Portfolio

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Selected Works
2023 - 2024

MSAAD 2024'
Columbia University
Graduate School of Architecture, Planning and Preservation

STEWARDSHIP OF AIR

Fall 2023
_2023.09~2023.12
_Columbia University GSAPP
_Collaborative work with Chuxi Xiong
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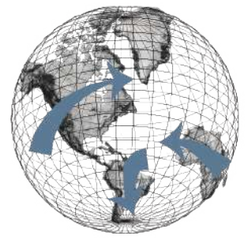
Can architecture engage in discussions about the ownership and stewardship of air?

This project initiates a discourse on the ownership and stewardship of air, acknowledging the distinct ways in which nature and humans interact with air. Emphasizing the role of architecture, the project delves into how it can uniquely engage with and utilize air, proposing an approach that differs from both natural and artificial methods. The aim is to suggest innovative ways for architecture to incorporate and optimize the utilization of air resources.

ATMOSPHERIC RIVER

"Flying rivers," often referred to as aerial rivers, are a natural phenomenon crucial to the well-being of the Amazon Forest basin and South America's forest. Contrary to their appearance as clouds, they are actually vapor trails and play a fundamental role in the floating river phenomenon. Flying rivers function by transporting water vapor towards the mountains, creating a suction effect that draws in additional moisture from the Atlantic Ocean. This process results in heavy rainfall that drenches the South America. These rivers extend for thousands of kilometers throughout the forested areas of the Amazon. They are indispensable for maintaining the ecological balance and are a key element in regulating the forest's temperature.



Hydrological Cycle

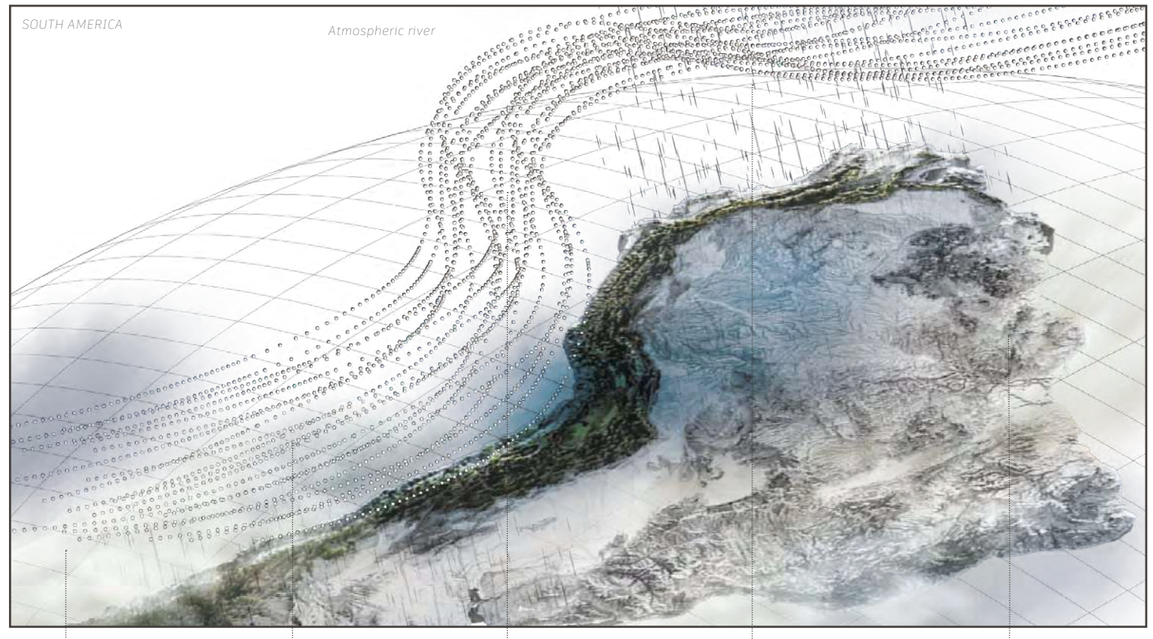
The hydrologic cycle is the continuous movement of water within the Earth-Atmosphere system. It primarily involves water transitioning from the Earth's surface to the atmosphere and returning. The key processes in this cycle include evaporation, transpiration, condensation, precipitation, and runoff.

Forests Help Make Clouds

Forests contribute to cloud formation and play a crucial role in cooling the Earth. Trees are a critical cog in the global water cycle: Trees pull water from the ground and release it into the atmosphere as vapor through pores in their leaves in a process called transpiration, which can drive temperatures and rainfall across the globe.

Biogenic Potassium Salt from Trees

In the Amazon rainforest, cloud droplets form around organic aerosols rich in potassium salts emitted by plants. These particles act as seeds for water droplets, facilitating condensation of organic compounds from isoprene and terpenes in the atmosphere.



5.
The concentrated humidity arrives in the south and southeast of Brazil, reaching as far ad Argentina before dispersing

4.
The flying rivers carry the accumulated humidity to the interior of Brazil, causing rain to fall in other regions

3.
Part of the humidity falls as rain, forming the rivers of the Amazon Basin

2.
Moving west , the vapour approaches the Andes. Blocked by the mountains, it circles back over Amazon

1.
In Amazon, water is given off by the ground and plant life in the form of evapotranspiration along with further condensation due to the humidity. The region winds shape the course of flying rivers

The Mysterious Amazon Mist ARU

In the Amazon, there's a natural occurrence known as "Aru," which is a thick fog or mist that appears in the early morning after sunrise. It adds a mystical atmosphere to the forest and is a part of local legends. Indigenous people believe Aru is a divine gift from the Gods, as it brings fertility to the forest. During ceremonies, they share knowledge through songs, dance, storytelling, and food exchanges. Aru also aids them in hunting by attracting animals when it moves through the forest. These ceremonies also serve as social gatherings and opportunities for arranging marriages among the indigenous communities.

Weather modification

Cloud seeding is a weather modification method in the western United States that artificially enhances precipitation by releasing substances into clouds, promoting the formation of ice crystals or raindrops. It is used for water resource management, agriculture, and environmental preservation by increasing rainfall or snowfall in targeted areas.

Hail suppression

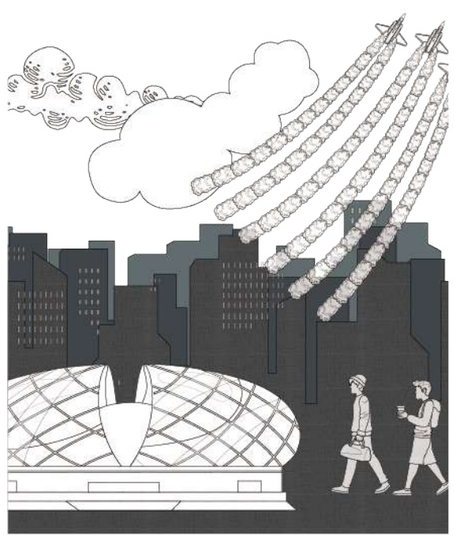
Initiated in 1996, the program in Alberta aims to minimize hail damage to urban properties by using cloud seeding planes from June to September 15th annually. Silver iodide is employed to produce ice crystals and reduce hail size, transforming potential damage into smaller hailstones or rain. Cloud seeding in Alberta is specifically used for hail mitigation, not as a complete "off" switch for hailstorms.

