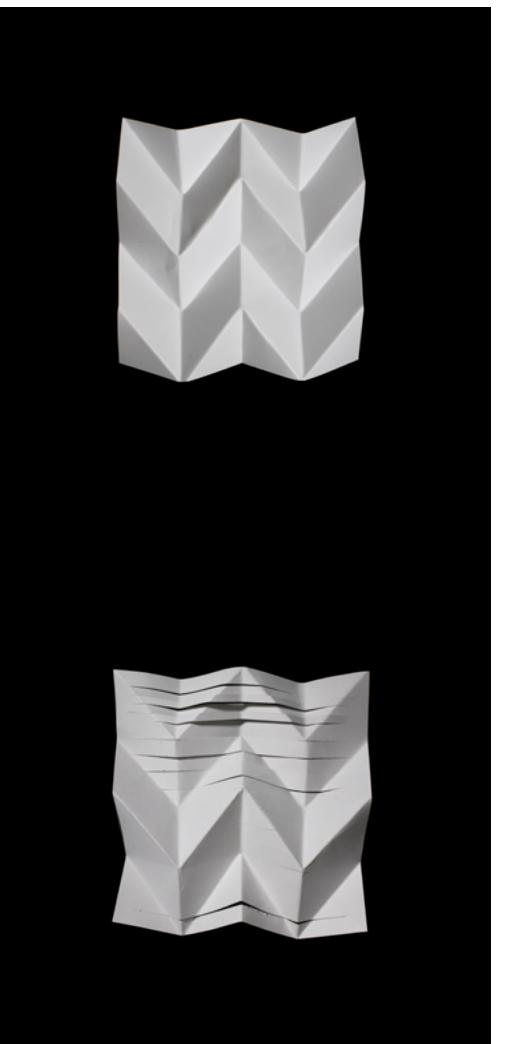
Fold & Cut

2017 / Shape Aesthetics and Design / Instructor: Ming-Chuan Fu

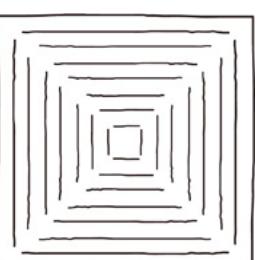
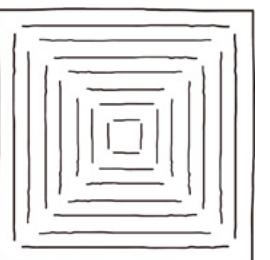
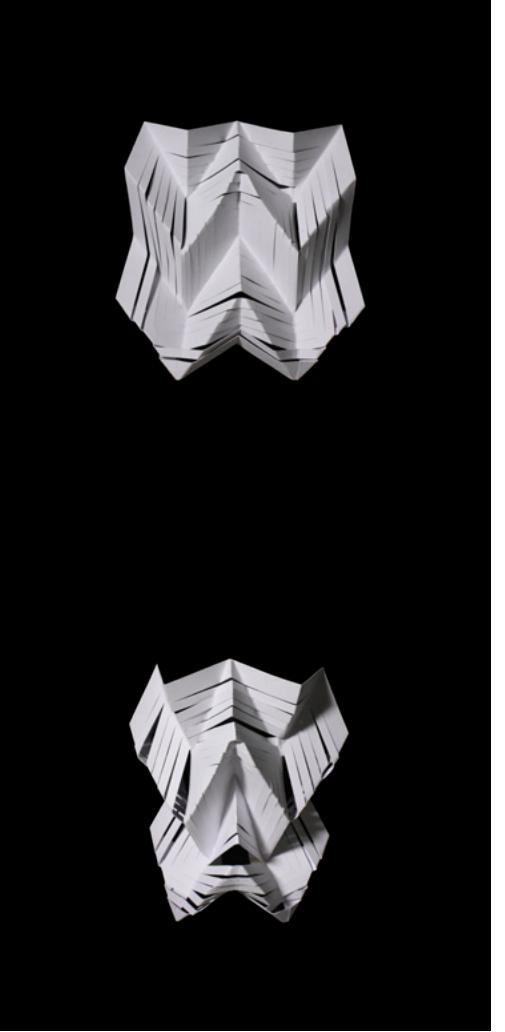
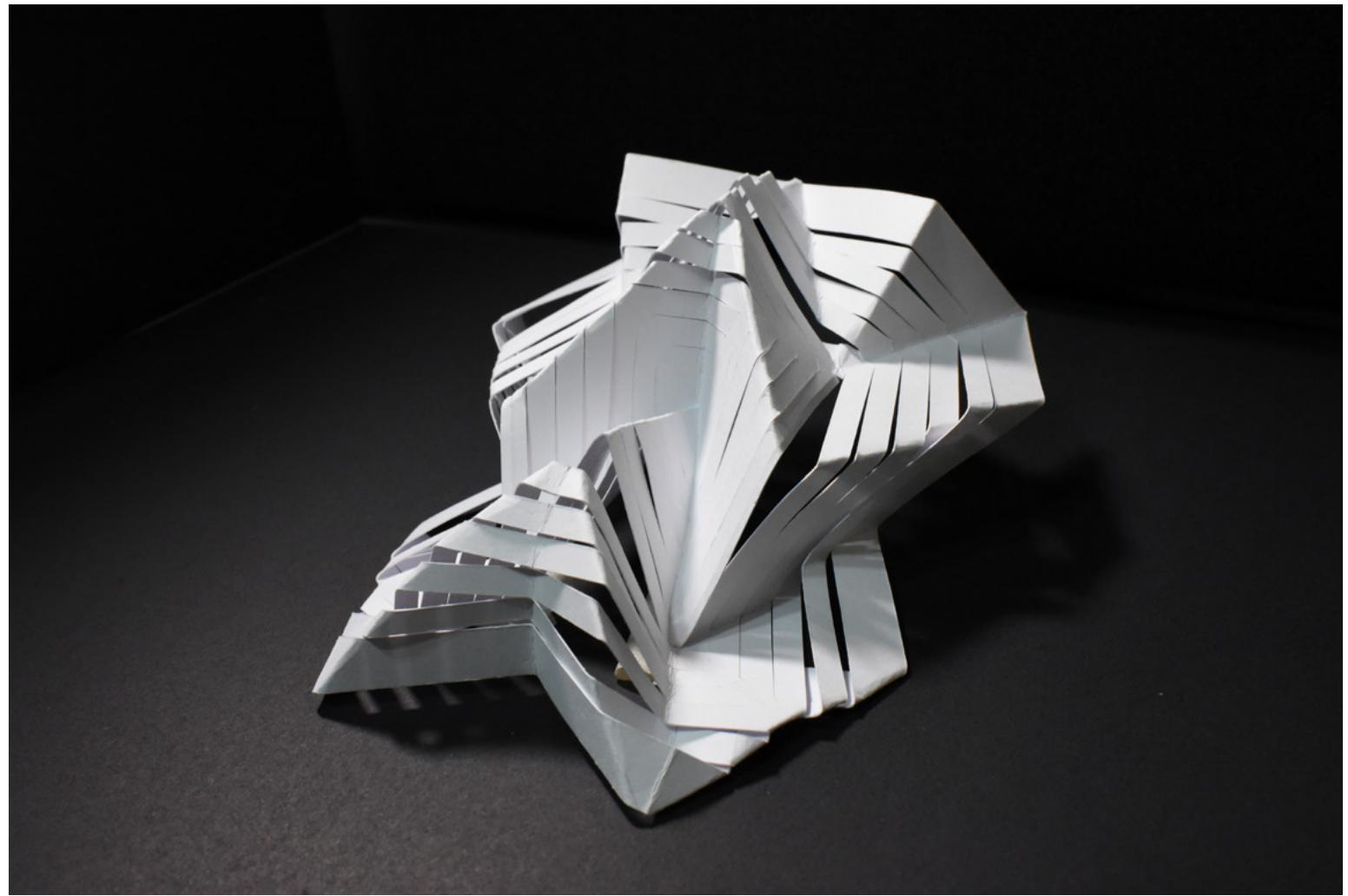
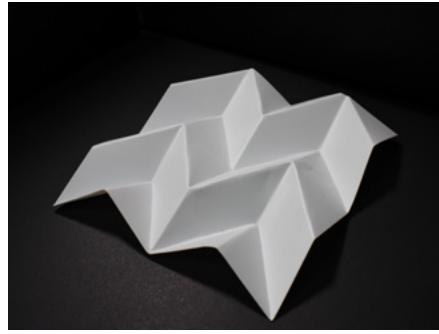
"Fold" is a technique to transform an object between 2D and 3D.

"Cut" is a technique to make openings on an object.

In this project, the paper is the medium to explore the synergistic effect of using these two techniques.



