YUNTIAN ZHANG

DESIGN PORTFOLIO

Edition: 04.01

Year: 2025

EDUCATION

MS.AAD @ Columbia University 2022. 05 — 2023. 05

B.Arch @ Syracuse University 2017. 08 — 2022. 05

ACTIVITIES & ACHIEVEMENTS

Entrepreneurial Lead — @ NSF North-east Regional I-Corp

Panelist — @ "Utopia | The Shape of Things to Come" Exhibition

Co-Host — @ "Heterotopias | Of Other Places" Exhibition

External Consultant — @ Columbia University Game Research Lab

Excellence Award Winner — @ The 19th Asian Design Competition

Exhibitor — @ 2021 Virtual Architecture Students Exhibition

Exhibitor — @ "Challenge and Opportunity" Exhibition

EXPERIENCE

Freelance Part-Time UI/UX Designer @ Bomie LLC 2024. 12 — Present

- Created product visuals and presentation decks for client meetings and product promotion

Assistant Designer @ PolyGone Systems, Inc. 2023. 08 — 2024. 09

- Led design and execution of the Microplastic Educational Pavilion with 40% cost reduction compared to original proposal and $3K below assigned budget
- Designed and prototyped a full-scale microplastics filtration system, achieving a 96% retrieval rate, exceeding initial design goals by 16%
- Designed and prototyped the first client-use microplastic remediation flotation pontoon, achieving 72% microplastic capture rate and informing 1 key design improvement based on customer feedback
- Designed company marketing materials aligned with branding guidelines, leading to a 35% trade show conversion rate, surpassing the industry benchmark
- Conducted a 4-week customer research and 18 customer interviews, identified more than 4 key pain points and 2 market opportunities, and informed 2 key design pivot on product development
- Developed social media graphics and email campaign contents
- Designed a modern custom spiral staircase for the CTO's family property renovation

Architectural Design Intern @ MUDO Architects 2020. 07 — 2024. 08

- Created schematic designs for a master plan, skyscraper, and cultural museum projects
- Won the 2021 AIA Shanghai & Beijing Design Excellence Award for the Qingtian Museum design proposal
- Established task coordination guidelines among other interns to meet tight project deadlines
- Updated architectural plans based on engineering team's feedback

Architectural Design Intern @ Genarchitects 2020. 05 — 2024. 06

- Designed 3D-printed components and crafted physical model
- Created research analysis diagrams for projects' presentation documents
- Curated the company's portfolio for presentation at exhibition-use

Architectural Design Intern @ SIAD-C Tus Design Group 2020. 06 — 2024. 08

- 3D modelled facade details of two residential projects
- Created analysis diagrams and plan drawings
- Created images for client presentation decks

CONTENT

SOUNDSCAPE

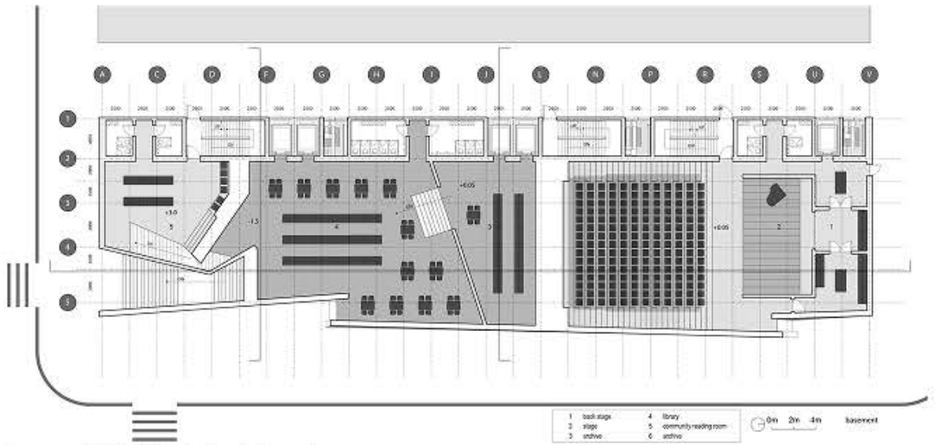
Shanghai, China

Typology: Museum
Collaborator: Ziyi Zhou
Advisor: Fei Wang (Syracuse SOA ARC 409 Comprehensive Studio)

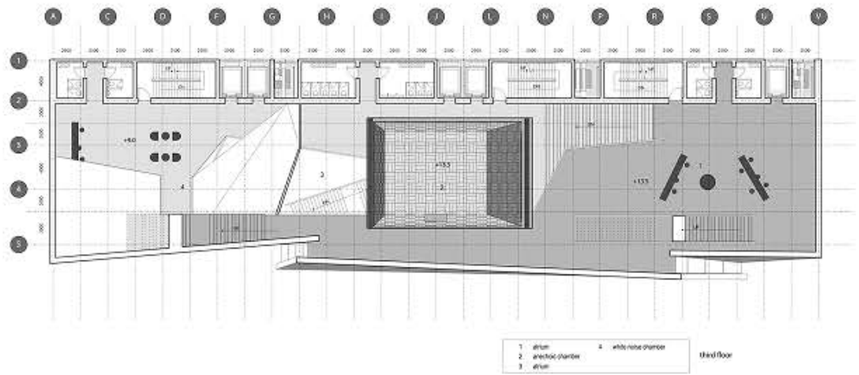
83 percent of human perception of things comes from vision, and only 11 percent comes from hearing. The singularity of perception resulted in sensory crystallization, mentioned in ***Plastic Bodies: Rebuilding Sensation After Phenomenology*** by Tom Sparrow.

It's a process where sensations coalesce into distinct forms, thereby influencing our perception and embodiment. Through sensory crystallization, our bodies continuously reshape themselves in response to environmental stimuli, highlighting the fluid yet structured nature of sensory experience. In the crowded and noisy urban environment, the sensory crystallization of the hearing has trained the urban residents to be less and less sensitive to the common noises in the background, such as the friction between wheels and asphalt roads, air conditioner humming at home, the echoes in the subway station, and dogs barking in the park. Urban environment has trained human bodies to ignore as much sound as possible to focus on the tasks at hand by depriving the nervous sensitivities to different sounds that are psychologically therapeutic to the better performance of human bodies and minds.

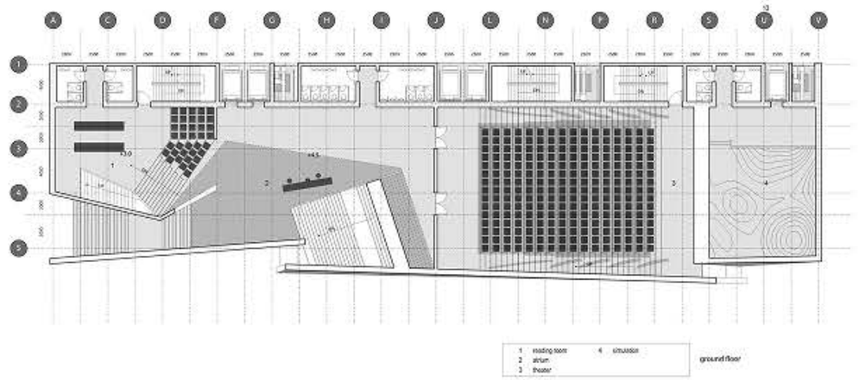
This project intended to break people's sensory crystallization and stimulate the sensitivity rethinking of hearing with unfamiliarity and unusualness. To create which, we proposed a series of sound-related and technologically supported programs, that expands and tests the boundary of daily life hearing. The programs include anechoic chamber to experience the extreme silence, simulation lab to magnify and visualize the sound vibration, white noise chamber to feel background sound of our daily life and sound therapy, sound art exhibition, sound theater, etc.