Cloud Wars

Countries in the Middle East and North Africa, including the United Arab Emirates, are actively pursuing rain-inducing technologies. The UAE utilizes silver iodide and a patented nanotechnology substance to seed clouds, creating rain through the bonding of these materials with water vapor particles. Scientists assert minimal environmental impact from the seeding materials.

Tourism

In Beijing, cloud seeding before public holidays, like National Day, has become a tradition to disperse pollution and ensure clear skies. However, for the Olympic opening ceremony, the focus was on rain dispersal. A significant effort involved the use of "weather changers" firing rockets from artillery into the clouds above Beijing for several hours before the ceremony, aiming to induce rain without affecting the Olympic stadium.



Rainmaking Used As Weapon

Operation Popeye was a classified U.S. Air Force cloud-seeding project conducted during the Vietnam War from 1967 to 1972. The objective was to extend the monsoon season over the Ho Chi Minh Trail, disrupting North Vietnamese military supplies by softening road surfaces and causing landslides. The project aimed to increase rainfall in specific areas to hinder the enemy's military supply trucks.

CLOUD SEEDING

The intent of seeding is to disrupt the natural processes of cloud evolution to alter how precipitation is formed. Here we define precipitation as any type of hydrometeor that reaches the ground, for example, rain, snow, graupel or hail. The two components of the atmosphere that must be present to form precipitation are aerosol particles and water vapour. There is little that can be done to enhance the water vapour artificially; hence, cloud modification is only attempted through changes in the aerosol particle population.

1.
Silver Iodide crystals have almost exactly the same shape as ice crystals

2.
Water droplets supercooled to less than 32F attach to silver Iodide and freeze

3.
Ice crystals stick together and begin falling as snow within 20 minutes.

Water is released as ir freezes, warmed air rises

1.
Rain starts to form when water molecules in a cloud start to condense on dust particles, forming small cloud droplets

2.
As those cloud droplets collide with other droplets, they grow

3.
Cloud seeding speeds up thus collision process. Silver Iodide Particles are shot into clouds, which give the droplets inseide more material on which to condense. The resulting particles grow faster and are usually bigger than normal ets

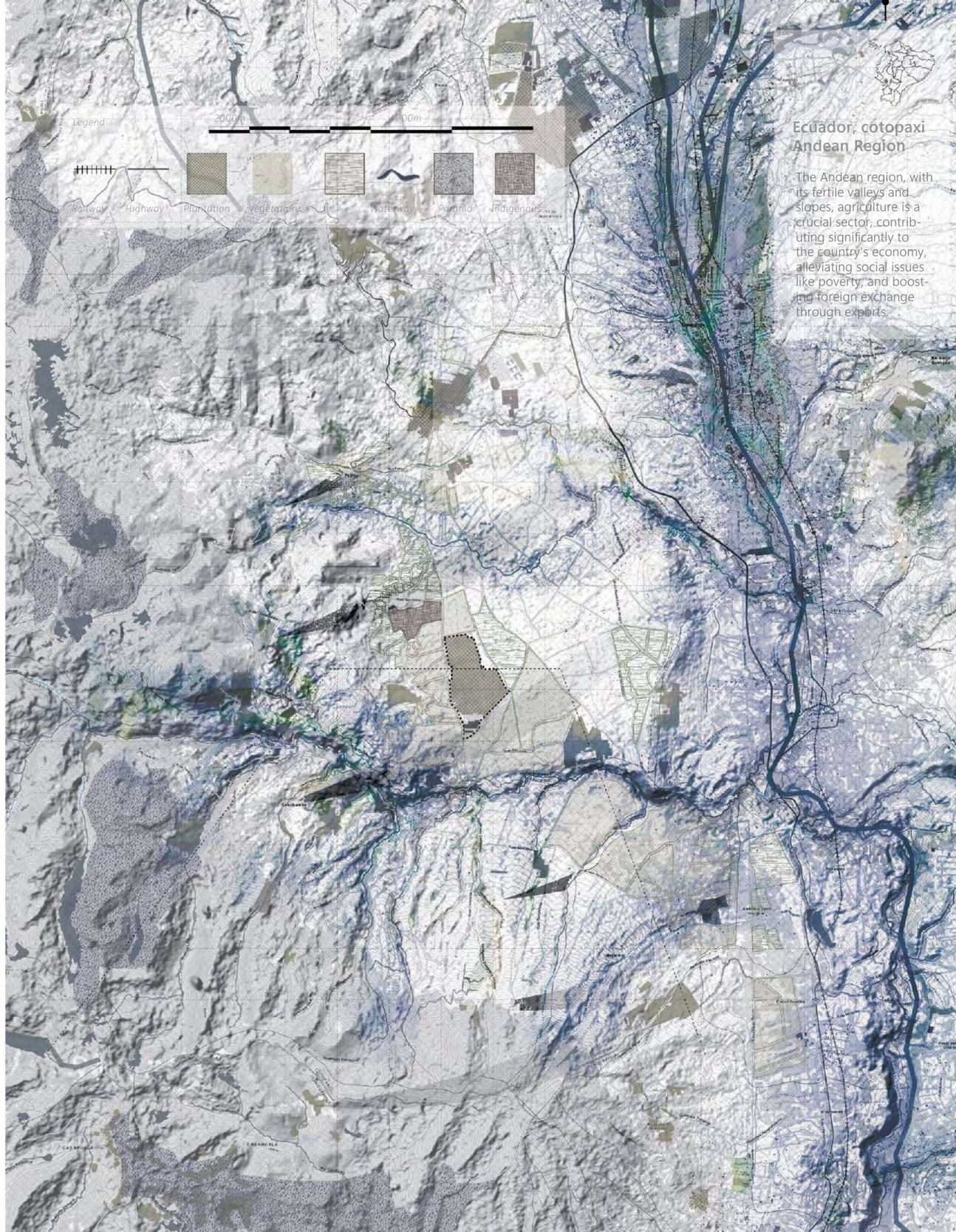
4.
Once they get big enough, the droplets begin to fall from the cloud as rain

Conflict between Indigenous people and plantation company

The Andean Chakra, an ancestral agricultural system of the Kichwa Indigenous Peoples in the Ecuadorian Andean region, is characterized by the integration of climate, ecosystems, agricultural practices, and biodiversity. This system involves planting combinations of trees and shrubs among crops to enhance soil structure, reduce erosion, and improve nutrient and carbon cycling. On the other hand, the use of anti-hailstone cannons in the Alpamalag valley not only showcases environmental control ambitions by plantations but also reflects underlying issues of inequality and marginalization in the region that facilitated their installation.

Unevenly distributed Land and water

The San Isidro páramo, known as Chilca Tingo Chaupi Urku, is a vital high-altitude moorland situated uphill from the village in Cotopaxi province. The páramo is not only symbolically important but also a life source for the community. An irrigation system was constructed in the páramo around 2010, sourcing water from two mountain streams. This was a response to neighboring broccoli plantations disrupting local weather patterns to protect their crops without proper authorization. The community took legal action based on constitutional rights related to Buen Vivir from the 2008 Constitution to address land distribution and resource management issues.