Miura Fold

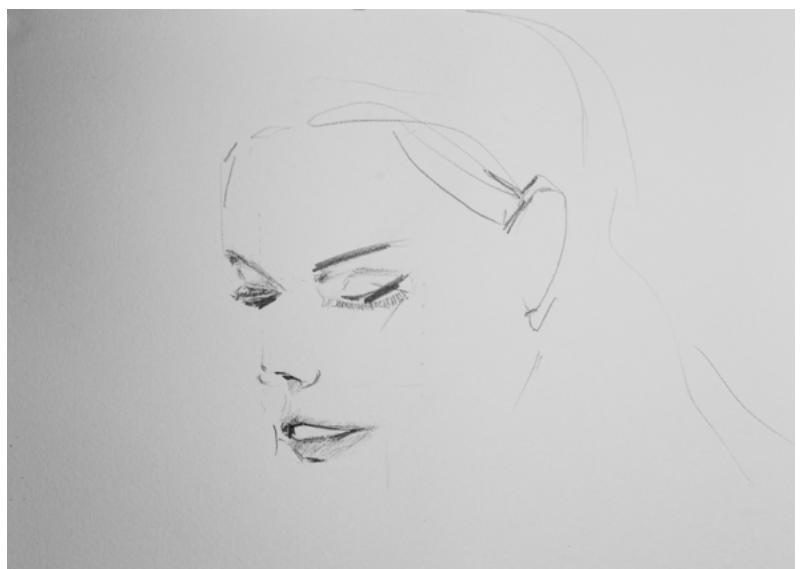


Illustrations

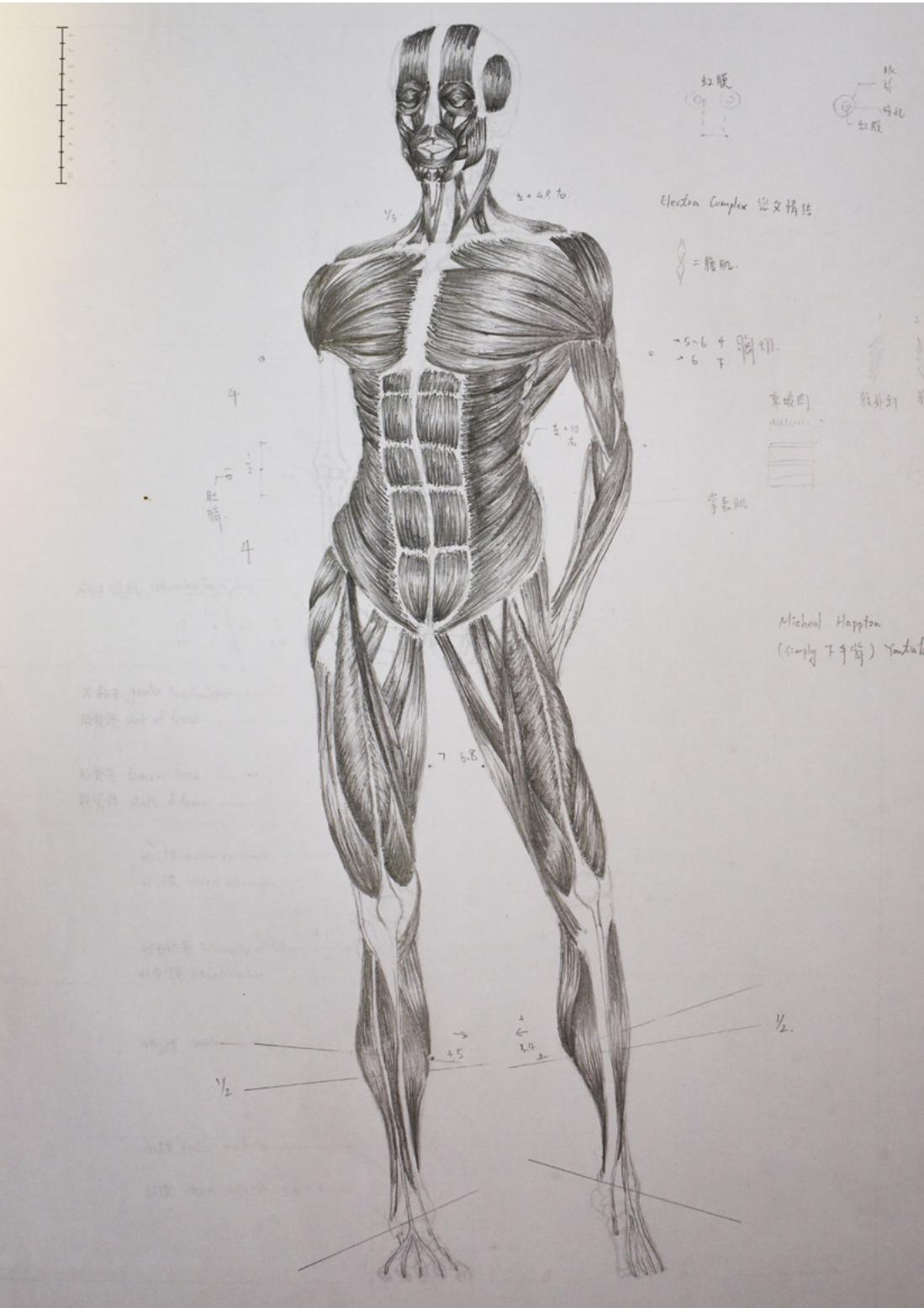
2019-2020 / Personal Interest

2021 / UC Berkeley / Instructor: Kyle Steinfeld

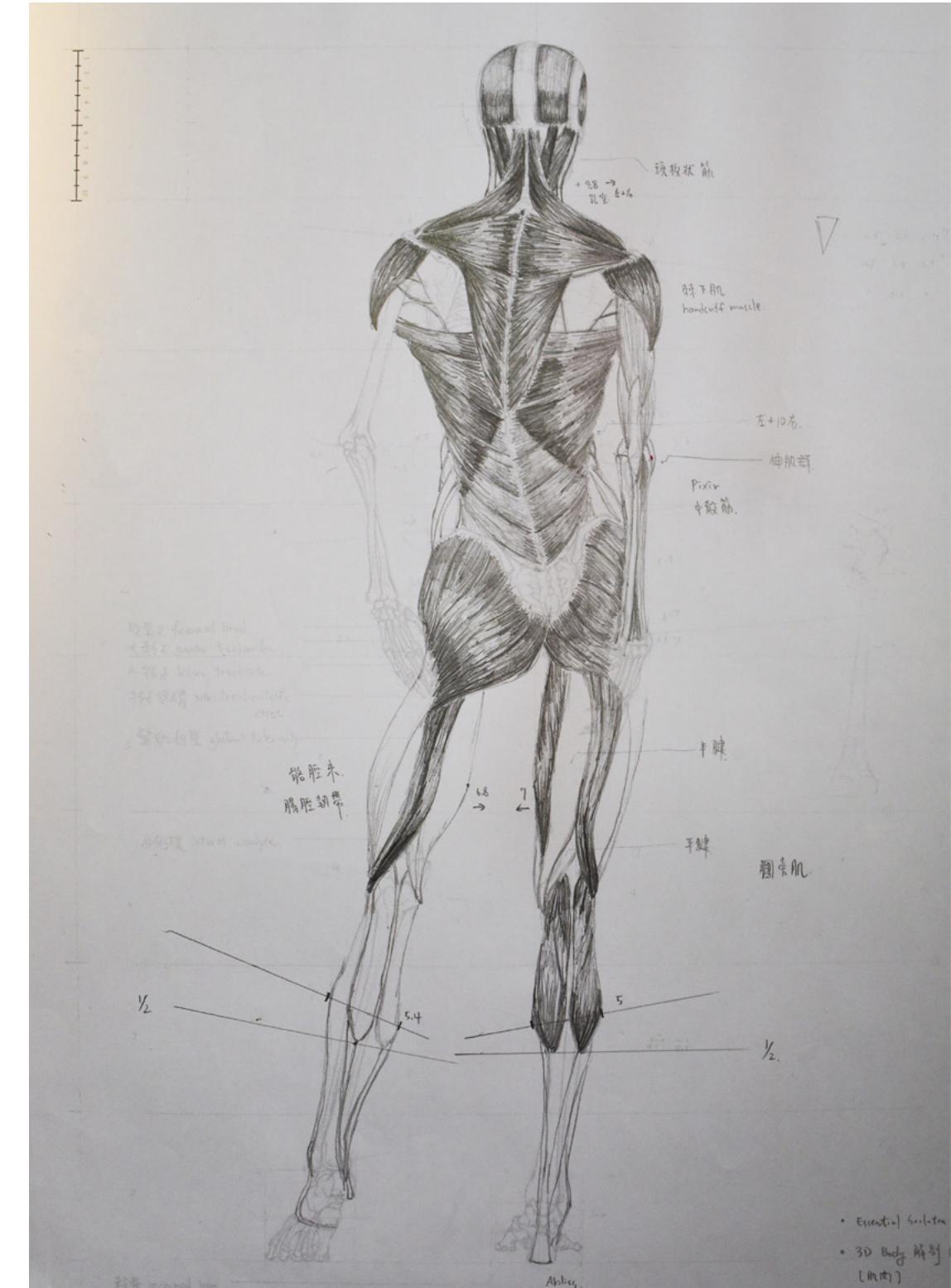
By learning anatomy, I realize not only the proportions of the human body but the scales and proportions in the built environment. Furthermore, I observe the motions and wearings of human beings to catch the rhythm of life.



Life Drawing 01, 2019
Pencil



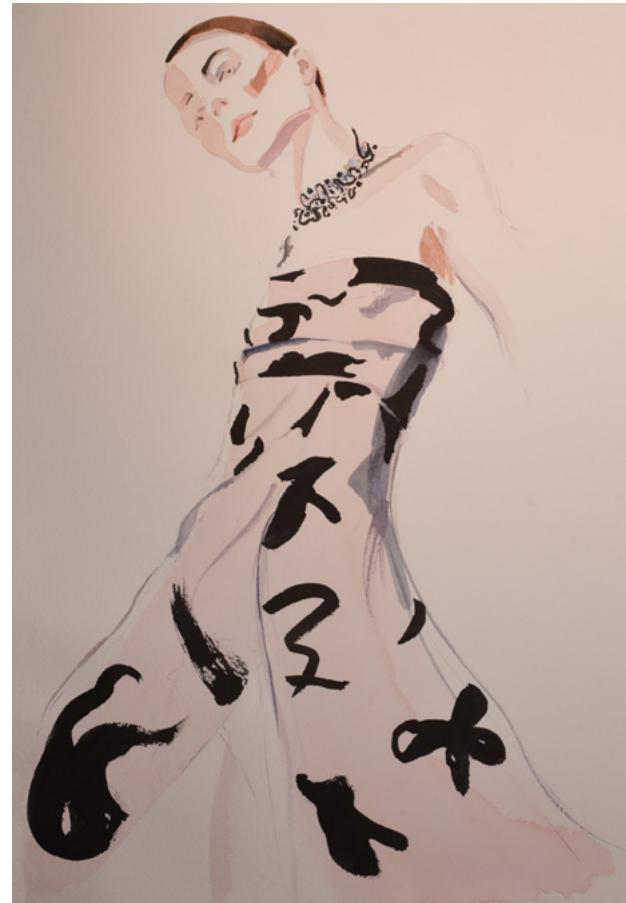
Art Anatomy 01, 2019
Pencil



Art Anatomy 02, 2019
Pencil



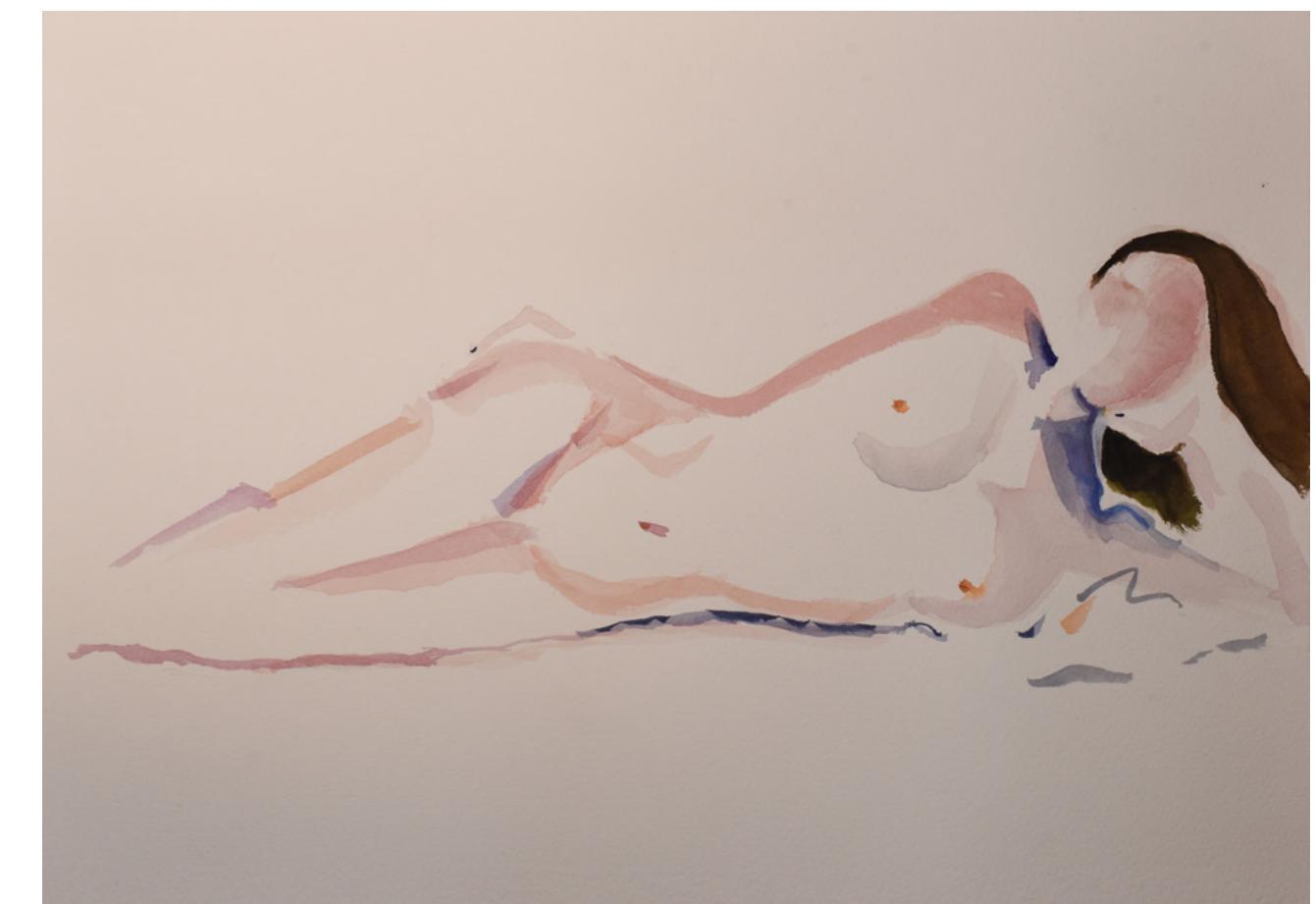
Fashion Illustration 01, 2019
Water Color