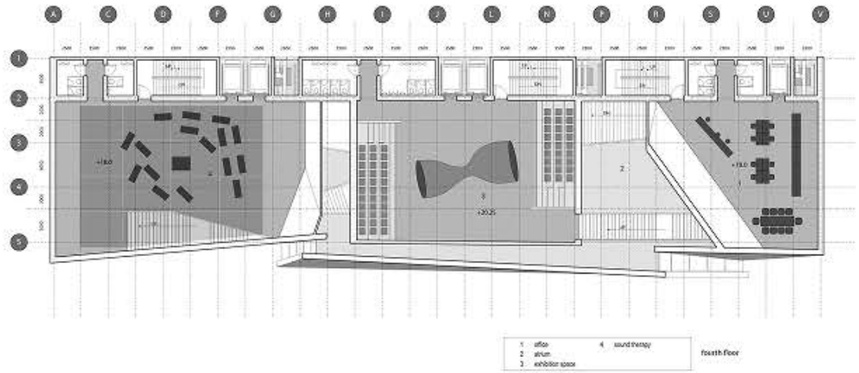
Basement (Archive + Back Stage)



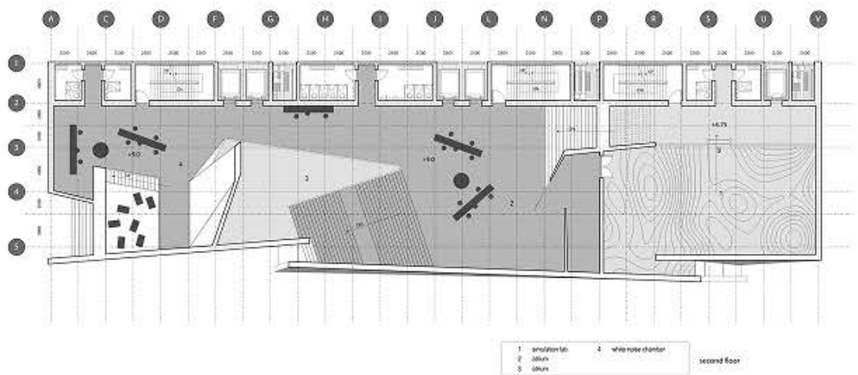
3rd Floor (Exhibition + Anechoic Chamber + Atrium)



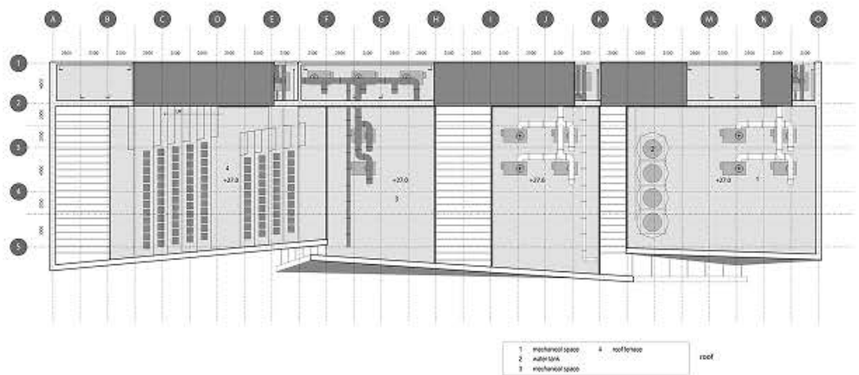
1st Floor (Library + Atrium + Theater)



4th Floor (Meditation Chamber + Exhibition + Office)



2nd Floor (Exhibition + Atrium + Simulation Lab)



Roof Floor (Roof Theater + MEPs + Skylight)

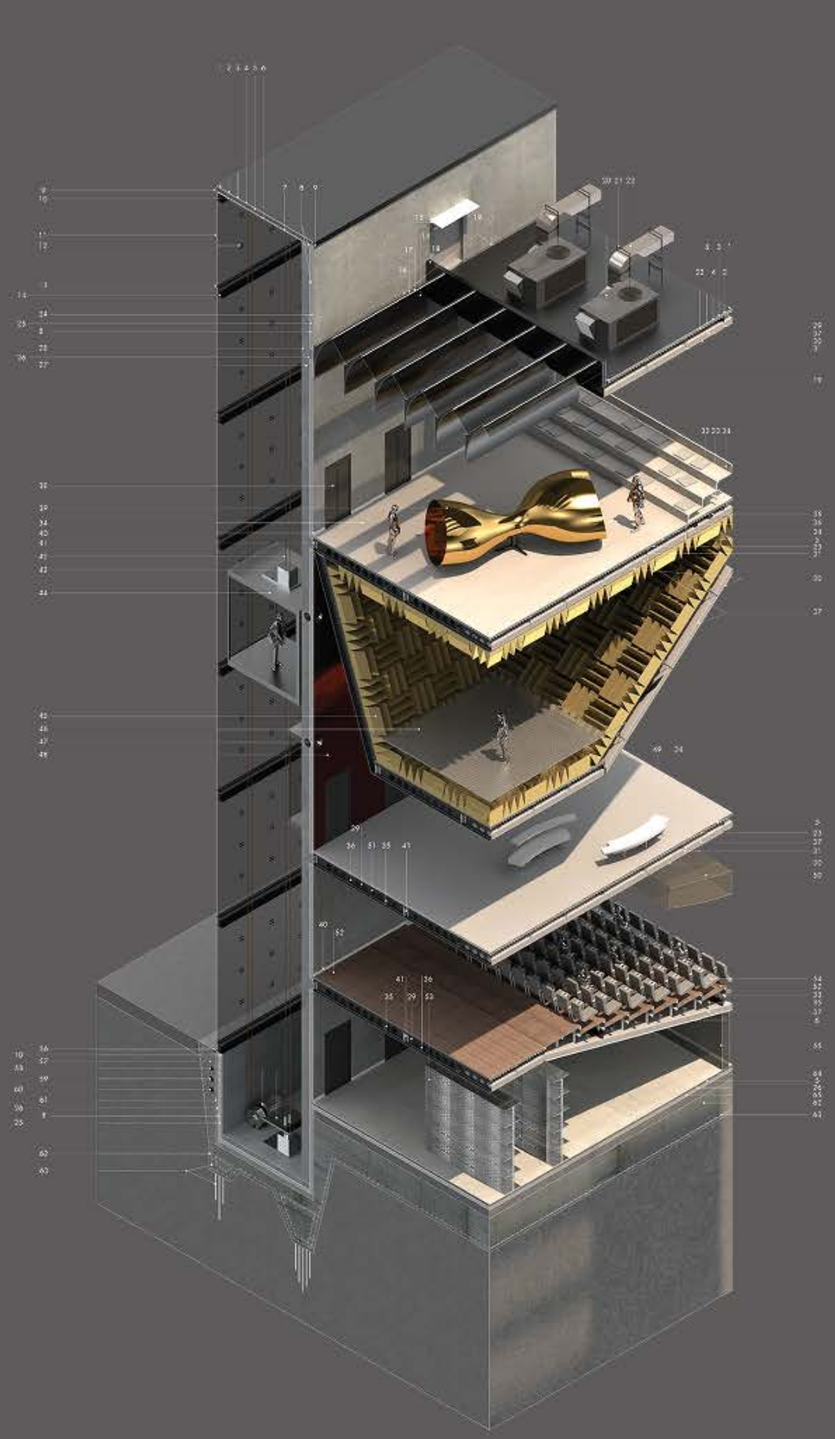
Building Systems

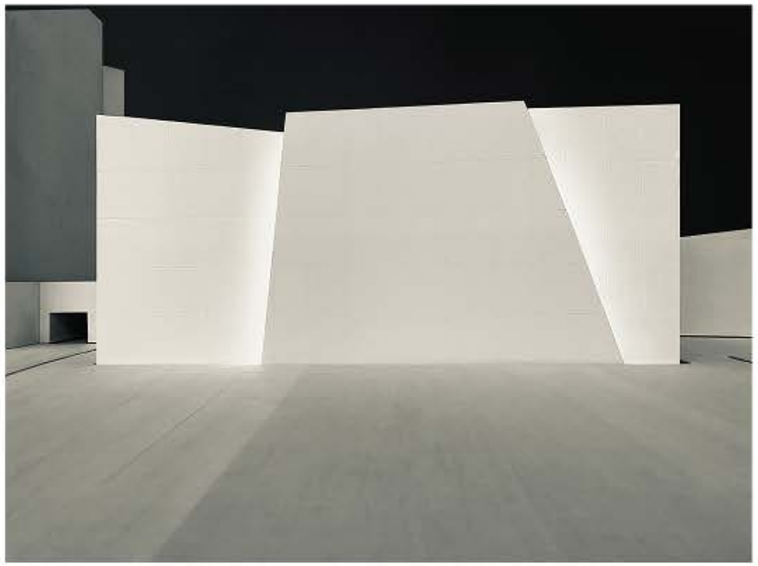
The building enclosure creates an enclosed immersive acoustic experience while intentionally limiting natural light to control interior brightness. The skylights incorporates designs that bounce off direct sunlight to create soft and smoothing lighting for the interior environment. They are also designed for redirecting rainwater to prevent accumulation and natural ventilation in play with the signature entrance and interior geometries of the building.

Acoustic Design

The atrium design takes advantage of the geometrical shape of several amplifiers, creating an ambient environment for acoustic depth and infinite echoes, drawing visitors from the entrance to a sensory-reshaping experience.