Ecuador, cotopaxi Andean Region

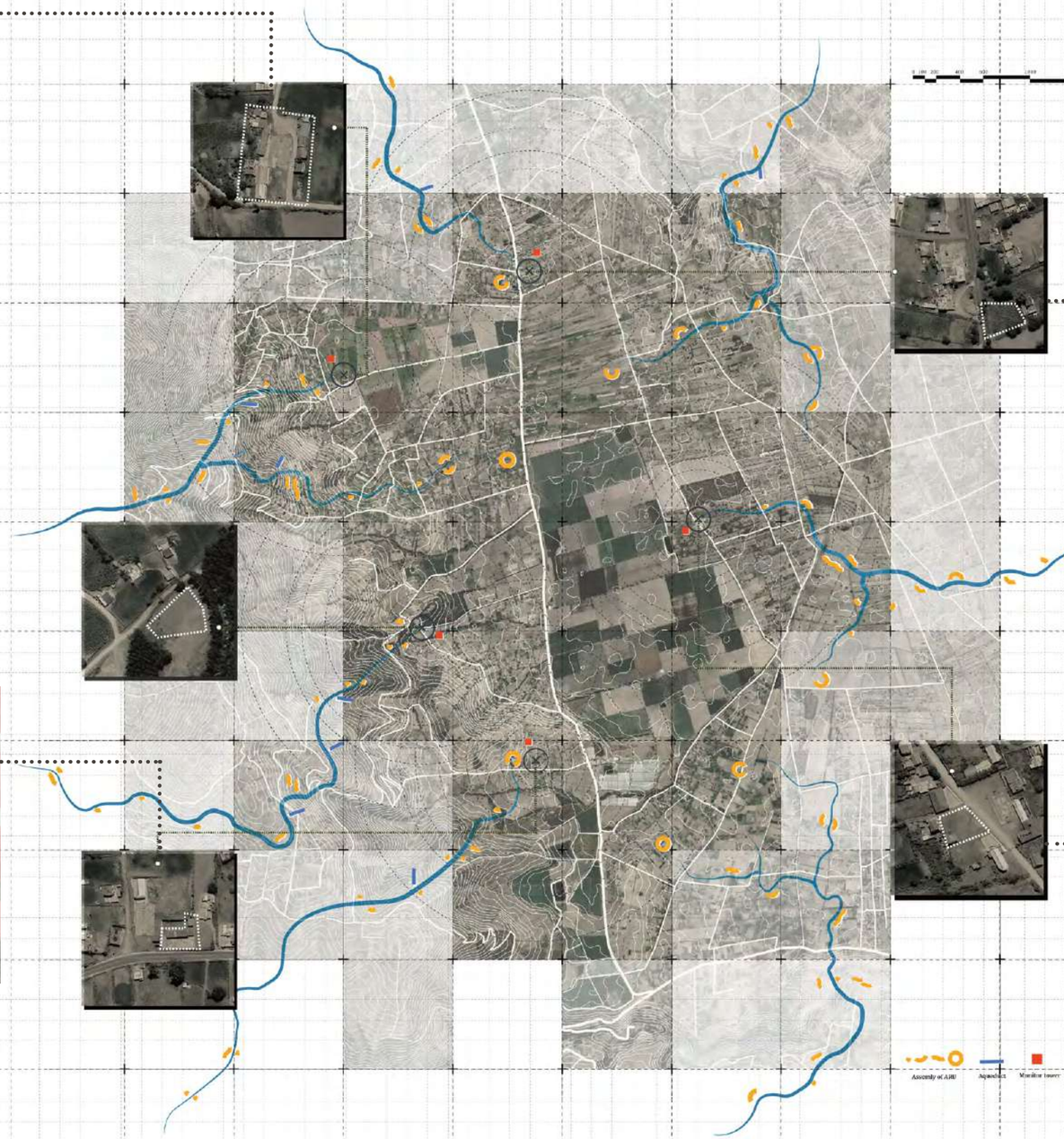
The Andean region, with its fertile valleys and slopes, agriculture is a crucial sector, contributing significantly to the country's economy, alleviating social issues like poverty, and boosting foreign exchange through exports.

Fognet pavillion
combined with Indigenous vernacula house

This project involves the indigenous people's response to monitor cloud seeding activities in broccoli plantations and counteract them. In response to the aggressive use of air by plantation owners, the project aims to utilize air in a different way. The architectural solution proposed is the "fognet pavilion." Various fognet pavilions will be strategically placed around the broccoli plantation area, tailored to the unique context of each region. These fognets will not only harness the air of the area but also serve the function of monitoring the actions of the plantation owners. Using local materials such as clay and thatch, the fognets will be integrated with existing structures, arranged like pavilions, prompting a reconsideration of stewardship over air and water in the region.

Negotiation Center

The Negotiation Center is located in close proximity to the community center in San Isidro village (Comunidad San Isidro). At present, the community center, along with the village square situated in front of it, serves as a multifunctional space for hosting diverse community activities. This includes conflict resolution campaigns and interviews addressing ongoing issues within the community.



Crop Market

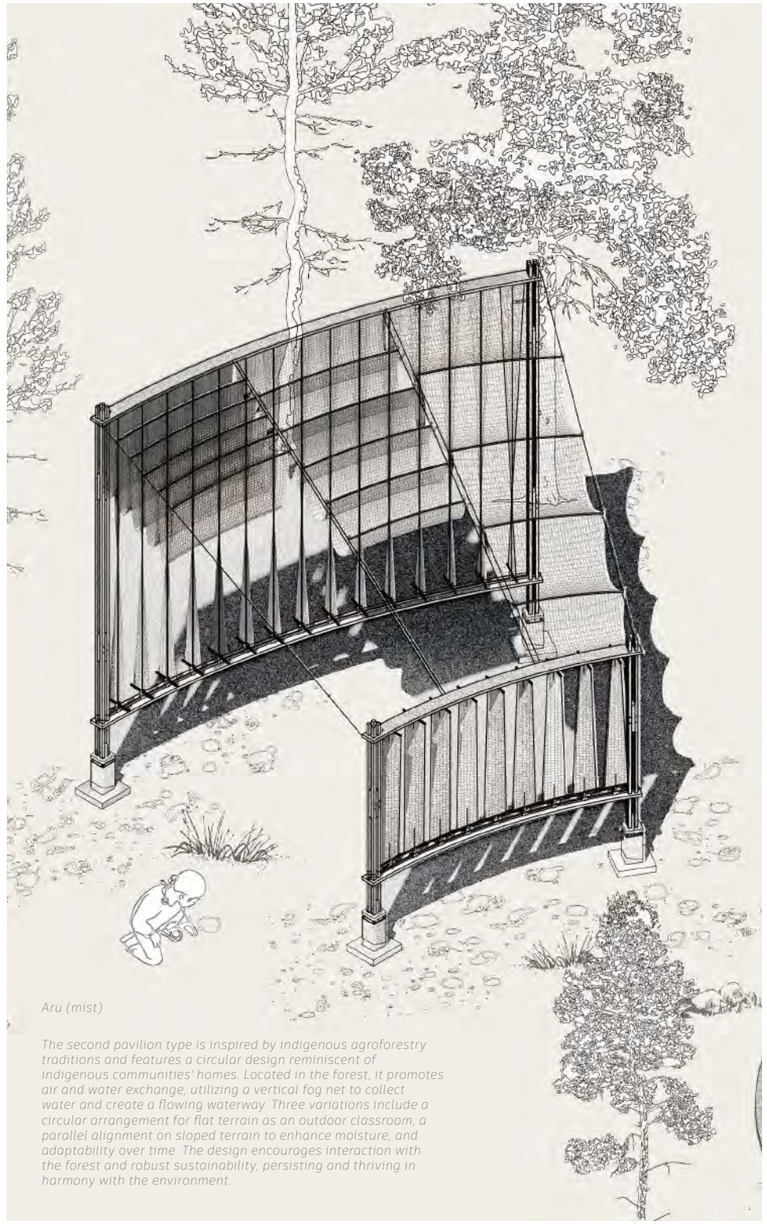
Situated in a strip mall along Via La Merced, a main thoroughfare connecting to the city center of Pujili, the proposed Crop Market serves as a pivotal space for food exchanges and trades. This initiative aims to support households in the surrounding area by offering an alternative outlet for locally grown produce. The market not only facilitates the exchange of goods but also empowers residents by granting them greater control over access to food and the choices available to them.