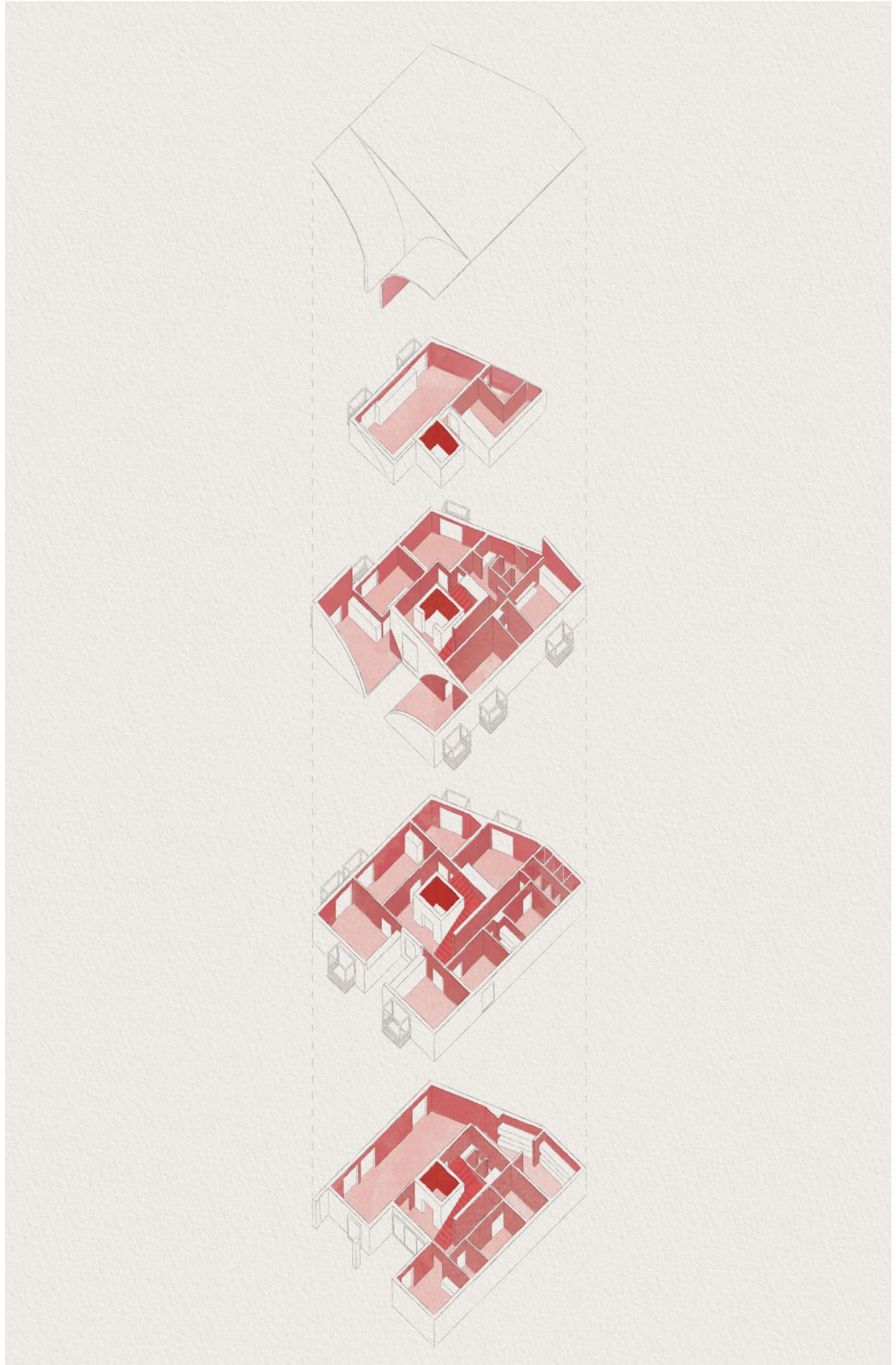
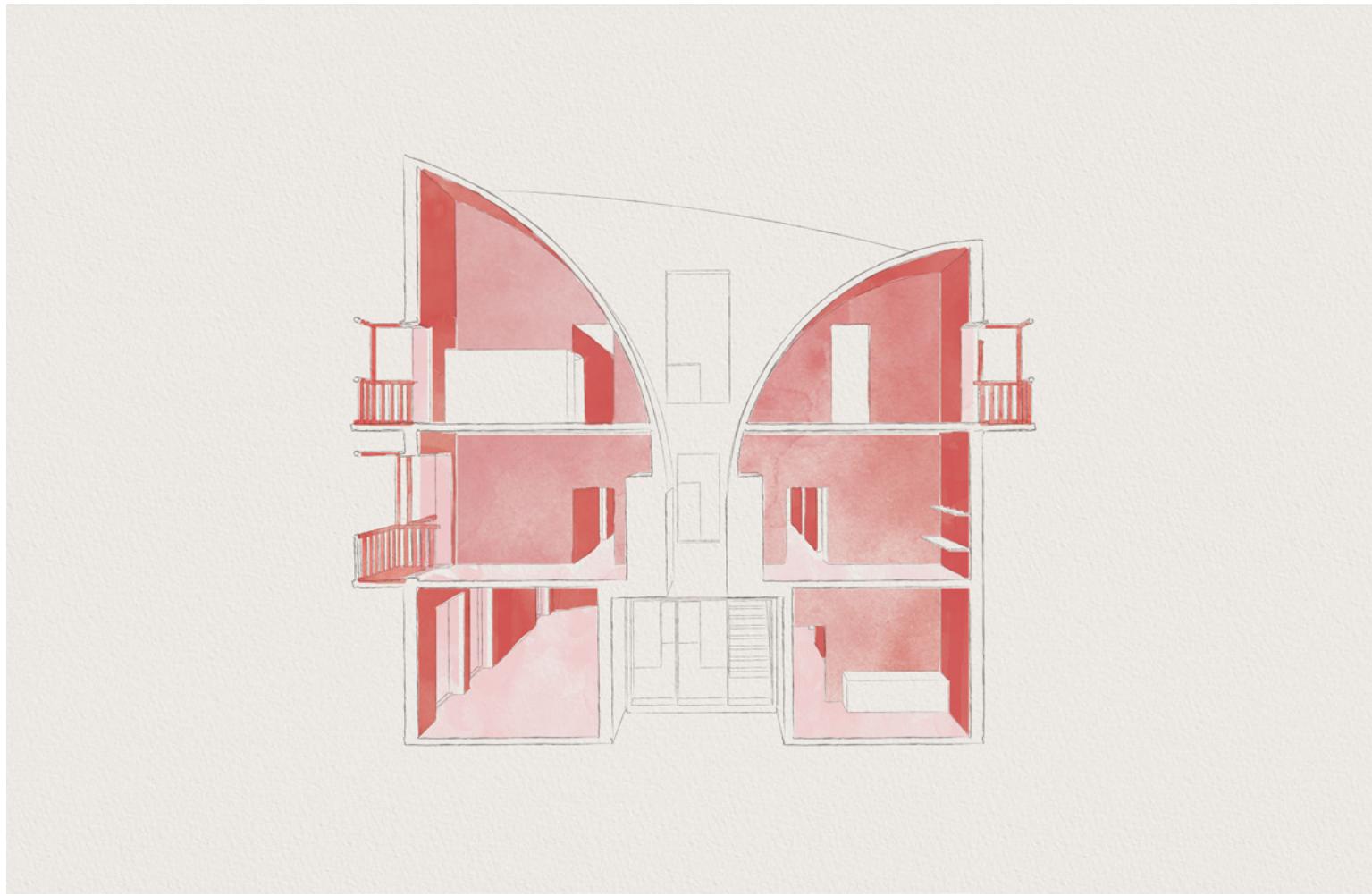
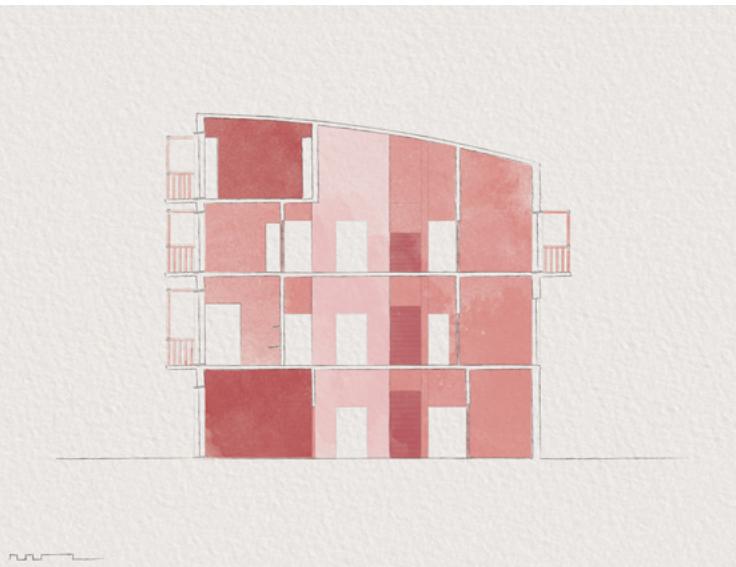
Fashion Illustration 02, 2019
Water Color



Fashion Illustration 03, 2020
Water Color



Life Drawing 02, 2020
Water Color



Representation, 2021 / Precedent: Habitat for Orphan Girls, ZAV Architects
Digital Drawing

Instead of coloring the whole canvas, coloring partially can strengthen the contrast of the overall composition, solid and void, exterior and interior, positive and negative space. It highlights the parts we would like to focus on in different drawings. Without brilliant colors or delicate textures, "the white" could be walls, beams, columns, and even the environment. The blank frames all possibilities.