1 roof waterproofing plaster
2 dry-seal membrane
3 protective liner
4 tapered screed
5 cast-in-place concrete, 50mm
6 concrete ceiling panel, 25mm
7 insulation foam, 50mm
8 insulation foam, 150mm
9 drape
10 steel stud
11 double-pane glazing
12 glazing holder
13 aluminum mullion
14 steel I-beam, 20cm x 30cm
15 rain screen, anodized aluminum
16 roof skylight panel, anodized aluminum
17 steel mullion
18 guardrail, anodized aluminum
19 drain gutter, steel mesh
20 HVAC machine
21 steel rack
22 HVAC insulated pipe, anodized aluminum finish
23 steel deck, 50mm
24 concrete panel
25 gypsum bard
26 vapor barrier & air barrier
27 cast-in-place concrete shear wall
28 steel I-beam 30cm x 40cm
29 steel I-beam 15cm x 40cm
30 translucent concrete ceiling panel, 25mm
31 steel ceiling panel hanger
32 gray seat cushion
33 steel stair support
34 stucco finish, 10mm
35 supply air tube, 150mm diameter
36 return air tube, 150mm diameter
37 insulation foam 200mm
38 aluminum elevator door, painted gloss black
39 double echo installation by Vincent Leroy
40 anodized aluminum basing, 100mm height
41 steel connection bolts
42 elevator cable
43 cable hanger
44 elevator car
45 anechoic foam
46 steel mesh floor
47 atrium air supply vent, 300mm diameter
48 reflective dark red aluminum panels, 75cm x 150cm
49 Classican sofa
50 ETFE air pillow
51 water pipe, 50mm diameter
52 wood plank flooring
53 steel book shelf
54 performance theater seat, gray leather & aluminum arm
55 translucent concrete brick wall
56 ground drain gutter, 20cm width
57 gravel
58 city water supply
59 city water exhaust
60 city hydrant
61 concrete retaining wall
62 concrete cast foundation
63 steel rebar
64 concrete cast foundation
65 rigid insulation, 200mm
66 facade concrete panels, 3m x 4m
67 HAY square table, anodized aluminum
68 HAY arm chair, anodized aluminum





POST-ANTHROPOCENE MACHINES

Somewhere In Antarctica, Earth
Typology: Extreme Environment Structures
Collaborator: Zheng Fang
Advisors: Britt Eversole, Roger Hubeli, Julie Larson, Jean-Francois Bedard (Syracuse SOA Thesis)

The notion of machine has shaped and directed the conception of architecture in relation to functionality, efficiency, and economy. But this 'form follows functions' neglects the agency of the machine in reinterpreting and reshaping human's relationship with the environment. This thesis intends to explore the antithesis of machine and its functional (and humanist) ambitions. Machines are not simply responsive objects, but are autonomous agents that could be aesthetisized through their interaction with both the environment and the human, offering a sensuous cohabitation between the human, the environment and the machine.

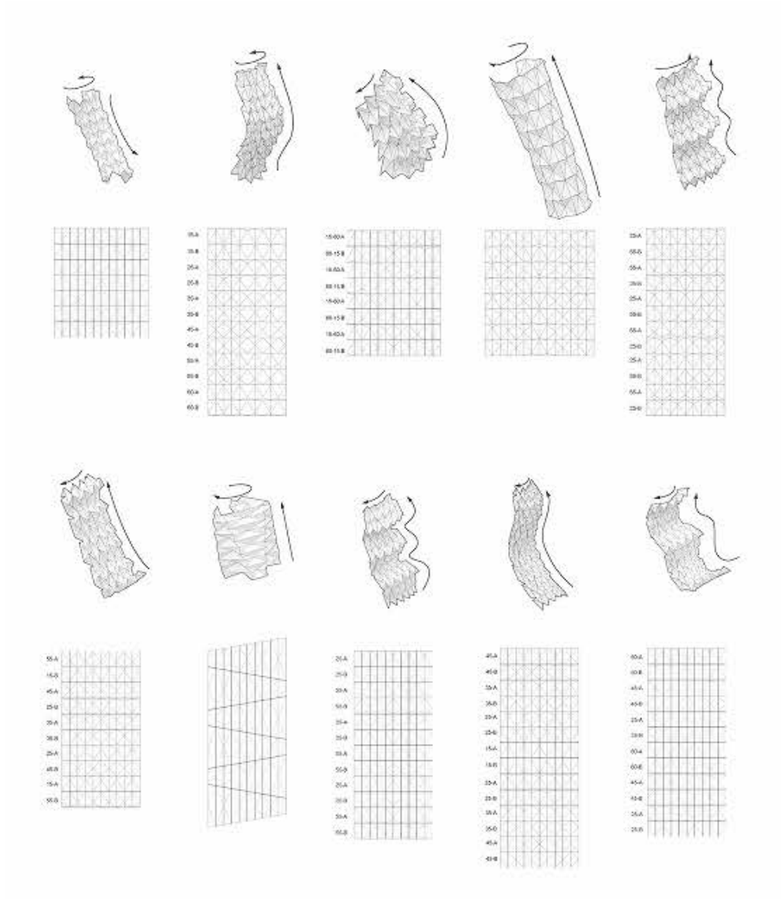
This thesis manifests itself as a series of pneumatic architecture machines made up of silicone components, pipes, valves, manifolds, circuits, and joints controlled by algorithms and sensors. The structures sense changes in atmospheric pressure and respond overtime. While the post-human machine is a material embodiment of information, it nevertheless rejects absolute human control, efficiency, and optimal solutions. Its core function is to generate unexpected effects, and conditions that expand our understanding of the environment, and the endless possibilities of the machine...

A posthuman continuum between human nature and technology catalyzed by smart materials, machine-learning, and indeterminate systems are challenging our conception of architecture as a strictly human-centric endeavor. The question now leads. For whom does one design? And how might architecture be integrated into what Haraway calls the "messy contingencies, material ambiguation, and heterogeneous audiences" within our environment?

The post-human is our present, and it requires extensive studies into the autonomous technology which will enable us to explore architecture not as something governed by disciplinary interiority; but as something that interact with the forces of the environment through highly contextual, embedded, formal, spatial, and experiential studies. The environement has not been neutral ground, but has always been "brisling with hybrids" in the act of becoming.

If the environment and the humans are soft, and penetrable, constantly ingesting, copulating, eating, growing, drinking, defacating, and above all exchanging matters and information, then so is architecture. Architecture is never rigid.

Architecture is soft in terms of its constant flux of energy to maintain a desirable condition. However, mechanical systems are fixed and non-responsive. And this softness has failed in terms of its spatial and experiential implications. So this thesis takes on the challenge of bringing architecture softness to spatially comprehensible scale.



Architectural Softness:
Origami

Origami's mathematical beauty is exhibited through its structural rigidity and mechanical flexibility. The angle of creases would cause defection in folding directions and change in structural rigidity. Most of origami are categorized into planar-shaped, spiral-shaped, and dome-shaped. Thus origami has huge practical potential in robotic design and form-finding.

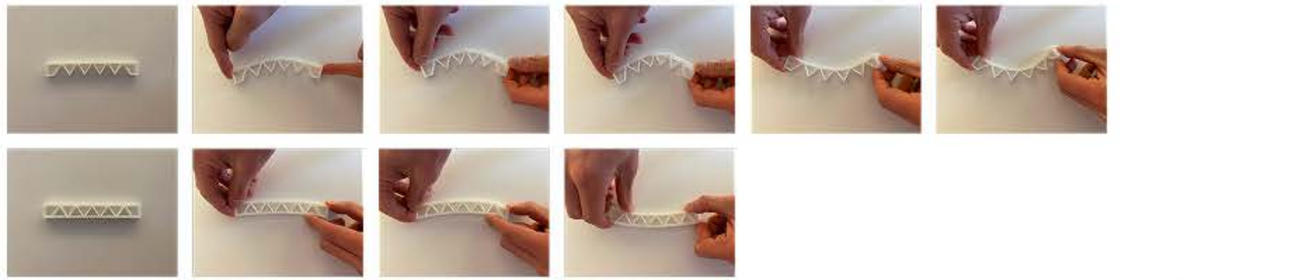
Architectural Softness:
Rigid Body Motion

Learning from robotic rigid body motion, the transforming pavilion is consisted of stable triangular parts and transformable quadrilateral parts that regulate its motion and constantly reshaping the space beneath the canopy.




Architectural Softness:
Silicone Rubber Pneumatic Component

To investigate softness, we tested on hard materials like resin, and by giving it a zigzag teeth-like pattern and thining the thickness, the printed parts become plastic elastic and can be bended towards certain directions. This elasticity makes this fabrication method suitable for making joints, movable connections, and other kinetic parts.