School with Agroforestry

The proposed school near Buena Esperanza De Juigua aims to counter the decline of the Panzaleo community's traditional Andean chakra system due to colonization. It serves as a dedicated space for younger generations to learn and appreciate these practices, contributing to the preservation of the Panzaleo people's unique agricultural heritage.

Research Center

The Research Center, near a preserved forest, serves two purposes: practicing the Andean Chakra system at a higher altitude and researching climate change, particularly humidity, air pollution, and agroforestry's impact on the water cycle and cultural systems. Additionally, it investigates suspicious weather modification practices by regional agricultural companies.



Aru (mist)

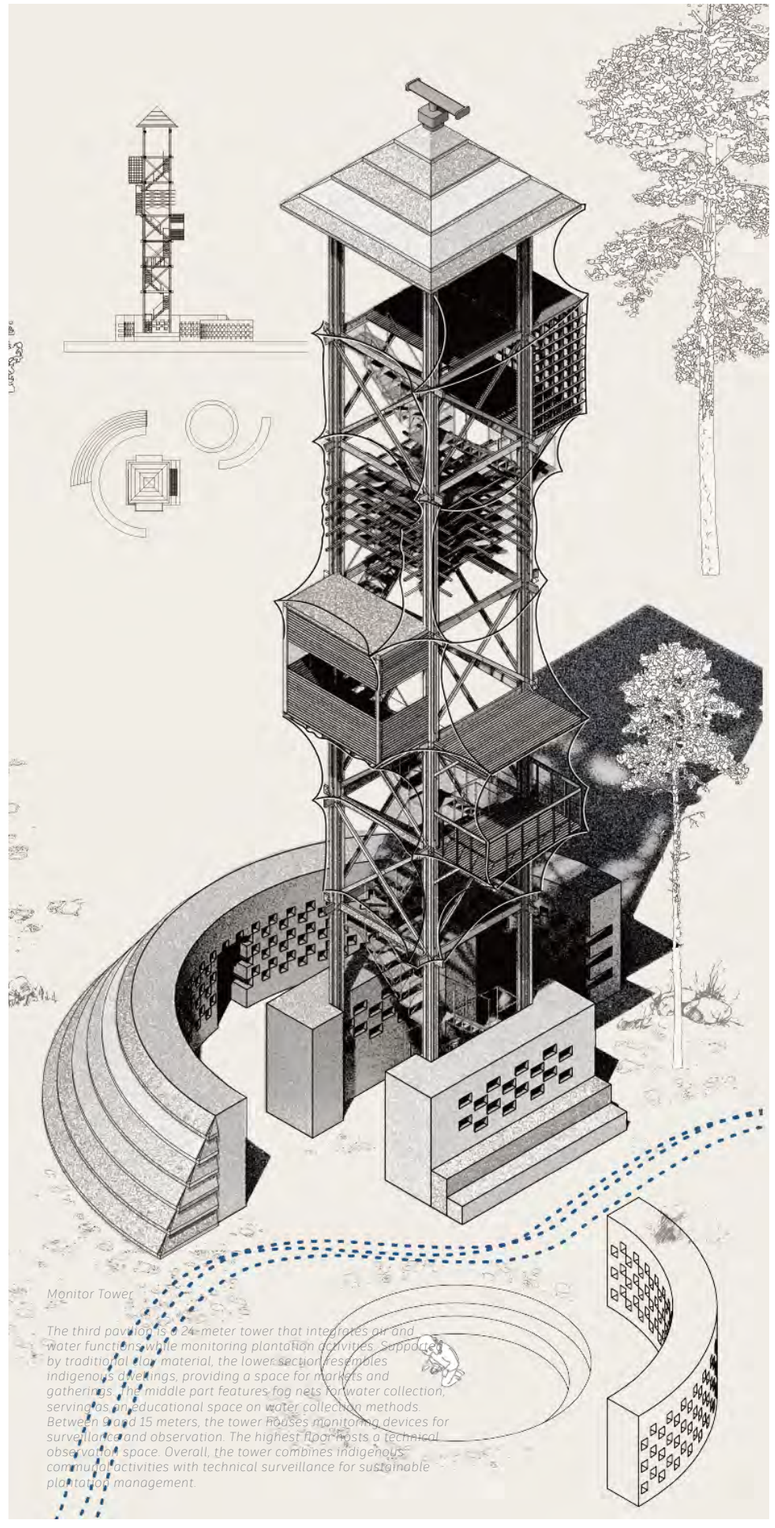
The second pavilion type is inspired by indigenous agroforestry traditions and features a circular design reminiscent of indigenous communities' homes. Located in the forest, it promotes air and water exchange, utilizing a vertical fog net to collect water and create a flowing waterway. Three variations include a circular arrangement for flat terrain as an outdoor classroom, a parallel alignment on sloped terrain to enhance moisture, and adaptability over time. The design encourages interaction with the forest and robust sustainability, persisting and thriving in harmony with the environment.

Fognet

Fog nets are innovative devices designed to harness water from the atmosphere by facilitating condensation. The collected water is channeled into water reservoirs situated alongside agricultural fields, thereby establishing a microclimate distinct from the ambient atmospheric conditions. Demonstrated benefits of these water channels include enhancing crop resilience through the moderation of nighttime temperatures, mitigating the adverse effects of drought, facilitating irrigation, and minimizing soil erosion.

Aqueduct

The indigenous people around San Isidro have a longstanding tradition of celebrating the gathering of water, particularly associated with fog. This type is situated in steep areas, creating a water channel from the main waterway to form a new reservoir. The collected water cascades down through the water canal, resembling a waterfall. The indigenous community celebrates around the gathered water, expressing gratitude and partaking in ritual celebrations. Through these ceremonial activities, the indigenous people not only commemorate their historical cultural awareness of water but also use the space for gatherings and relaxation.



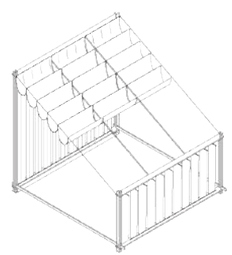
Monitor Tower

The third pavilion is a 24-meter tower that integrates oil and water functions while monitoring plantation activities. Supported by traditional clay material, the lower section resembles indigenous dwellings, providing a space for markets and gatherings. The middle part features fog nets for water collection, serving as an educational space on water collection methods. Between 8 and 15 meters, the tower houses monitoring devices for surveillance and observation. The highest floor hosts a technical observation space. Overall, the tower combines indigenous community activities with technical surveillance for sustainable plantation management.