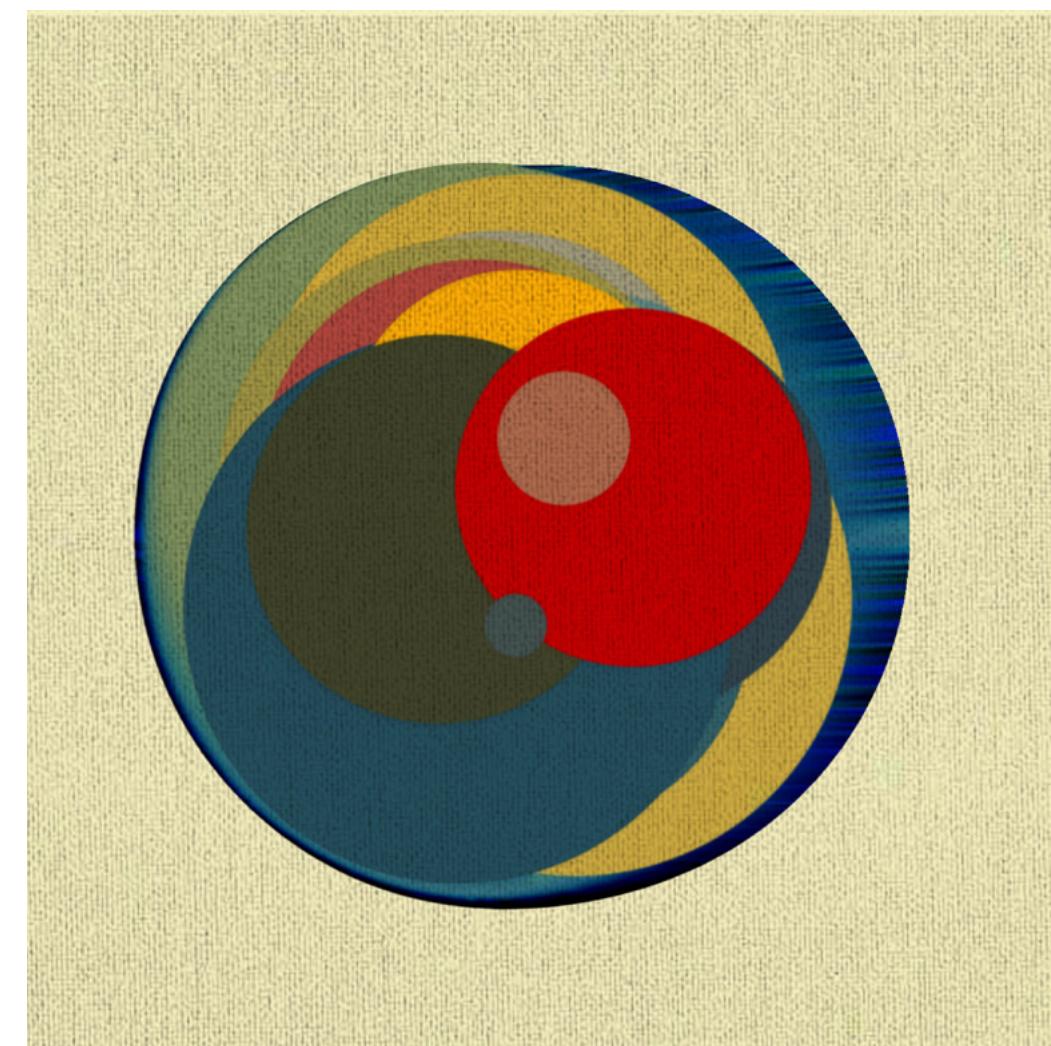
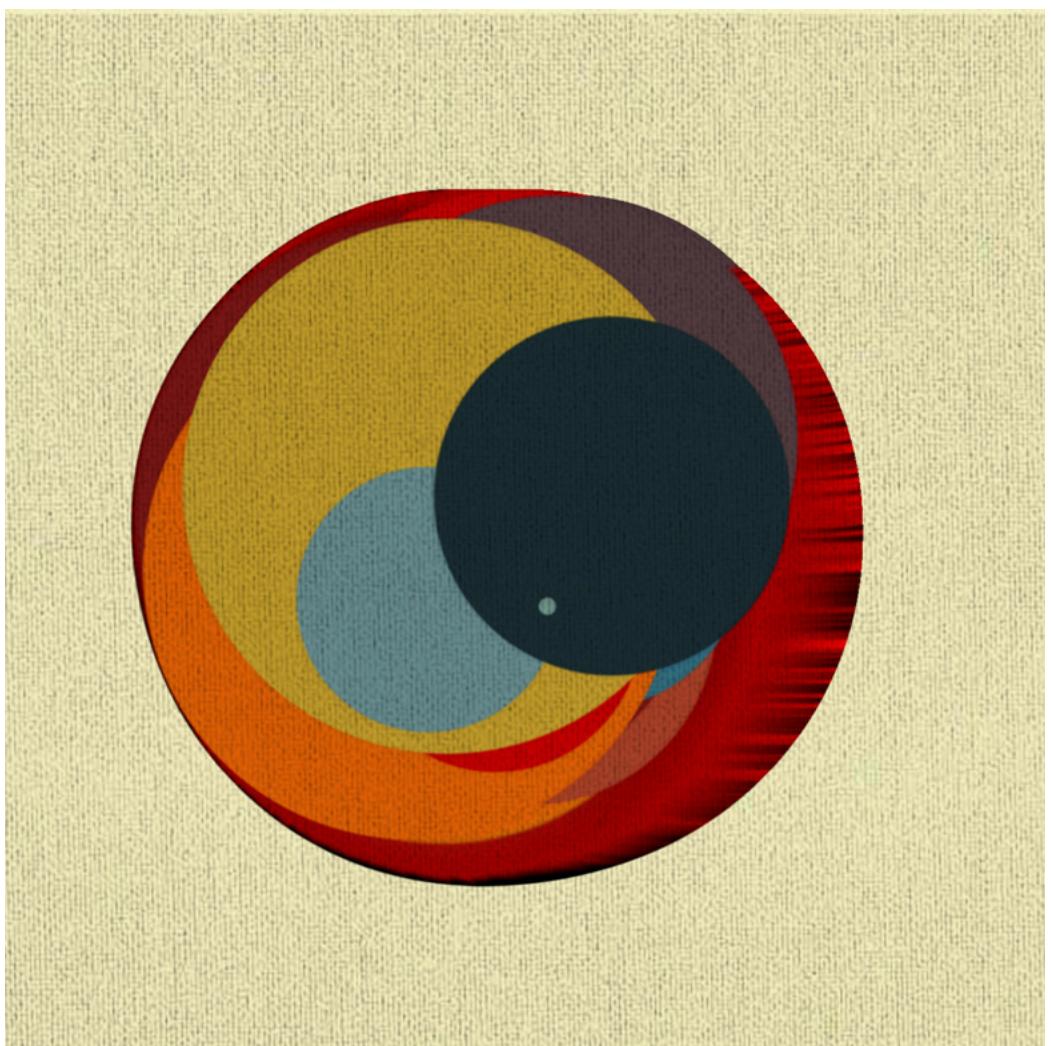
Using the process and style of techniques such as pencil sketching and watercolor painting is the revival of hand drawing in the digital age. It presents not only the work but how the author thinks and does it, the linework and the brushwork. It is the place where thinking and working join together.

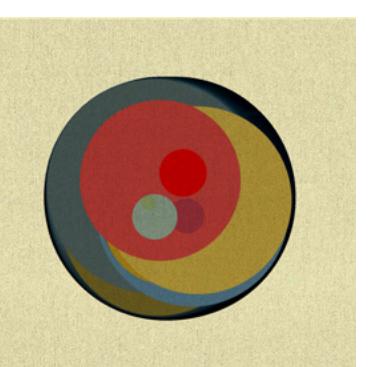
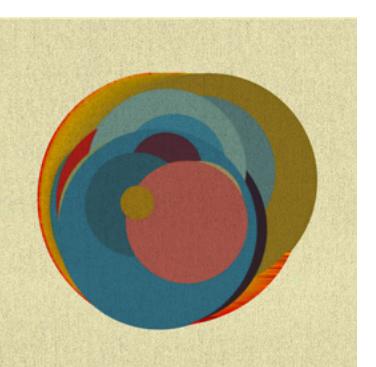
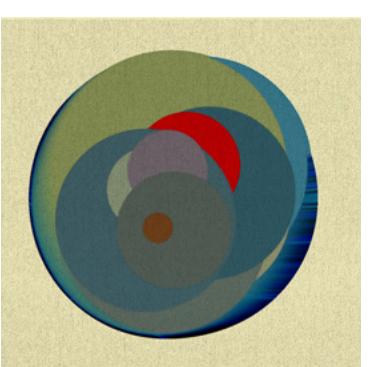
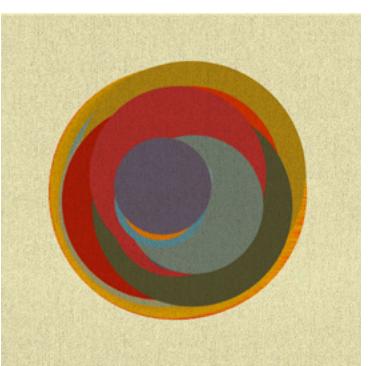
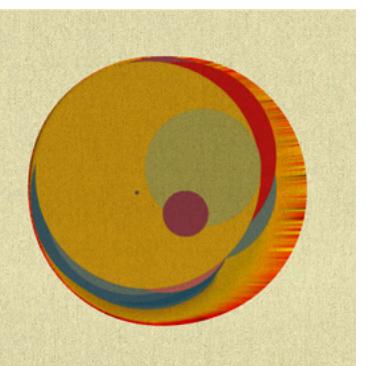
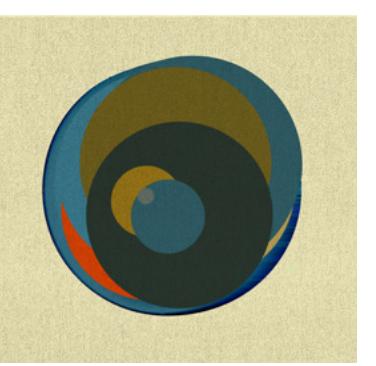
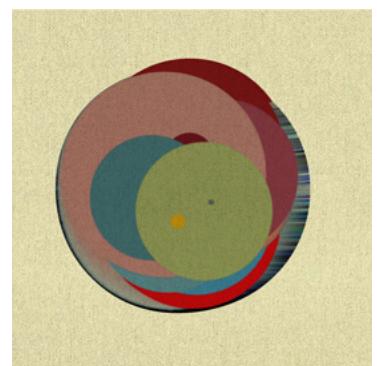
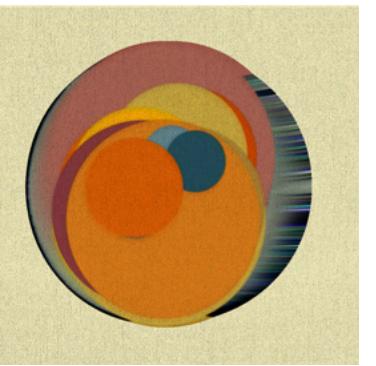
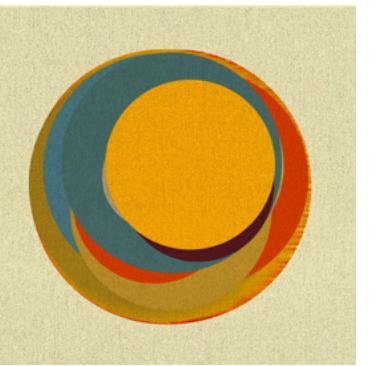
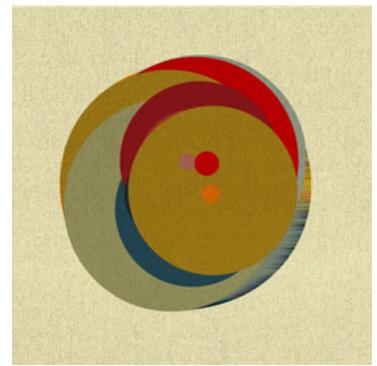
YUAN

2023 / Personal Interest

YUAN in mandarin has multiple meanings. It could be the shape circle. It could also be a predetermined binding force between people and people or people and the environment. This project aims to simulate the dynamic phenomenon and capture the tension, balance, and serendipity of the predetermined binding force that shapes our world.