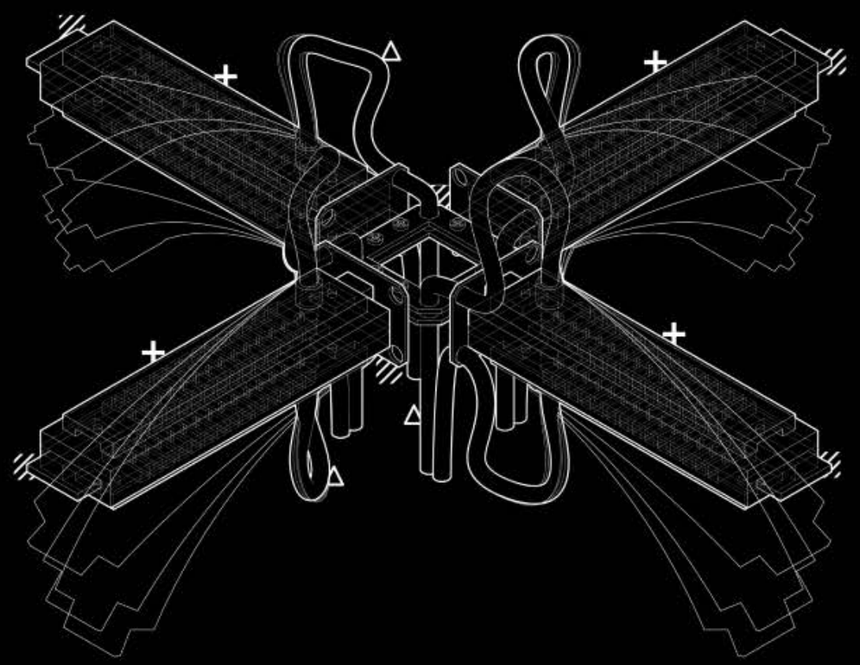



Architectural Softness:
3D-Printed Flexible Skeleton

The 3d printed teeth-patterned parts would required outer forces to actuate the bending motion and pneumatic actuation can be a perfect fit for it. By 3d printing molds in the shape of pneumatic chambers, the casted silicon rubber would remain internally hollow for air to go in and deform the soft silicon rubber. This deformation can be used to actuate the deformation of the teeth-patterned skeleton.

Post-Anthropocene Machine No.1

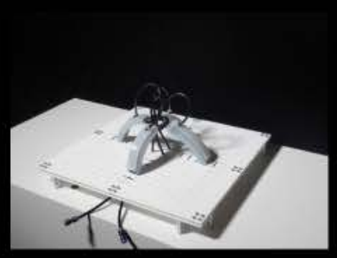
The No.1 prototype features pneumatic controlled arms arching at one end with another pinned down to form a dome-shaped cavity underneath.



△ *Pre-Fabricated*

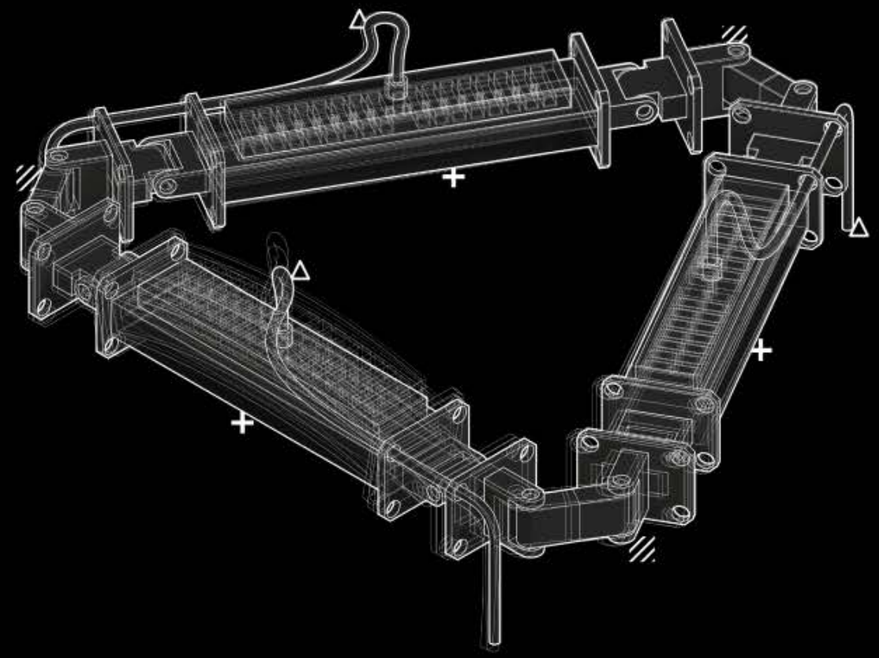
▨ *3D-Printed*

\+ *Cast*



Post-Anthropocene Machine No.2

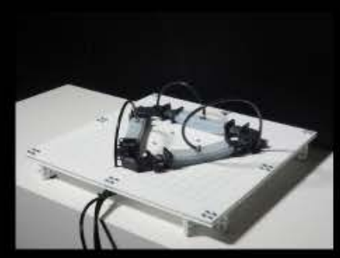
The No.2 prototype features pneumatic controlled arms arching in the middle with two ends pinned down to form a slice of opening underneath.