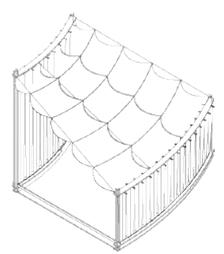
Combination of Aru
According to Topography and Program

Agroforestry

Fognet ARU is structured into three main types. Through combinations of these types, it can be arranged to suit slopes, generating different programs. When arranged in a circular layout on flat terrain, it creates a traditional celebratory space for indigenous people. Within this circular pavilion, indigenous communities gather, forming a meeting place. Furthermore, the upper part of Fognet can be opened or closed based on tree growth, showcasing the sustainability of Fognet and indicating its potential for coexistence with agroforestry.



Fognet Aru type B



Fognet Aru type C

MYCELIUM INSERT FOR FAST FASHION

Spring 2023
_2024.01~2024.04
_Columbia University GSAPP
_Collaborative work with MINYOUNG JEONG
Instructor David Benjamin
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Can mycelium modules shift fashion and architecture towards sustainability?

The gradual integration of mycelium modules into existing buildings showcases a belief in a subtle shift towards sustainability in fashion and architecture. This integration influences the overall layout and program of the buildings. The aim is to change perceptions of fast fashion and promote sustainability by incorporating mycelium inserts not only in educational institutions but also in retail shops as showcases for fashion brands. These modules will feature programs related to biomaterials, inspiring new perspectives and desires while raising awareness about sustainability.

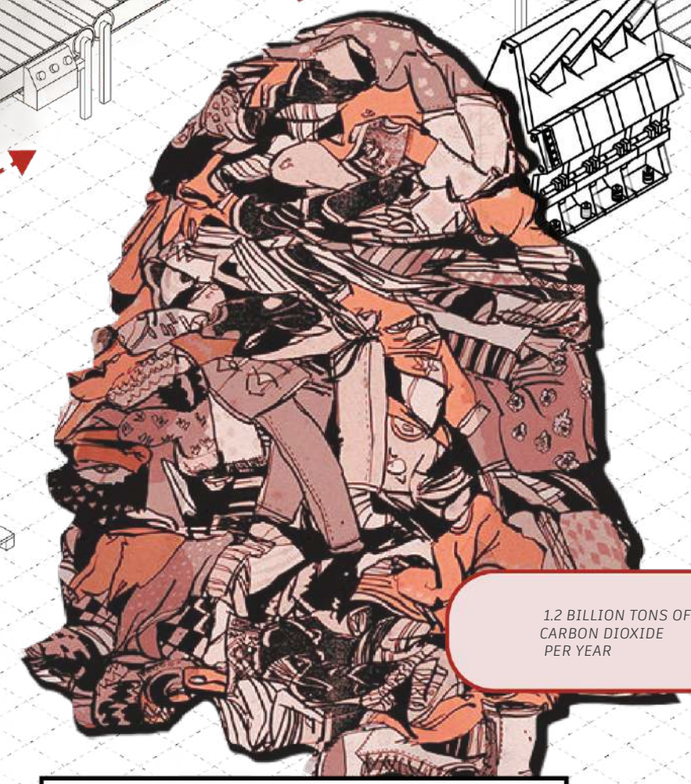
Raw Material Acquisition

Significant amounts of carbon are emitted during the production processes of key fibers such as polyester, synthetic fibers, and cotton.

700 GALLONS OF WATER
use to make one cotton T-shirt

Processing and Manufacturing

Various energy-intensive processes contribute to carbon emissions during the transformation of raw materials into garments. These processes may include dyeing, weaving, cutting, assembling, and others.



1.2 BILLION TONS OF
CARBON DIOXIDE
PER YEAR

FAST FASHION

Fast fashion is a form of the fashion industry characterized by mass production and rapid turnover of new fashion trends to consumers at affordable prices. This industry rapidly produces garments to meet consumer demand with a focus on quick production and trend-sensitive products. However, this model can raise various issues related to environmental degradation, labor rights abuses, and sustainability concerns.

99%
Of used clothing is recyclable

2 MILLION TONES
OF WASTE PER YEAR

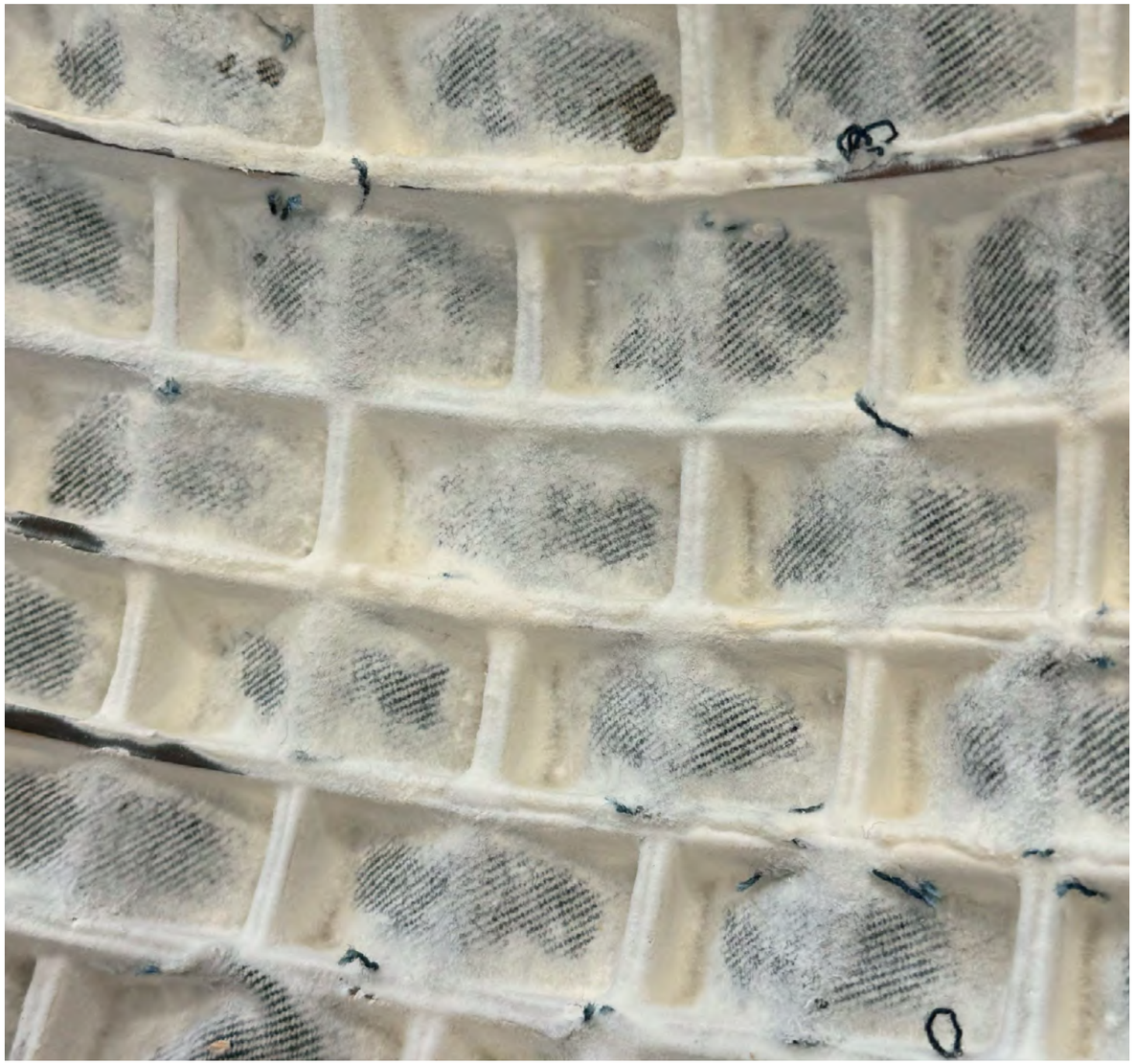
68 POUNDS
Average weight of clothes on
American discards per year

Waste Management

Clothing production often generates waste, including defective products, improperly sized patterns, leftover materials, etc. Disposing of this waste through methods like landfilling or incineration can further contribute to carbon emissions.