[Live Demo](#) [Source Code](#)

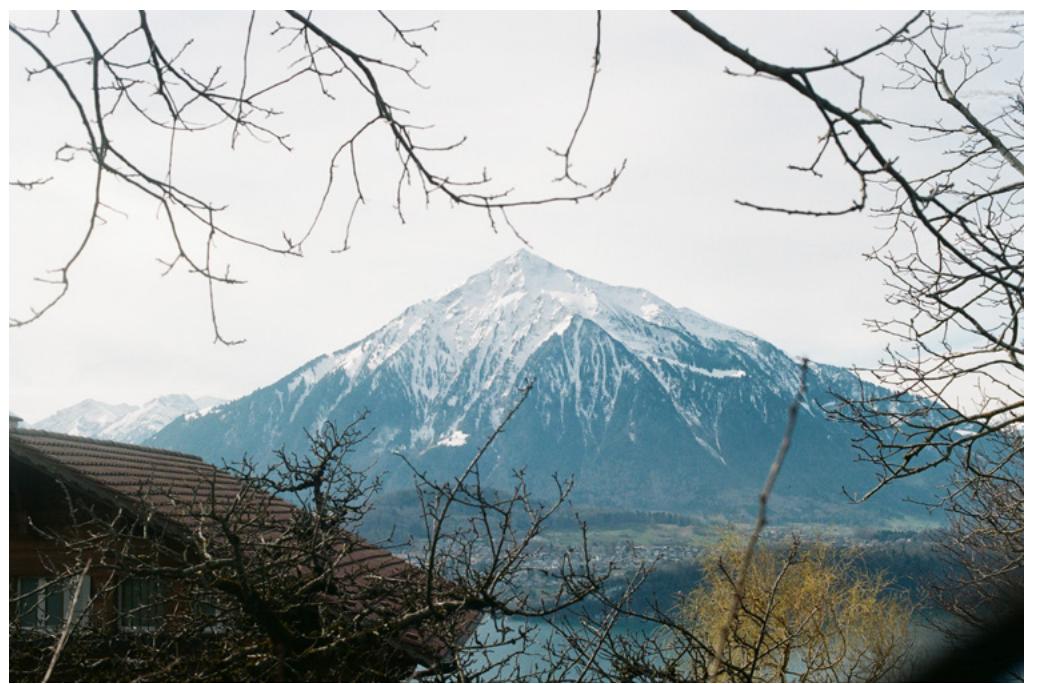
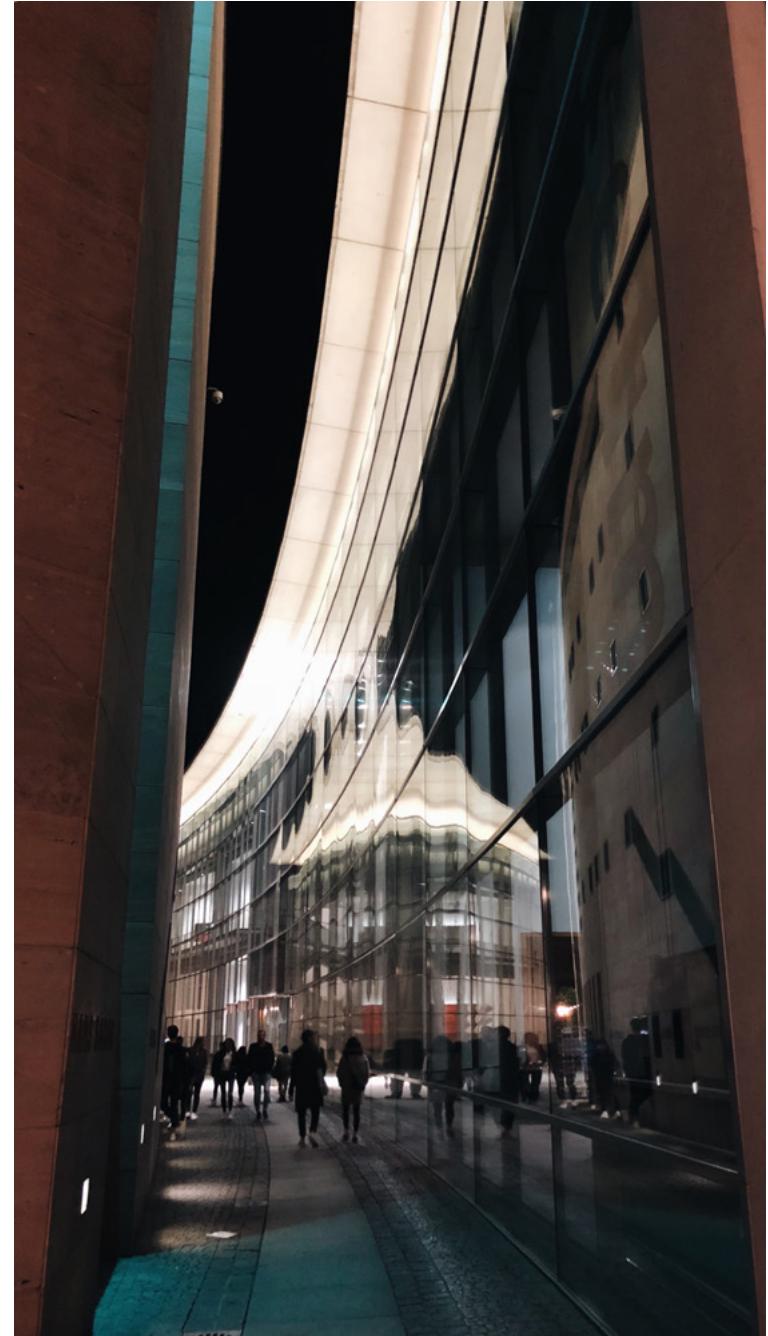




Photography

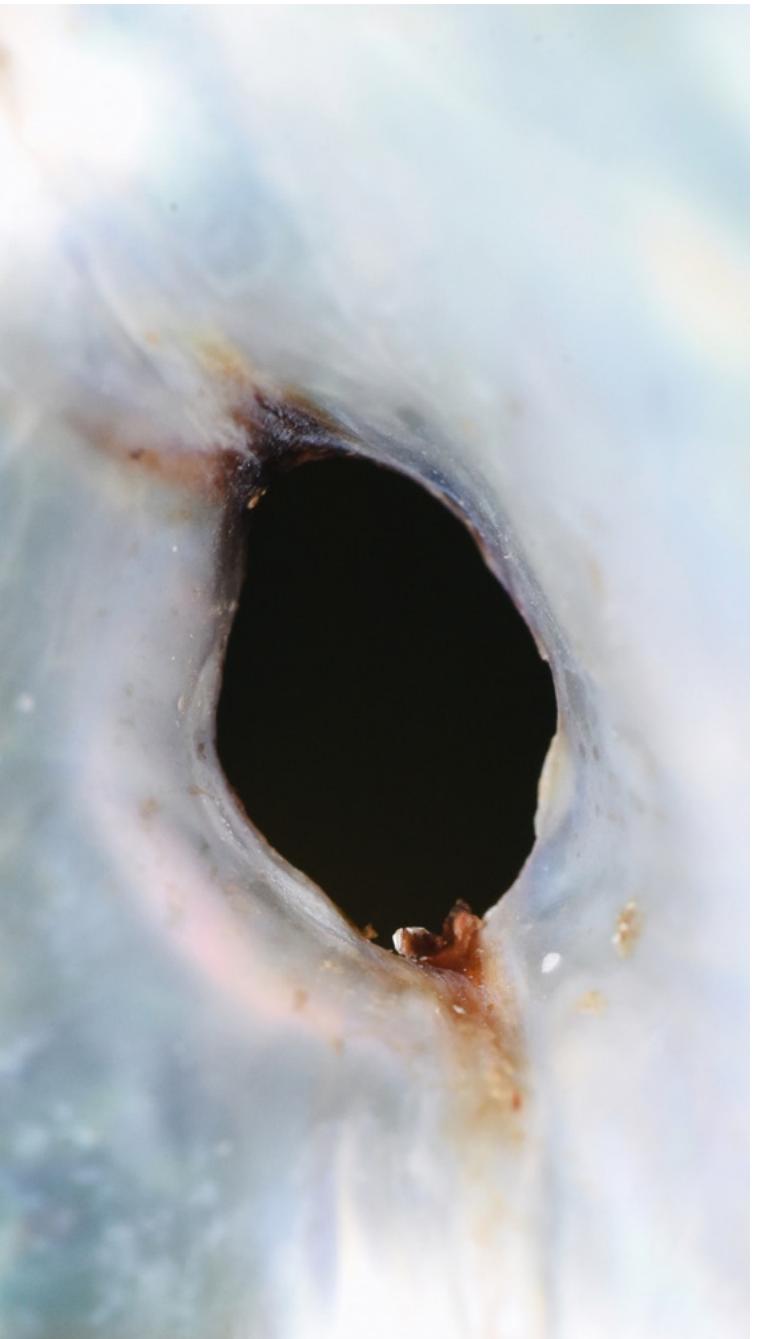
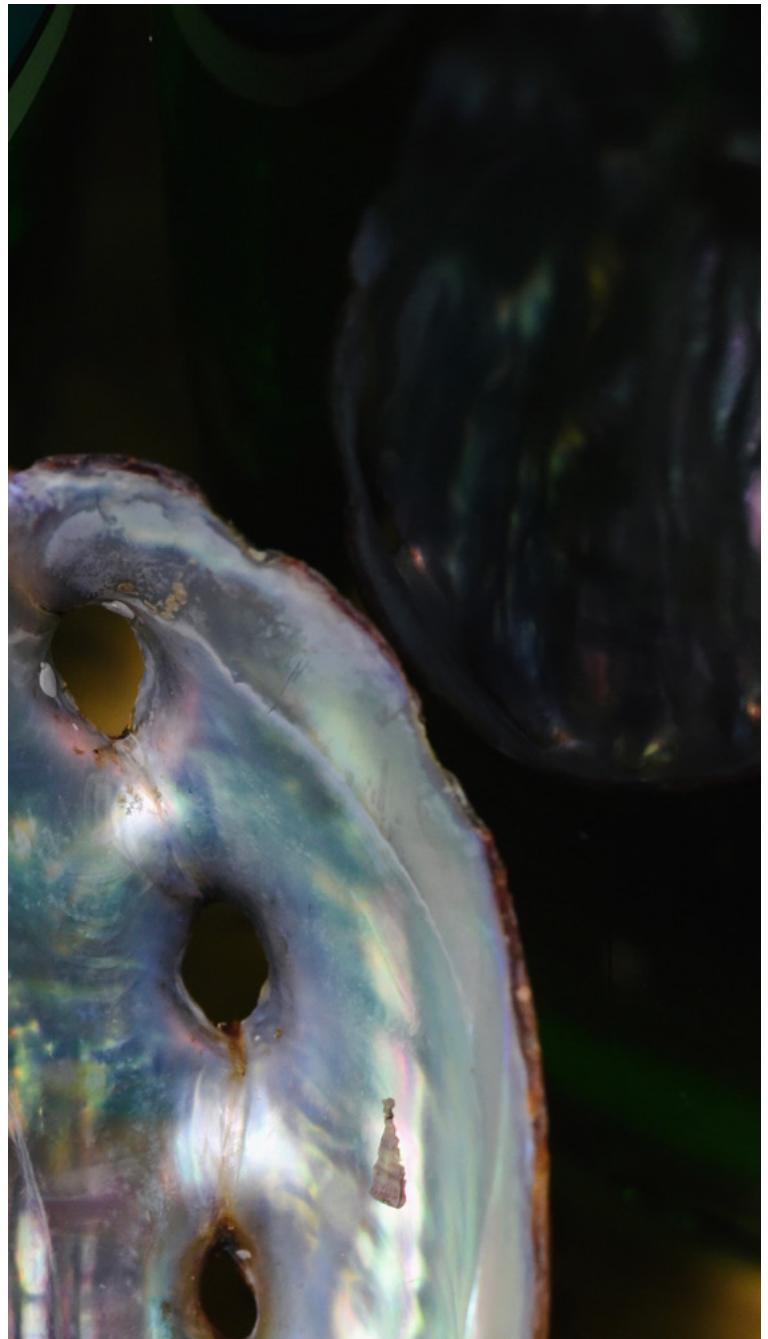
2019-2020 / Personal Interest

Though architecture is a projection of humans' minds, it has never been a real departure from nature. The built environment is a theatrical stage. In it, people should be actors, and at the same time should be audiences. This series presents some views about humans, nature, and the built environment.