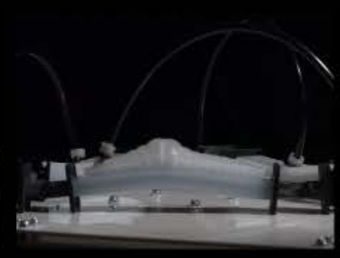


△ *Pre-Fabricated*

▨ *3D-Printed*

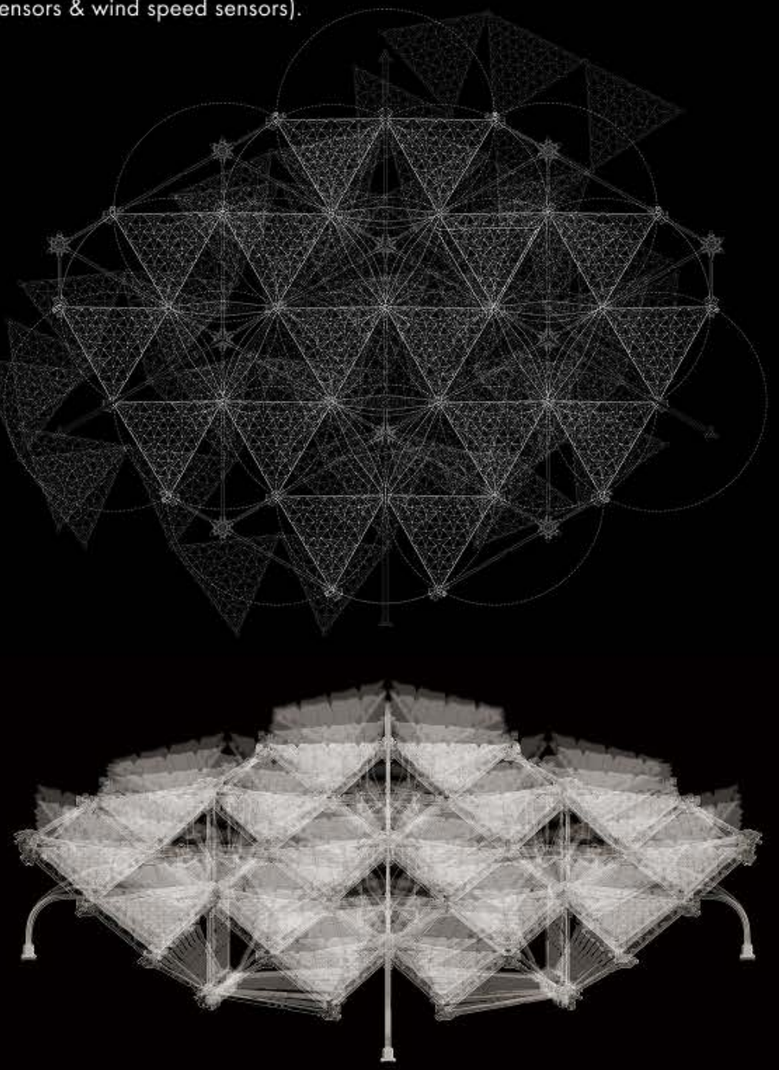
\+ *Cast*

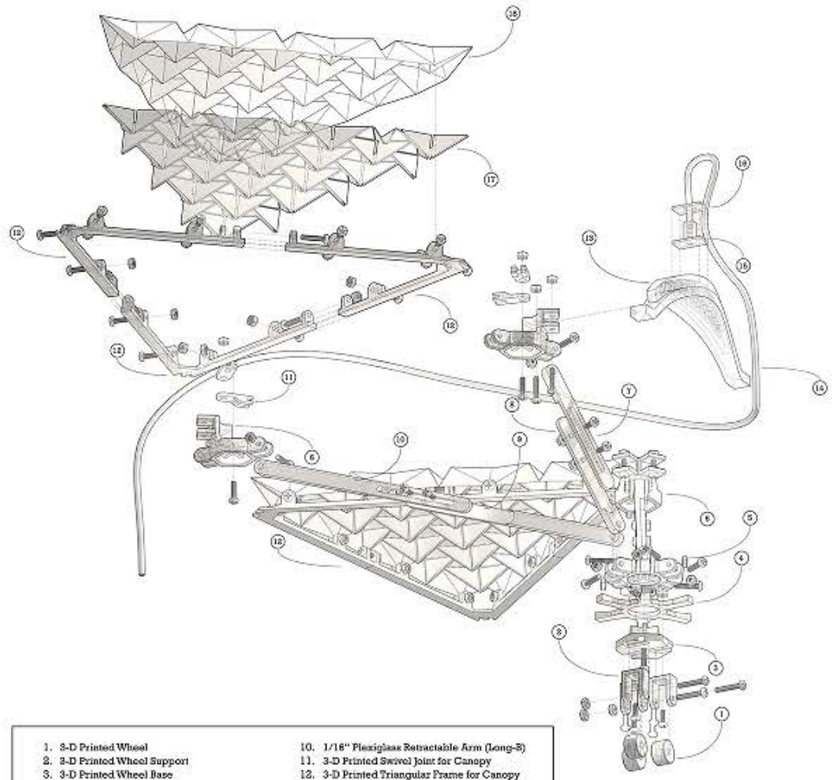




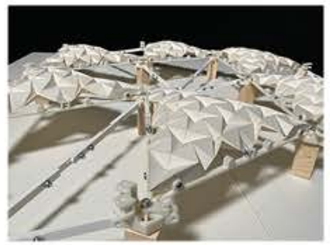
Post-Anthropocene Machine No.3

The No.3 prototype incorporates pneumatic arms, rigid body structures and triangulated origami tessellation, wiggling and crawling reactive to external environmental sensors (such as air pressure sensors & wind speed sensors).





1. 3-D Printed Wheel
2. 3-D Printed Wheel Support
3. 3-D Printed Wheel Base
4. 3-D Printed Arm Support
5. 3-D Printed Multi-Directional Joint
6. 3-D Printed Hybrid Joint
7. 1/16" Plexiglass Retractable Arm (Short-A)
8. 1/16" Plexiglass Retractable Arm (Short-B)
9. 1/16" Plexiglass Retractable Arm (Long-A)
10. 1/16" Plexiglass Retractable Arm (Long-B)
11. 3-D Printed Swivel Joint for Canopy
12. 3-D Printed Triangular Frame for Canopy
13. Casted Silicone Pneumatic Component
14. Pre-Fab 4mm Tubing
15. 3-D Printed Pneumatic Air Seal
16. 3-D Printed Pneumatic Air Seal Cap
17. 1/16" Ron Resch Origami Support
18. 1/32" Ron Resch Origami Canopy



Wanderer On Glacier

Wandering in the no-man's land in Antarctica, the responsive machine crawls through the expanse of glaciers. It wiggles, expands, and retracts—actions that are actuated by sensor readings of environmental changes: air pressure, wing speed, temperature, UV radiation and so on, giving it biomimetic habits and instincts.

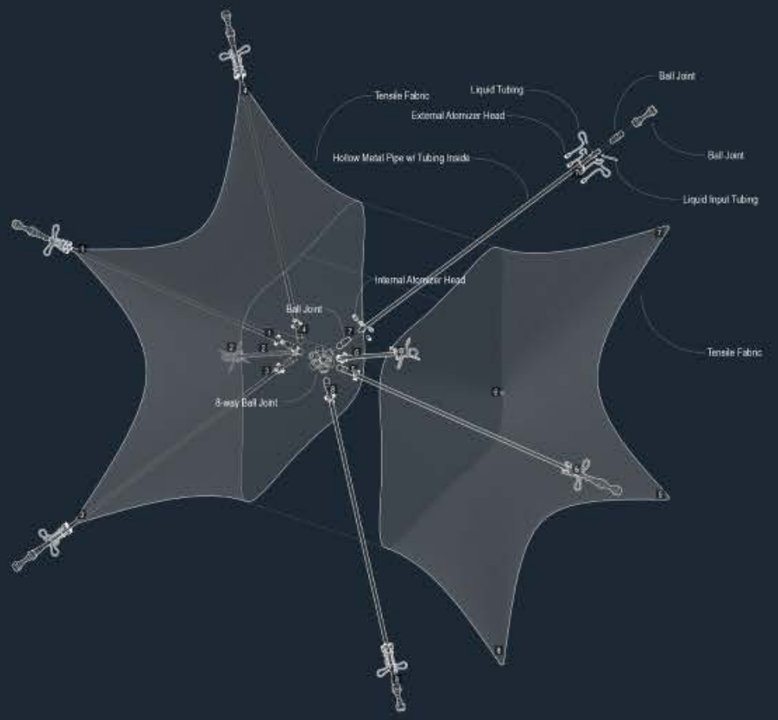
AIRCO - A CYBORG COMPANY

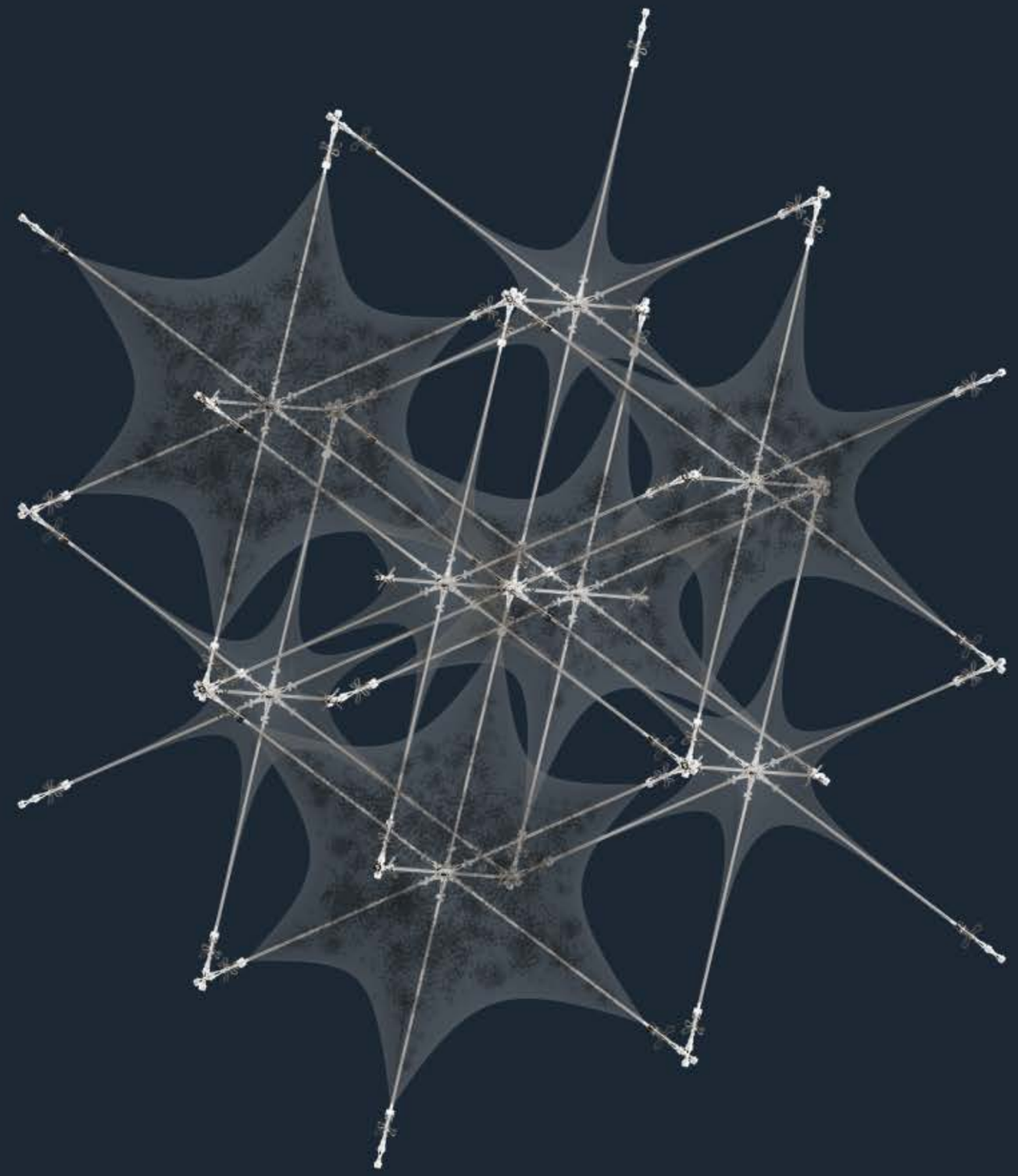
Greenhouse Gas Heavy Area

Typology: Extreme Environment Structures
Collaborator: Lingfan Jiang
Advisor: Michael Bell (Columbia GSAPP Advanced Studio II)

Since the industrialization, history of production has been intervened by machine subjects. The invention of assembly line by Henry Ford in the early 1910s caused a huge increase in human productivity. The space of manufacturing became a long, endless horizontal strip, with workers operating by the line, repeating one single task repeatedly. But human labor is destined to be surpassed by machine labor, at least in the repetitive manufacturing industry. A post-work society is in near future as the human labors are overtaken by machine labor and automation.