Transportation and Distribution

Carbon emissions occur during the transportation of manufactured clothing to retail outlets or consumers, covering significant distances domestically and internationally. This transportation amplifies the carbon emissions generated during raw material and product manufacturing.



MYCELIUM AS A CARBON NEGATIVE MATERIAL

The concept delves into leveraging mycelium, a fibrous fungal structure, alongside agricultural waste or fabric to engineer sustainable construction materials. By sourcing agricultural waste locally and tapping into the surplus clothing waste from fast fashion, the project endeavors to confront environmental concerns stemming from the industrialized production of fashion. The substantial carbon emissions and water consumption associated with fast fashion underscore the urgent need for sustainable alternatives. Hence, the project proposes integrating mycelium with fabric waste to fabricate construction materials, with the overarching aim of mitigating CO2 emissions. A comparison with conventional materials such as timber and concrete elucidates the potential environmental advantages inherent in the mycelium-based approach. the mycelium mixture. This method facilitates on-site mycelium cultivation, leveraging the structural integrity of the timber framework while promoting sustainable material usage and construction practices.

Through research, alternative substrates for mycelium growth beyond agricultural waste were explored, with fabric showing significant potential. Focus was placed on recycling clothing waste from fast fashion, notorious for high carbon emissions throughout its supply chain. Despite the recyclability of 99% of discarded clothes, the industry emits 1.2 billion tons of CO2 annually. To address this, discarded clothing is combined with mycelium to create construction materials, significantly reducing carbon emissions compared to traditional materials like timber and concrete.

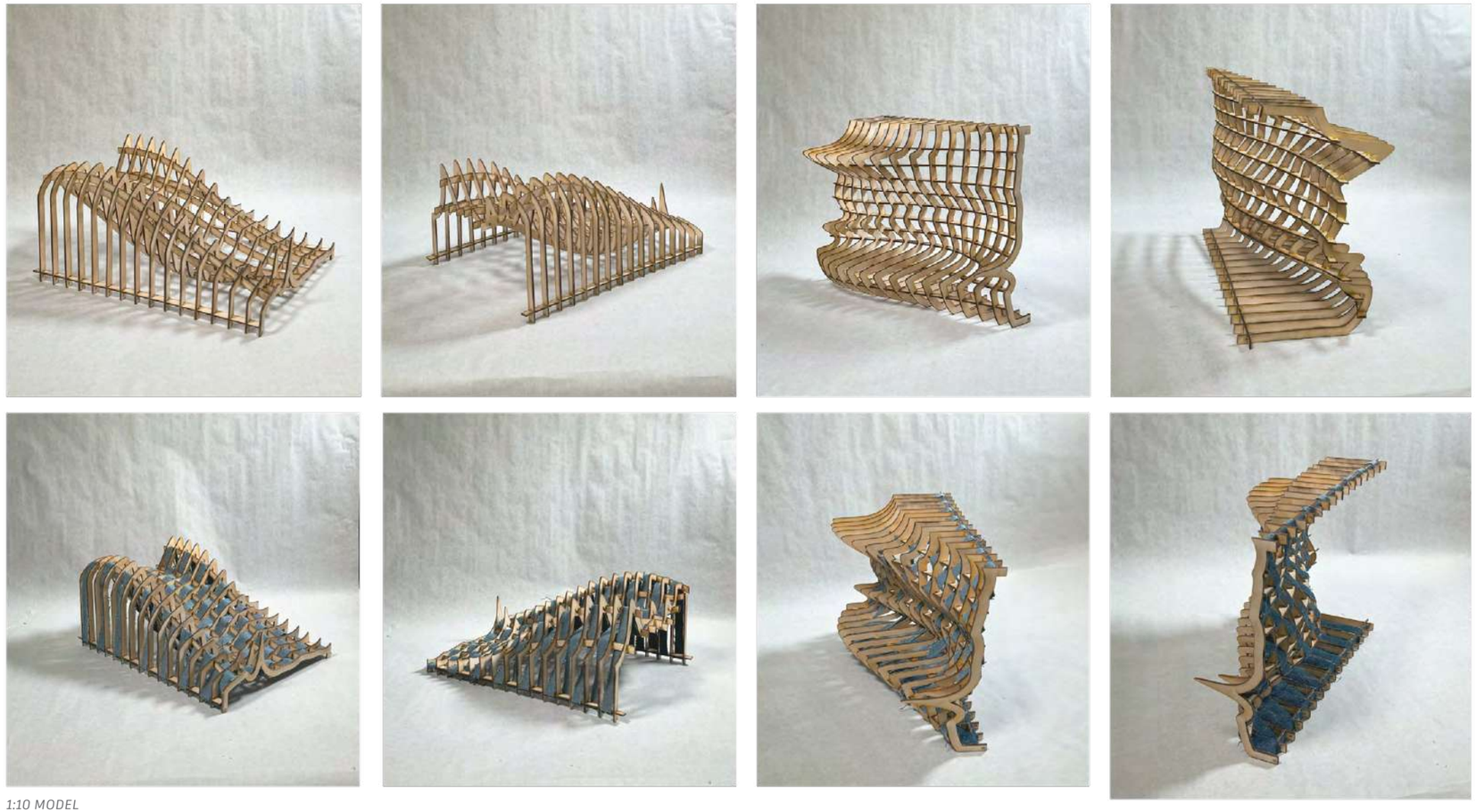
The initial concept models involved crafting rib structures using timber as a foundational step. Subsequently, exploration led to the utilization of weaving methods for creating the mycelium mold, revealing the potential of fabric as a structural element. This discovery prompted further investigation into fabric's role in the design process. The method included thinly slicing denim fabric into strips and weaving them to form a sturdy framework. This framework was then covered with a mixture of mycelium and agricultural byproducts, initiating a four-day incubation period for colonization and solidification. Through this iterative process, the versatility and potential of fabric as a vital component in the mycelium-based design approach became evident.

Through this iterative process of exploration and experimentation, the multifaceted potential of fabric emerged as a key component in our mycelium-based design approach. Its versatility and adaptability became increasingly evident as we navigated through various stages of our project, ultimately reshaping our understanding of sustainable design principles.

ORGANIC DESIGN FOR INTERIOR STRUCTURE

The interior space of the mycelium structure is meticulously designed to authentically showcase the unique properties inherent in growing mycelium. By employing rib structures, we establish an integrated organic environment suitable for both furniture and walls. Fabric strips are intricately woven between these ribs to organically shape the interior space. Subsequently, when the Fabric mycelium material is poured between the timber structure and the fabric-woven ribs, it solidifies, effectively defining and forming the space.