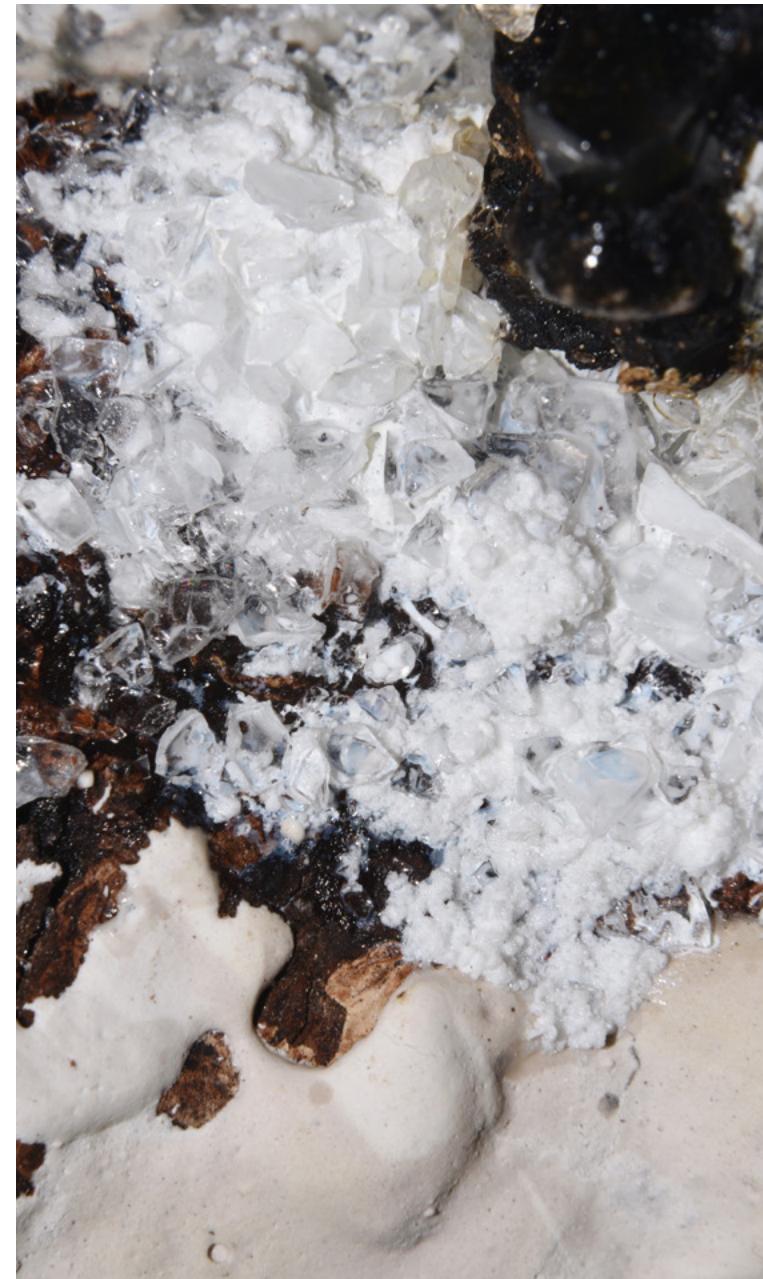


This series percepts familiar objects in an unfamiliar way. Through the microscale lens, materiality, space and geometry were redeicovered, the surface of an object is like a landscape, a new world of fantasy.