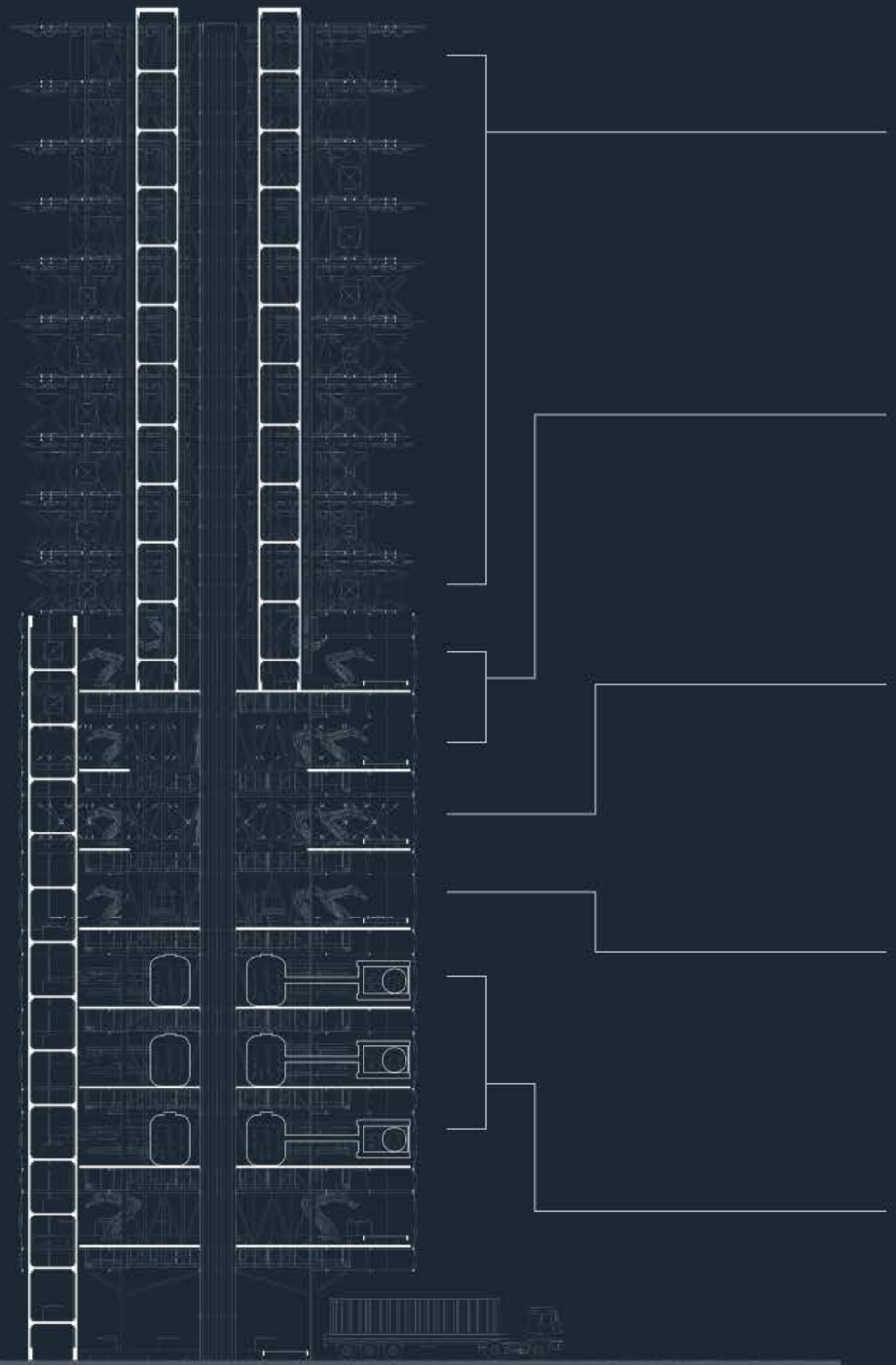
In AirCO, we are taking advantage of this automation to build good machines, machines that are not aiming for optimization solely, turning the heavily emissive factory line into a self-cleaning, self-digesting cyborg by using crystallization process of the guanidine liquid to capture CO2 from ambient air into a solidified crystal structure. Since modernization, the idea of optimization is embedded in every modern and contemporary machines like air conditioners, computers, microwaves, and so on, aiming for production rate and quality as high as possible for maximized human comfort. A good machine like AirCO cyborg, on the other hand, is constantly negotiating with itself, contesting its own birth and creation, eating up its footprint along the process of its completion and is a machine without results.





The Carbon Capturing Module: AirCO Cyborg-1

AirCO cyborg-01 is designed to capture greenhouse gas directly from the ambient atmosphere, which has been the hardest challenge in carbon capture and might become possible with the most up-to-date lab science discovery of using salt crystallization for carbon capture. It is designed with the capacity for different stacking formations to deal with different surface conditions. Flexible ball joint and soft pneumatic membranes allow it to conform its shape and appearance to the complex human environment and building surfaces.



Deployment Deck

Assembled modules are stored on the deployment deck, absorbing greenhouse gas in mid-air and waiting for deployment.

Final Assembly Deck

Pneumatic skins are attached to the modules and tubes are connected.

Skeleton Assembly Deck

Mechanical parts, sensors, mist sprayer heads, and batteries are connected and assembled.

Inventory Deck

The necessary parts are being machined, 3D-printed, and unboxed for later assembly.

Carbon Storage Deck

Crystallized salt with greenhouse gas captured are transported and stored here for external shipping to concrete factories, biolabs, and many other clients.

Carbon Sequestration Outpost In Cities

Carbon-capturing modules are being deployed among buildings in the city at the most carbon-condense areas. The modules intercept greenhouse gas emission from building mechanicals, ventilations, and populated areas.

Carbon Sequestration Outpost Along Highways

Highway traffics are also a main contributor to the gross GHG (greenhouse gas) emission. Take the Cross-Bronx Expressway in Bronx, NY as an example: the annual emission on the CBE would take 560 central parks for a year to absorb.

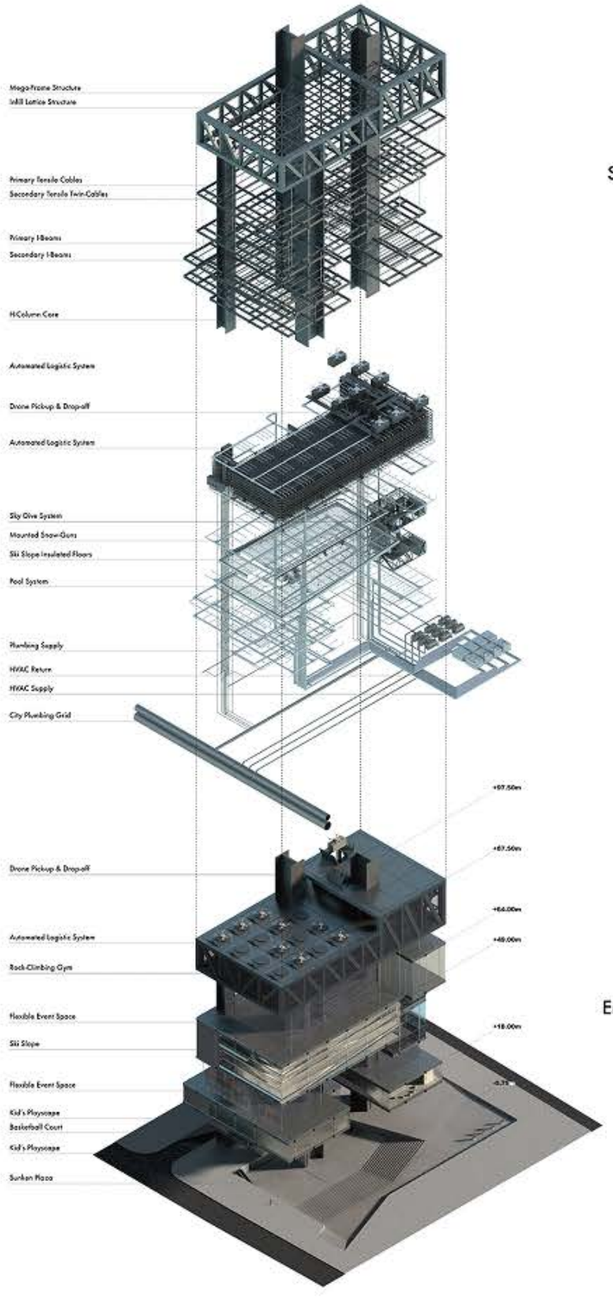
NEXUS

Shanghai, China

Typology: Urban Renewal
Collaborator: Zheng Fang
Advisor: Yanfei Shui (Syracuse SOA ARC 408 Visiting Critic Studio)

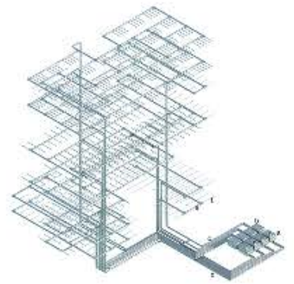
During the Reform and Opening in the 70s' China, the megacity and the largest harbor in East Coast China – Shanghai – went through a spectacular urban expansion to move the industrial zones and facilities from the inner ring of the city to the outer rim. During this campaign, hundreds and thousands of industrial lands were left unoccupied in the areas where are now filled with busy commercial and residential hubs. After the expansion, city government began to transform and redesign the industrial wastelands into co-work space, commercial center, urban greenland and so on to improve the urban fabric.