The undulating form of the structure serves a dual purpose. It not only guides the flow of the runway path, accentuating the dynamic nature of interdisciplinary activities within, but also offers flexibility by modulating into seating areas, tables, and exhibition spaces as needed. This approach ensures the seamless integration of functionality and aesthetics, enhancing the overall experience within the mycelium structure.



1:10 MODEL

SCALABILITY

Instead of merely replacing traditional construction materials, the approach involves utilizing mycelium to introduce entirely new construction methods. The goal is to develop innovative and scalable techniques that can be deployed in various iterations and applications.

The choice of FIT as the site stems from its strong commitment to sustainability coupled with limited space to execute its mission effectively. FIT serves as an ideal testing ground for showcasing the concept due to its reputation in the fashion education sector.

Beginning with this site, the aim is to envision how mycelium structures can be integrated into supply chains associated with fast fashion. The goal is to explore applications of the mycelium-based approach at every stage of the fast fashion industry, from corporate headquarters to local manufacturing facilities. Through this exploration, the feasibility and potential impact of the innovative construction method in addressing sustainability challenges within the fashion industry will be demonstrated.

1:200 MODEL

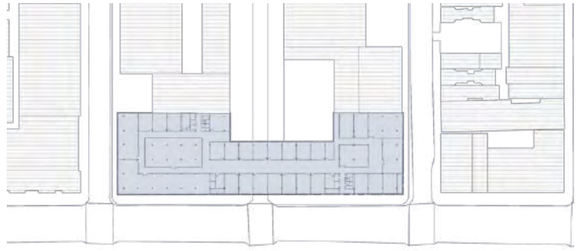
MYCELIUM INSERT

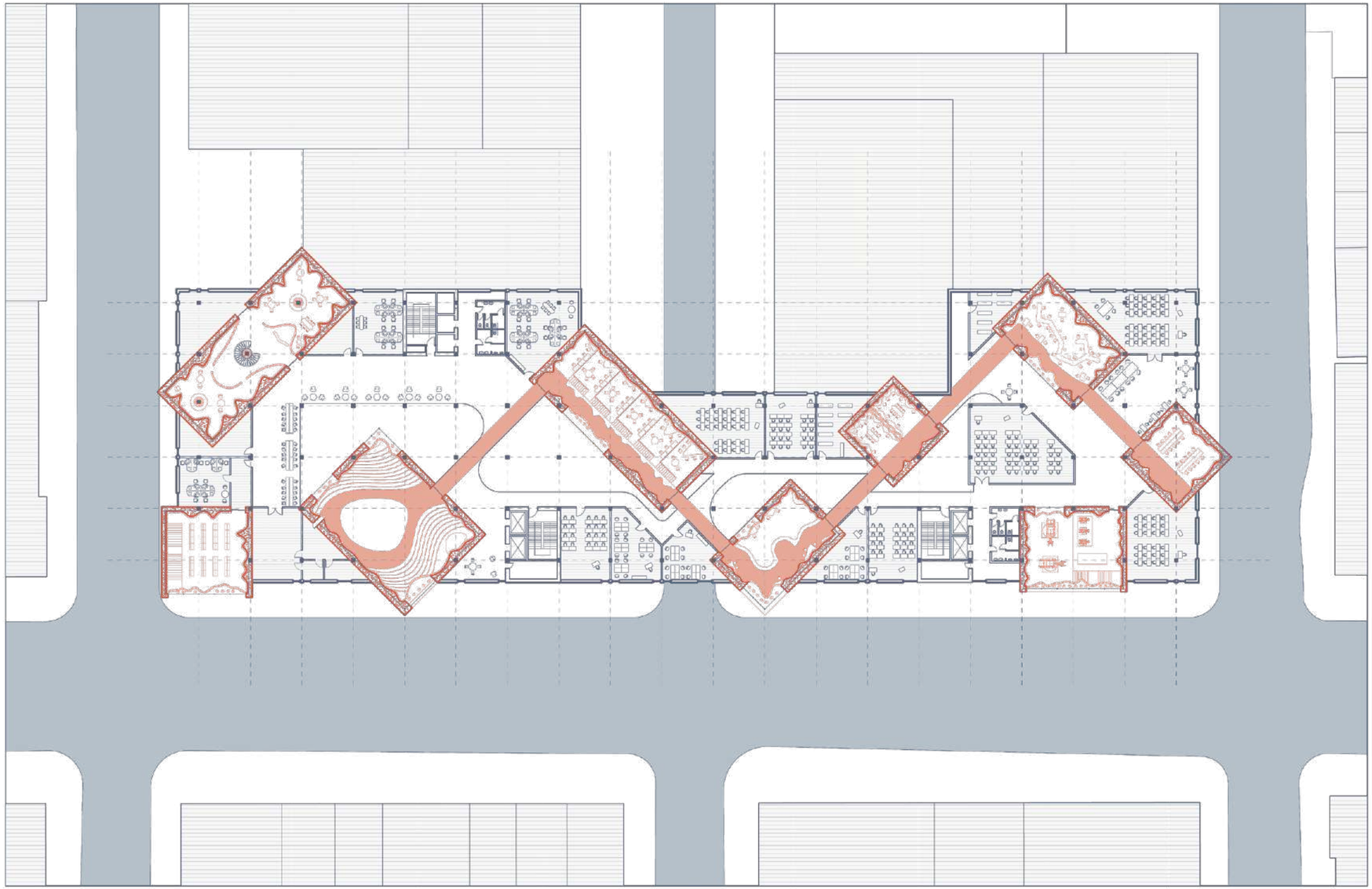
The plan involves integrating a mycelium structure within the existing grid structure to create a physical, collaborative space that actively supports the institution's sustainability mission. Unlike traditional classrooms, these mycelium spaces will exclusively house programs related to sustainability initiatives. The primary timber structure will be affixed to existing columns and beams, with the mycelium inserts providing flexible spaces for creative activities. This integration will entail reorienting and modifying the layout of conventional classrooms to accommodate these activities. Although individual modules will be inserted throughout the building, they will be interconnected to form a pathway within the structure. This pathway can also double as runway space for events when needed. This approach optimizes the use of existing infrastructure while fostering a dynamic and sustainable environment conducive to interdisciplinary collaboration and innovation.