Seashells



Beef Croissant

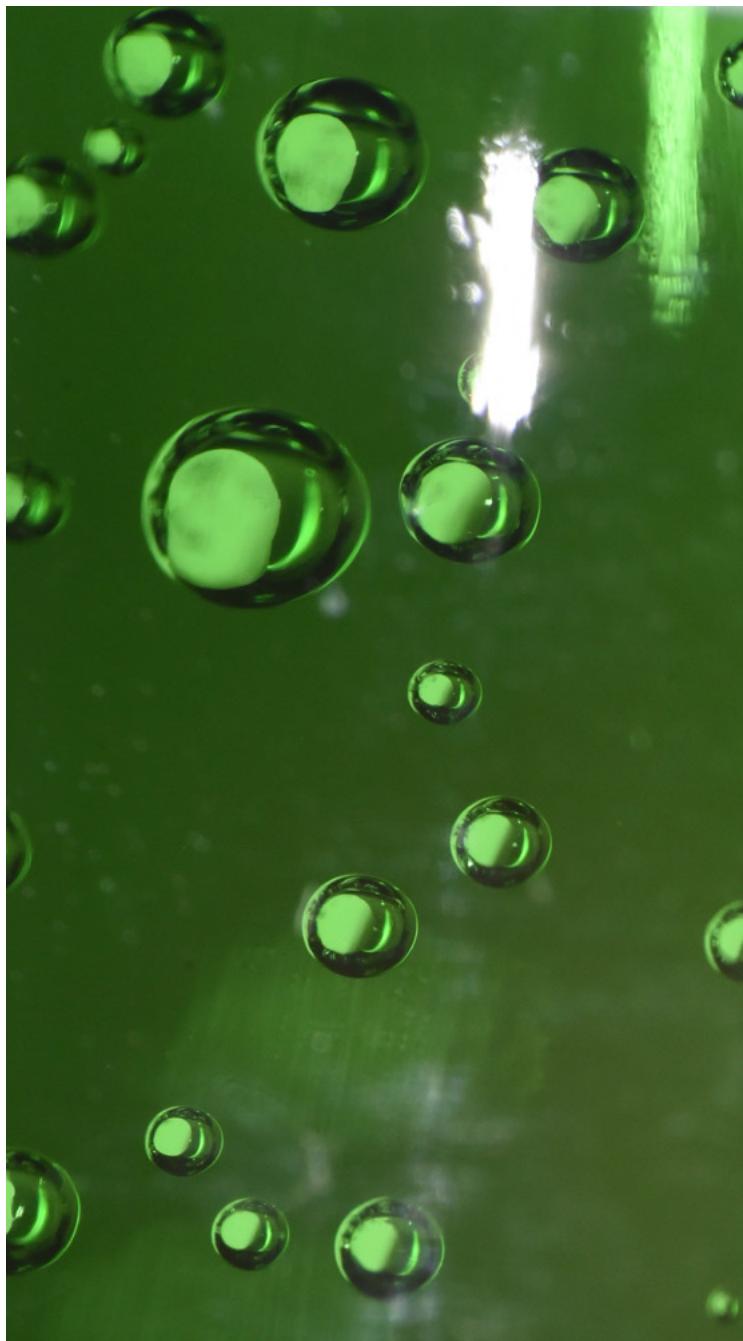


Detail of a Personal Work

Water Drops on a Food Container

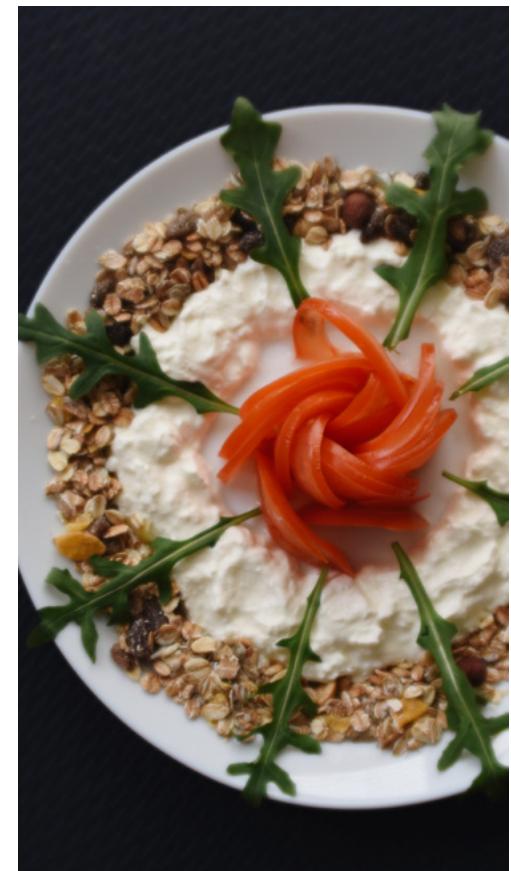


Bubbles in a Glass of Water



Plating

2019-2020 / Personal Interest

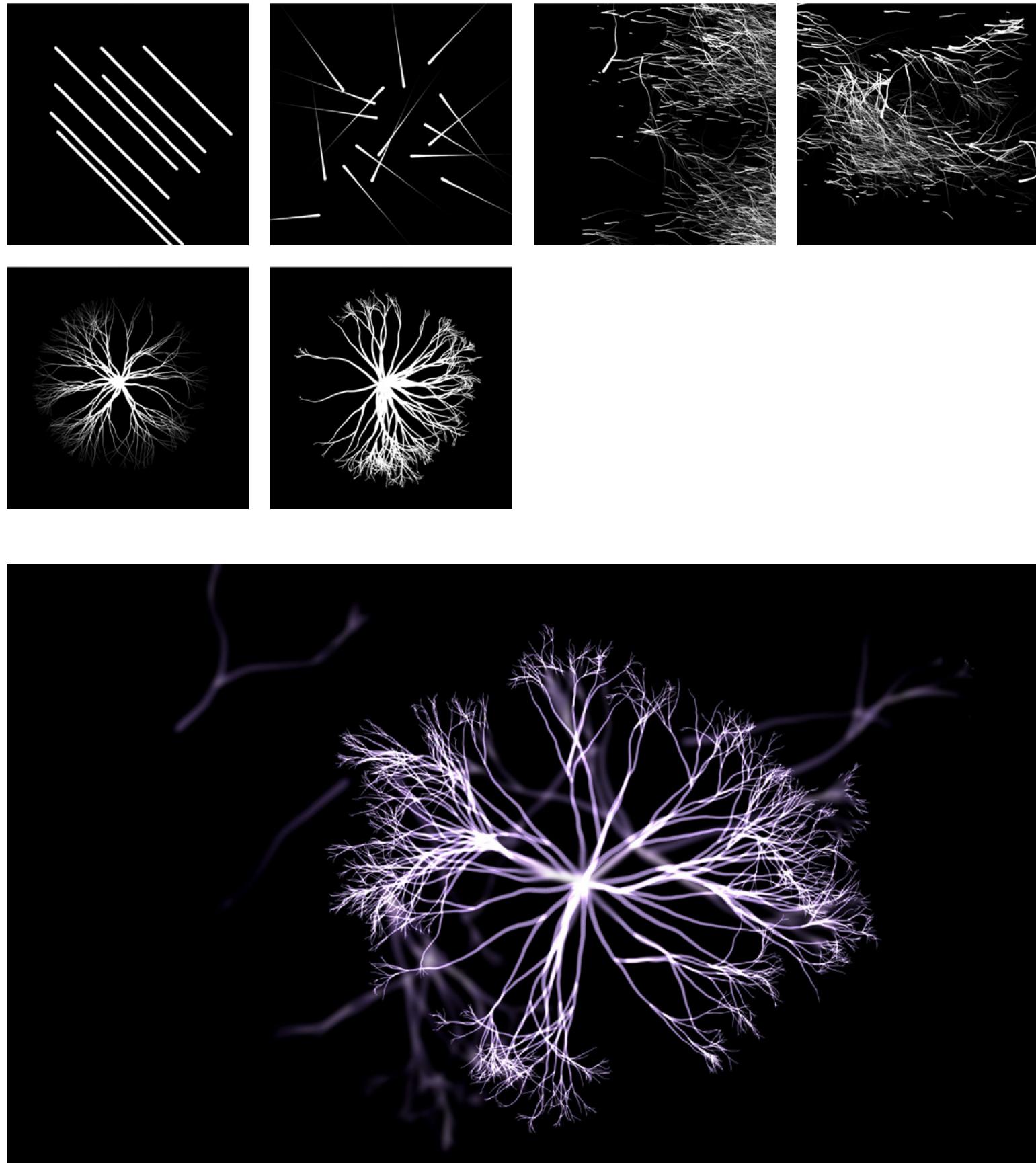
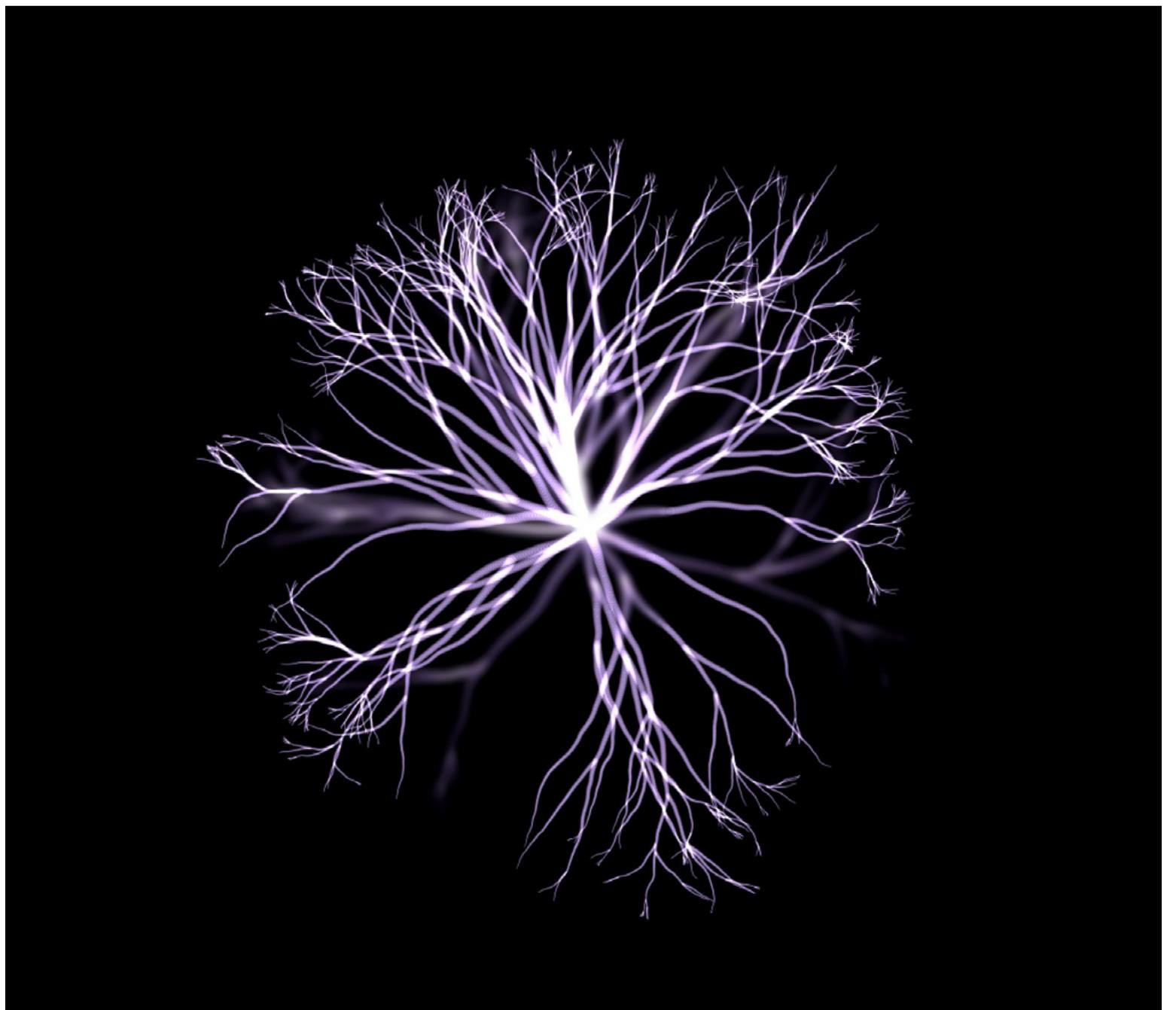


Thinking about the arrangement of elements on a plate is not only about visual experience, but about the flavor, the color, the texture, and the relation between each ingredient. It could be a small design practice for day-to-day life.

The Nature of Growth

2019 / Personal Interest

In this project, simple geometry and animation techniques were coded to simulate the process of growth, the irreversible increase of a body's organization that responds to space and environment throughout its life cycle.

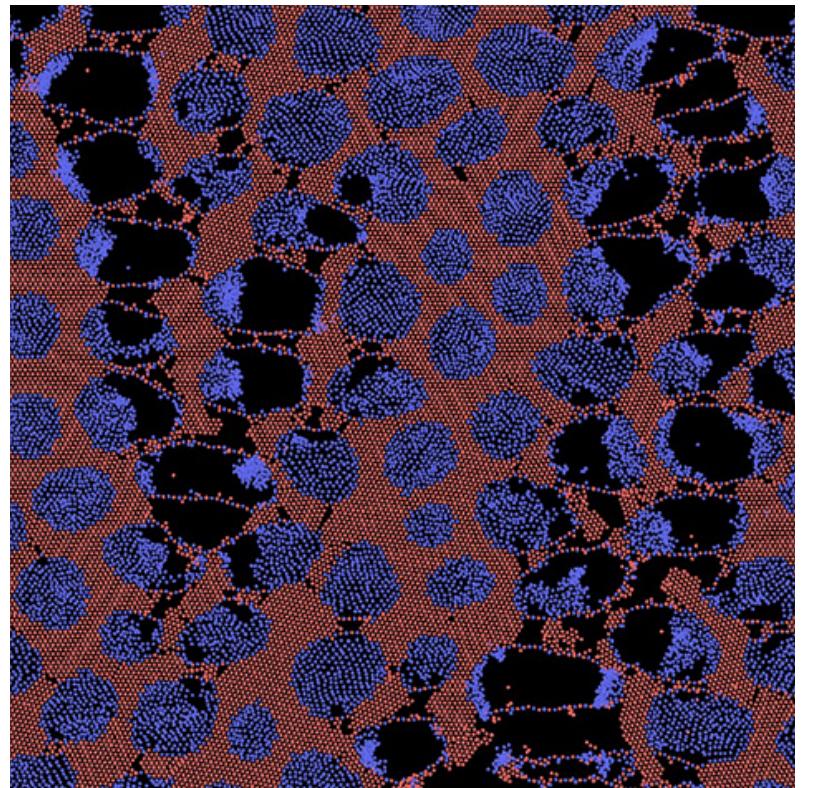


Bio-Inspired Composite Materials

2019 NCREE - NTUCE Joint AI Research Center
Summer Internship / Advisor: Shu-Wei Chang

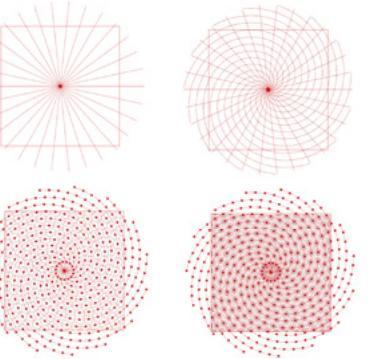
This project uses parametric models to generate a series of patterns inspired by Phyllotaxis, a common packing form in nature.

Later, Molecular Dynamics (MD) was introduced to simulate and gain properties, stress distributions, and probable fracture modes of composite materials. Hope to generate data for artificial intelligence models input and develop various materials in the future.

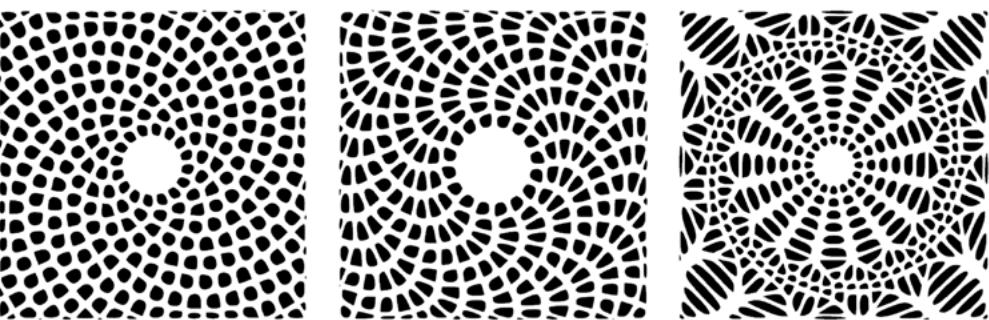


Biomaterials are usually composite materials that have high strength and toughness.

1. Phyllotaxis Inspired Patterns

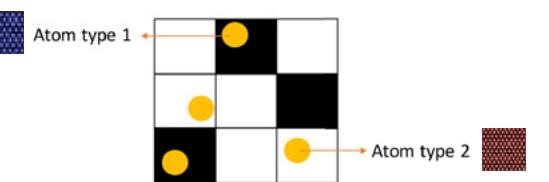


1.