Nexus is a project reshaping the future of industrial wastelands in cities and speculating an interweaving condition of logistic industry and urban entertainment. Sitting in the messy and unorganized logistic hub with multiple logistic service companies taking up the dark and crowded space that previously belonged to a textile factory and now are surrounded by residential neighborhood, the project aims to reorganize the logistic hub through storage rental for logistic companies in the back end and facilitate sports/entertainment/exhibition activities in the front end.



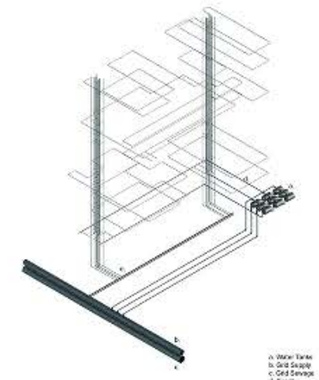
Structure

Swimming



HVAC

MEPs

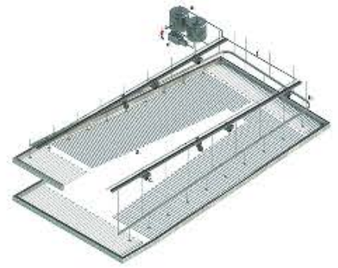


Plumbing

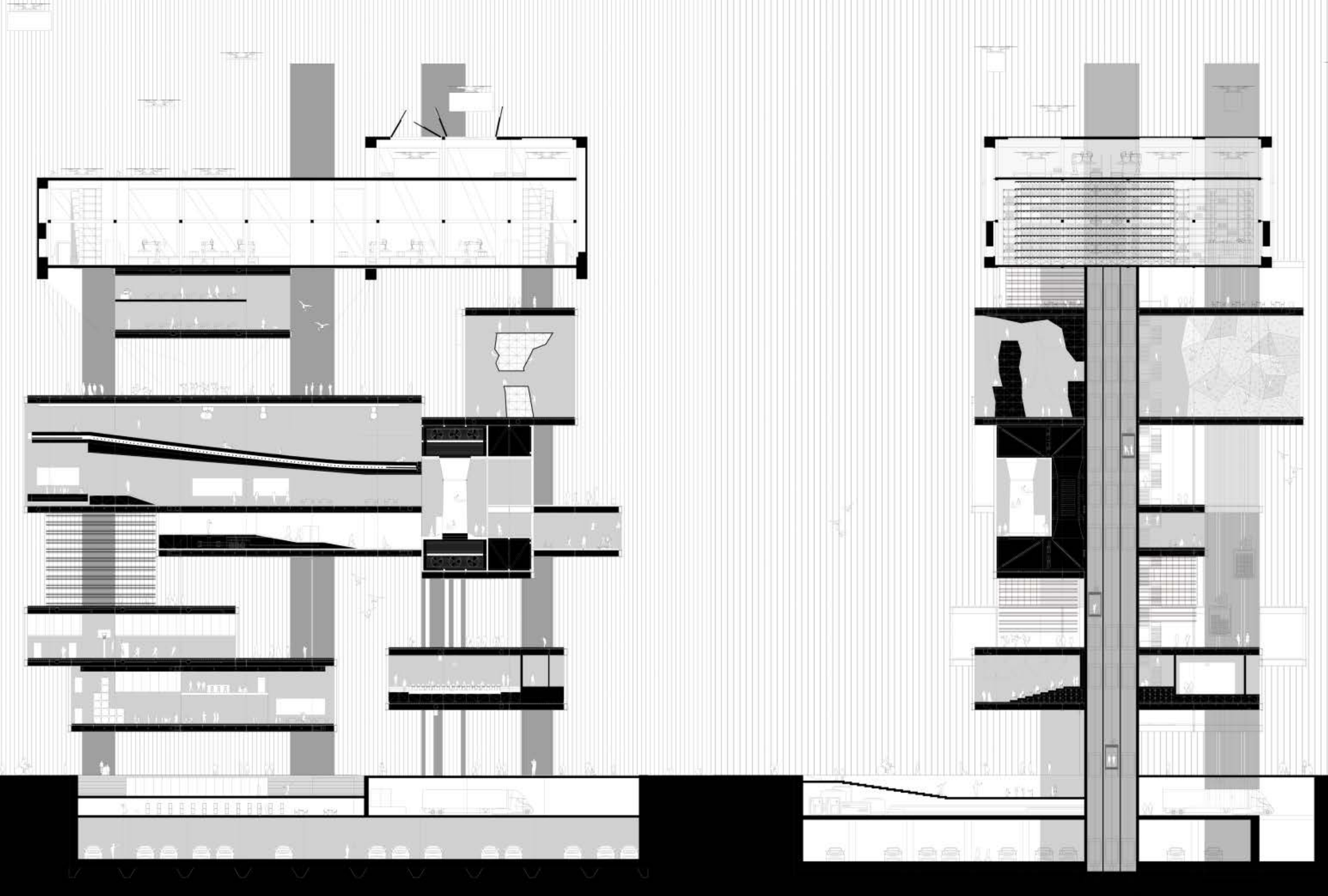
Automated Logistic System

Enclosure

Sky-Diving



Skiing



Display Boxes

The textured glass facades and PTFE translucent facades give a clear sight to the city streets, exhibiting the diverse events and activities happening at the Nexus while maintaining optimized interior environmental control for sensitive programs like indoor ski, theater and logistic center.

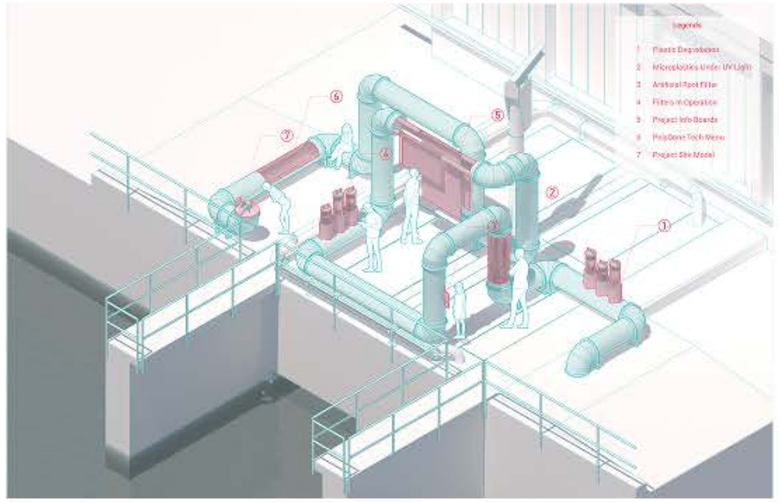
MICROPLASTICS EDUCATIONAL PAVILION

Atlantic City, NJ

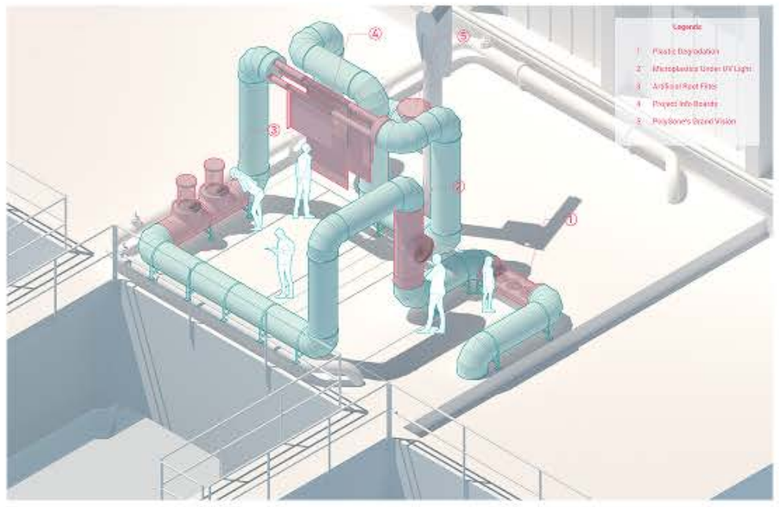
Typology: Exhibition Installation
Collaborators: Yidian Liu (COO), Nathaniel Banks (CTO), Shirin Sood (Intern)
Organization: PolyGone Systems, Inc.