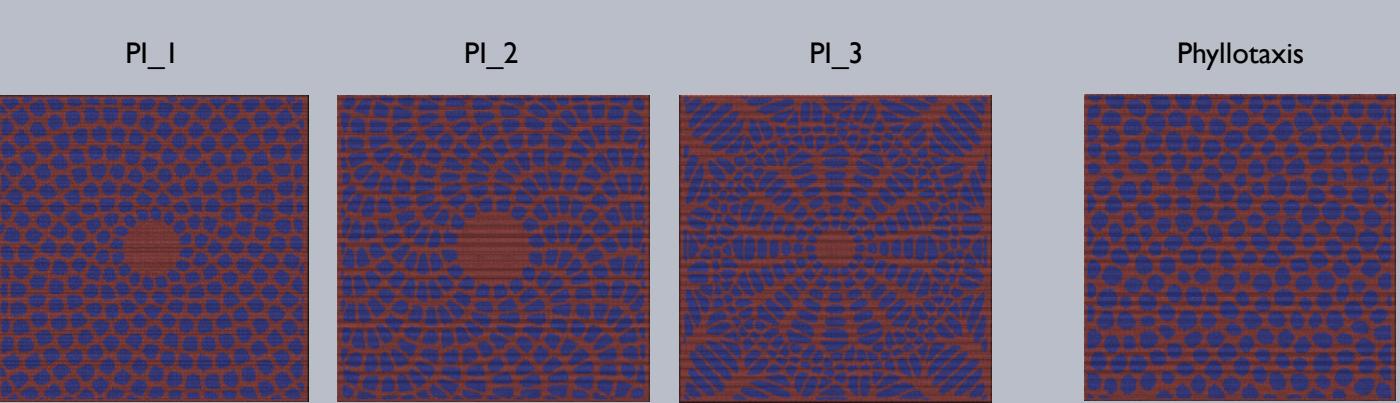


2. Image to Particle

Transform the geometry into particles that contain coordinate information.

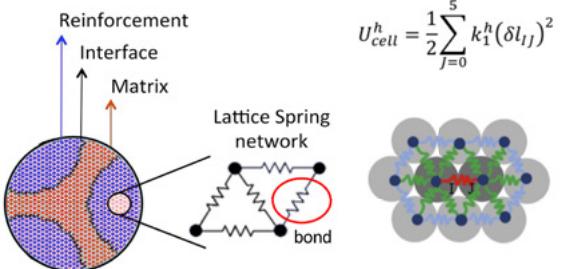


2.

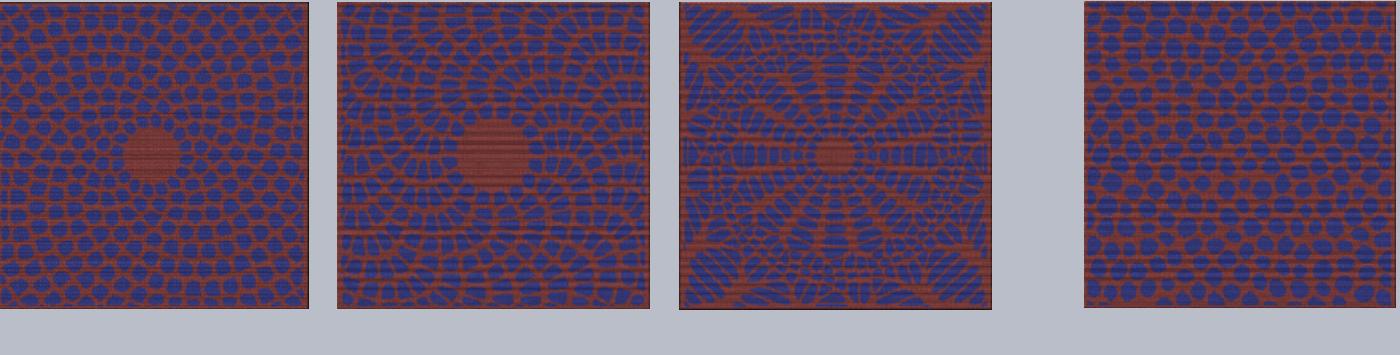


3. Lattice Spring Model (LSM)

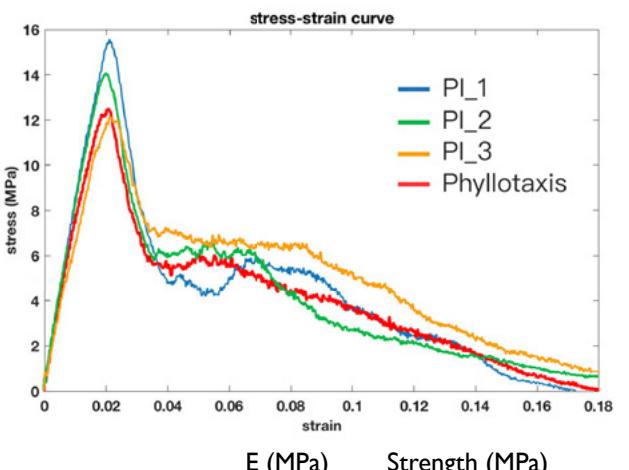
3 types of bond \rightarrow 3 values of spring constant (k)



3. Lattice Spring Model

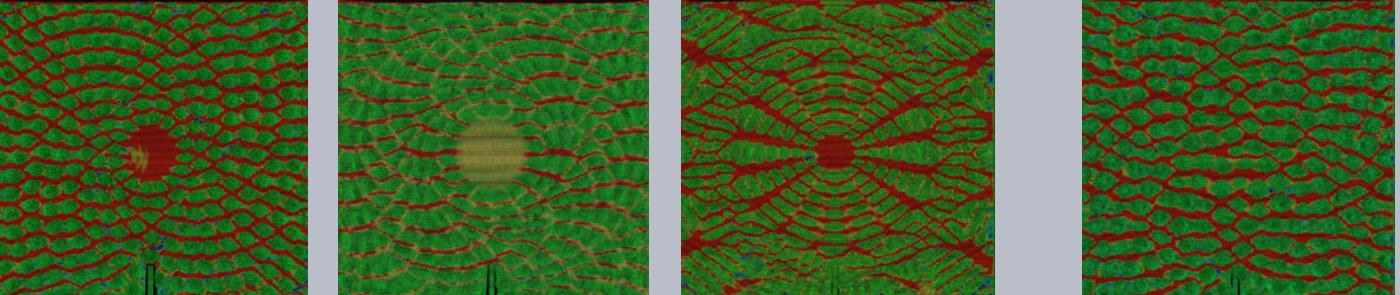


4. Tensile Test (Molecular Dynamics)

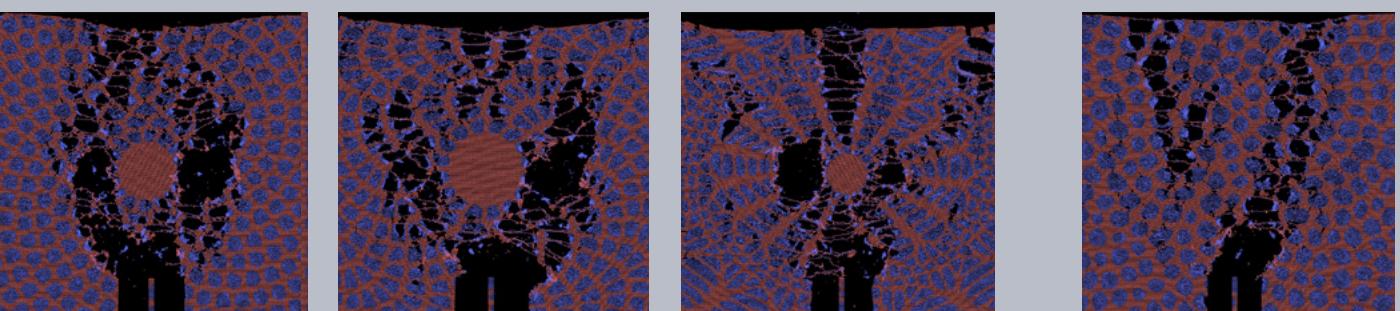


	E (MPa)	Strength (MPa)
PI_1	341	15.5
PI_2	284	14.1
PI_3	313	11.9
Phyllotaxis	242	12.5

4. Stress Distributions



Fracture Modes



Botani Plan

2020 / Personal Interest

By selecting all sorts of reuseable and recycled elements through aesthetics and functionality, this project assembles solid waste and natural materials in an organic form, discussing the issues between social development and environmental sustainability.



Materials: Wood, Plaster,
Recycled Pulp, Plant Debris,
Industrial Waste, Recycled
Glass, Accessories





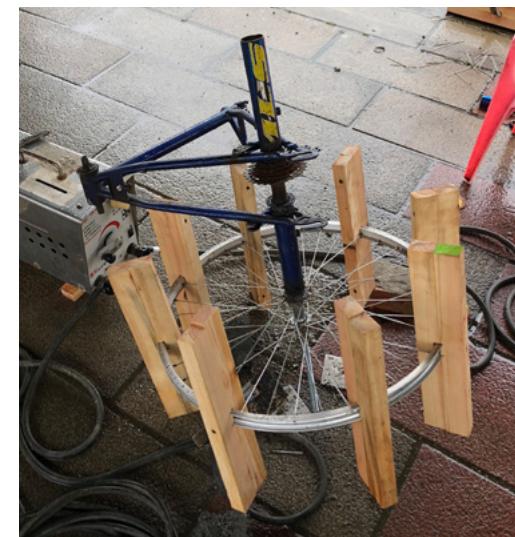
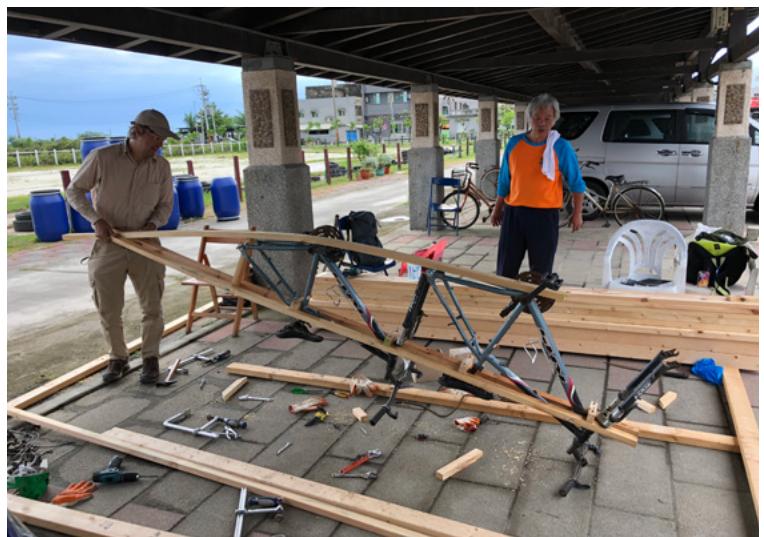
Floating Structures

2019-2020 / NTU Civil Engineering + NCKU Architecture joint workshop

Instruction team: Hervé Capart, Shih-Hung Yang, Fu Leung Lien

Role: Teaching Assistant, digital modeling and simulation, collaborate on design and fabrication in the instruction team

In the face of rising sea levels, how can private waste of coastal areas be leveraged for public benefit? In the 2019 instruction team, we collected broken bikes from coastal area neighborhoods to build a pedal-powered boat. The boat serves as a transportation and amusement facility at the Beimen Lagoon Visitor Center in Southern Taiwan.



In the 2020 instruction team, we try to push the design further by introducing wind power in our new floating structure. We recycled the 2019 instruction team project and a student group's work to build a floating structure powered by a windmill. The bike components of 2019 became the mechanism, and the floating parts were used to enhance the stability of the design.