The Microplastics Educational Pavilion is an annex installation to the first public microplastics demonstration pilot project in the US, located in the Atlantic County Utilities Authority Wastewater Treatment Facility in New Jersey. This is a major project I worked on at PolyGone Systems, Inc., a cleantech startup focusing on microplastic remediation.

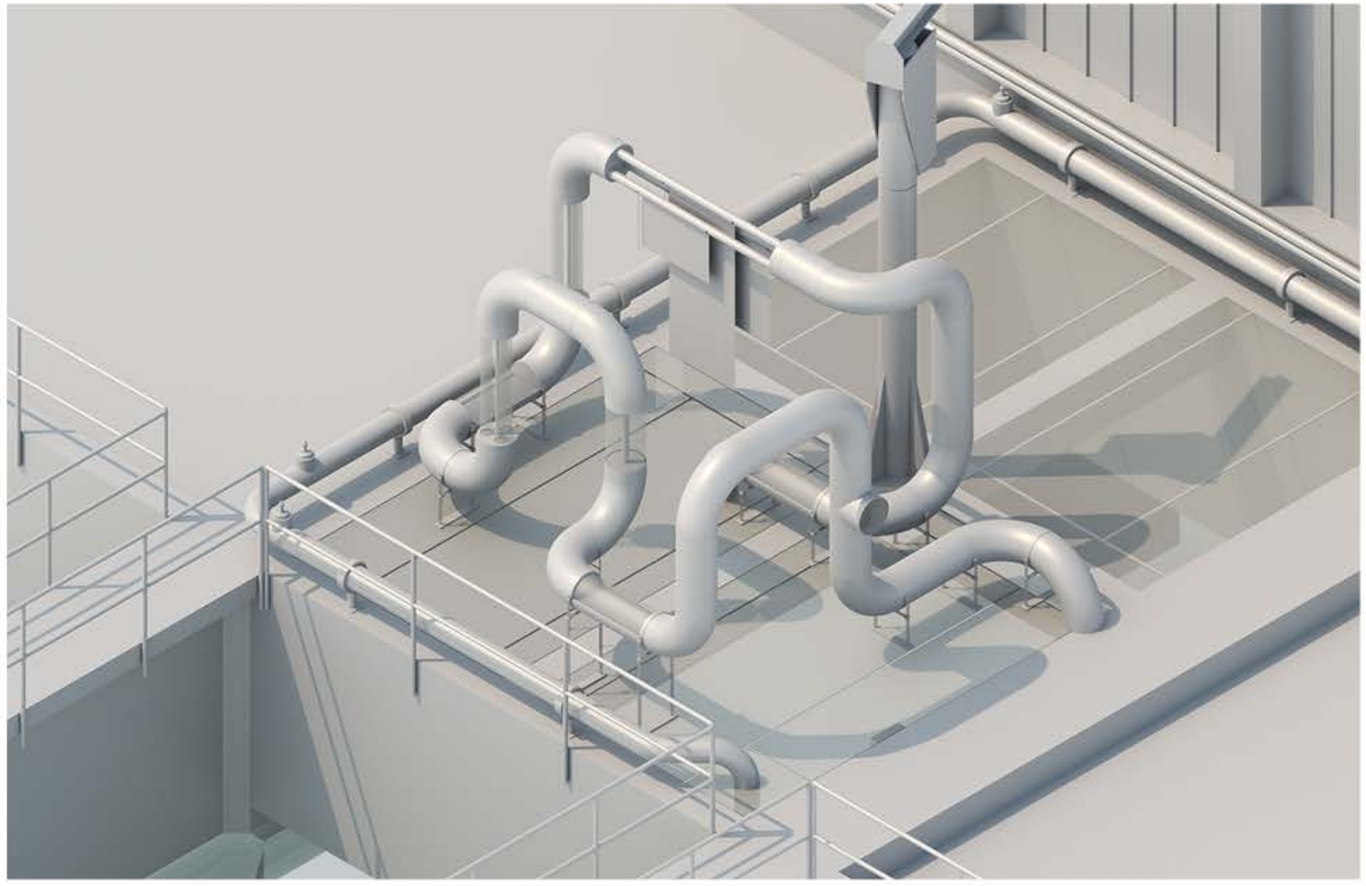
The whole pilot demonstration project consists of three parts: (1) the microplastic removal system, (2) the cleansing system for PolyGone's special microplastic filters, and (3) the microplastics educational pavilion. I worked as the main designer leading the design and manufacture of the cleansing system and the microplastics educational pavilion, while reporting to the company's COO and CTO.



1st Proposal



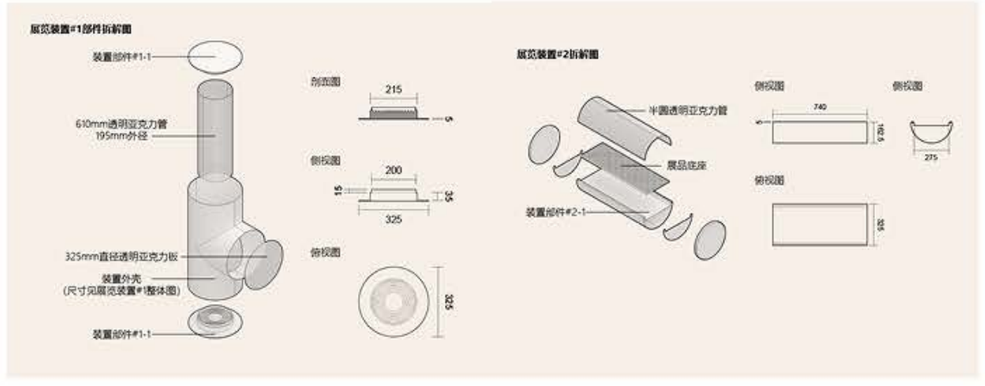
2nd Proposal

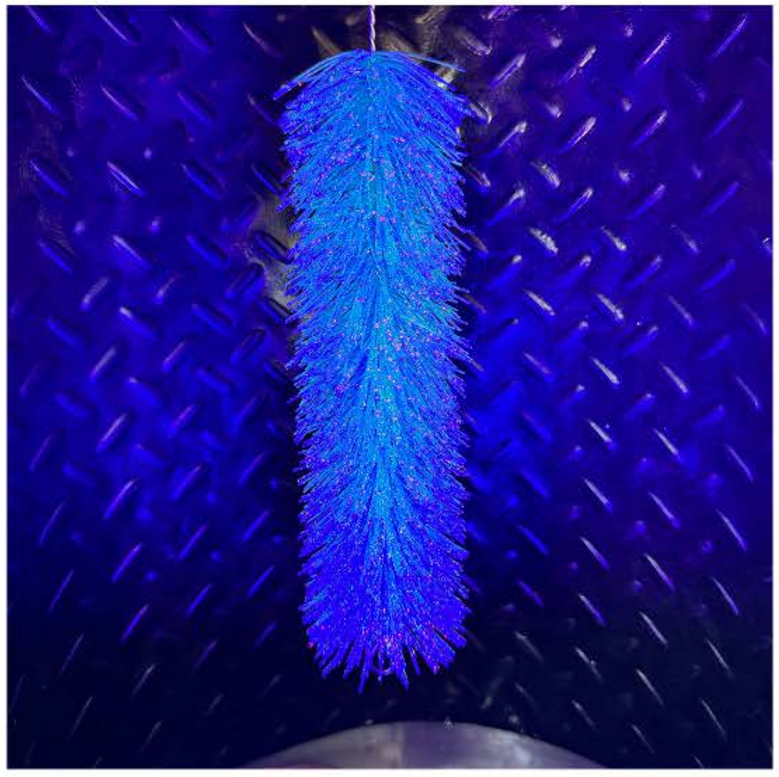


Final Proposal

Design Development

The project went through two revisions during the early phases due to budget limitation and site detail changes. The final proposal turns out the best option to balance the project budget and the exhibiting ambition we expected.





Exhibition Materials

The audience groups are diverse in expertise and ages, from industry professionals to school kids on field trips, so one of the priorities should be balancing the contents that are scientific, and easily comprehensible. The problem of microplastics is also not commonly educated yet, so a visual hook that grabs visitors' attention and curiosity is important. The exhibition contents include:

- The hook: Showing fluorescent microplastics particles under UV light)
- Different types of microplastics
- Sources of microplastics
- Impact on wildlife
- Impact on human
- PolyGone lab's sampling and analysis process
- The evolution of PolyGone's microplastic filters
- Overall information boards of the pilot project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DEMONSTRATION PROJECT

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DESIGN PORTFOLIO