REORIENT THE AXIS

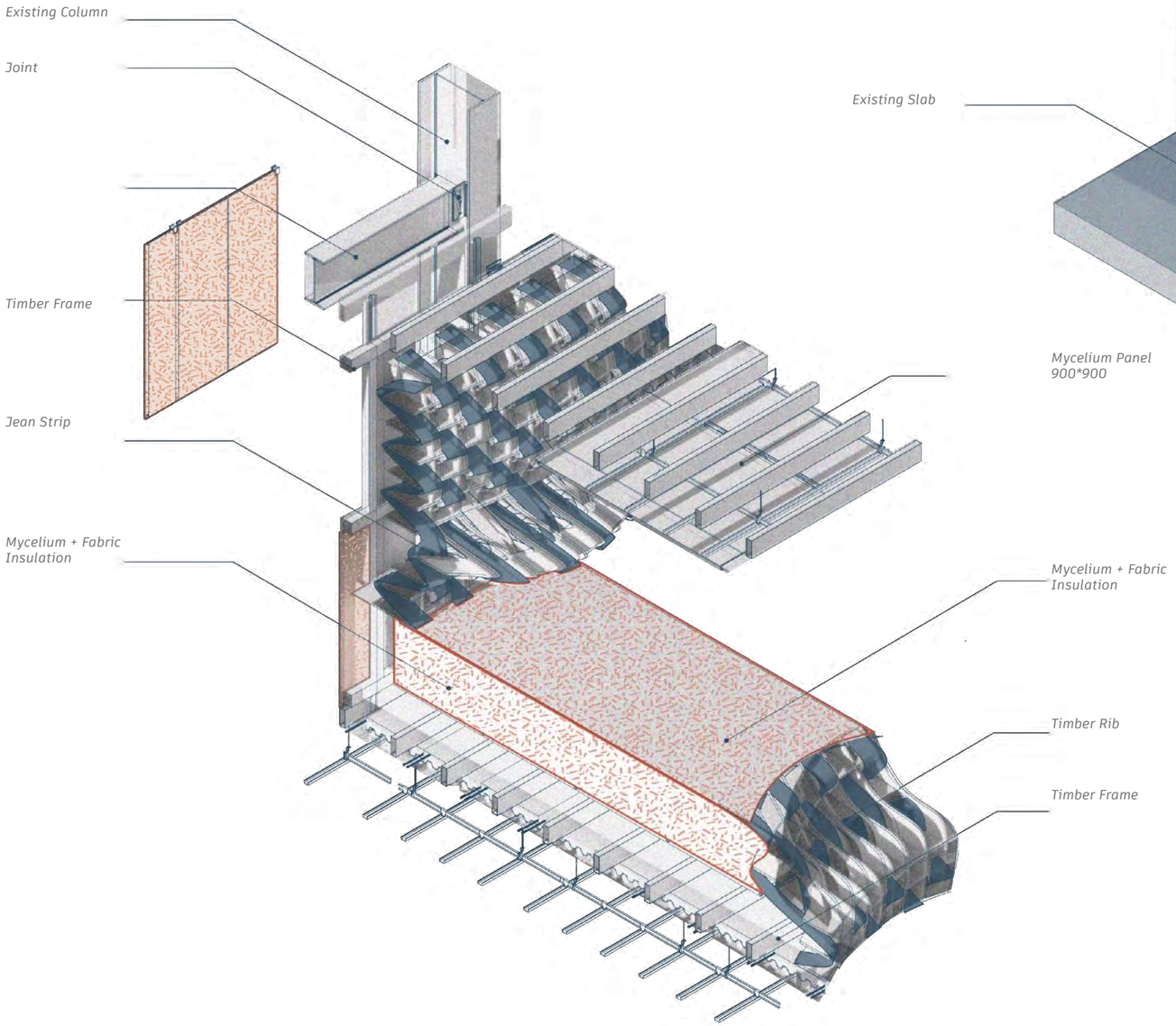
The project site is the Fashion Institute of Technology (FIT) in Chelsea, which holds a prominent position in the fashion industry. FIT is deeply committed to sustainable fashion, frequently hosting conferences and events on the subject. However, there's a notable absence of physical facilities supporting interdisciplinary courses and activities aligned with their sustainability mission. The proposed program seeks to address this gap by introducing open studios and exhibition spaces for experimental fashion, alongside a Material Lab dedicated to developing eco-friendly materials. This initiative aims to establish an innovative fashion platform that seamlessly integrates creativity with sustainability, reflecting FIT's core values.

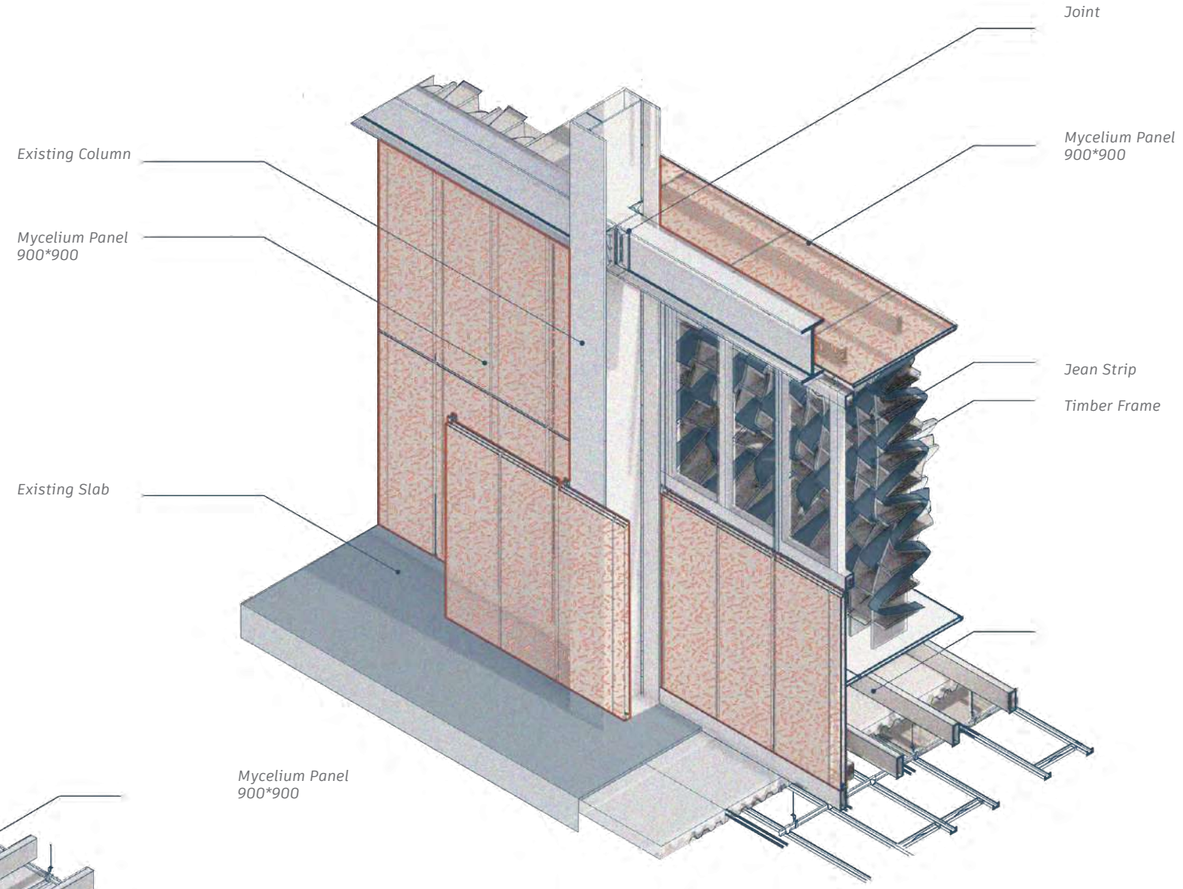
The proposal aims to enhance two existing campus buildings connected by a bridge, with classrooms on the east and a gallery and library on the west. The conventional layout of these structures lacks flexibility and sustainability. To address this, the plan involves integrating mycelium modules within the existing grid systems and structures. These modules will reconfigure the layout, introducing interdisciplinary spaces such as open studios and material labs. Interconnected modules will create a network, fostering collaboration and innovation within the buildings.





MYCELIUM FABRIC TIMBER HYBRID

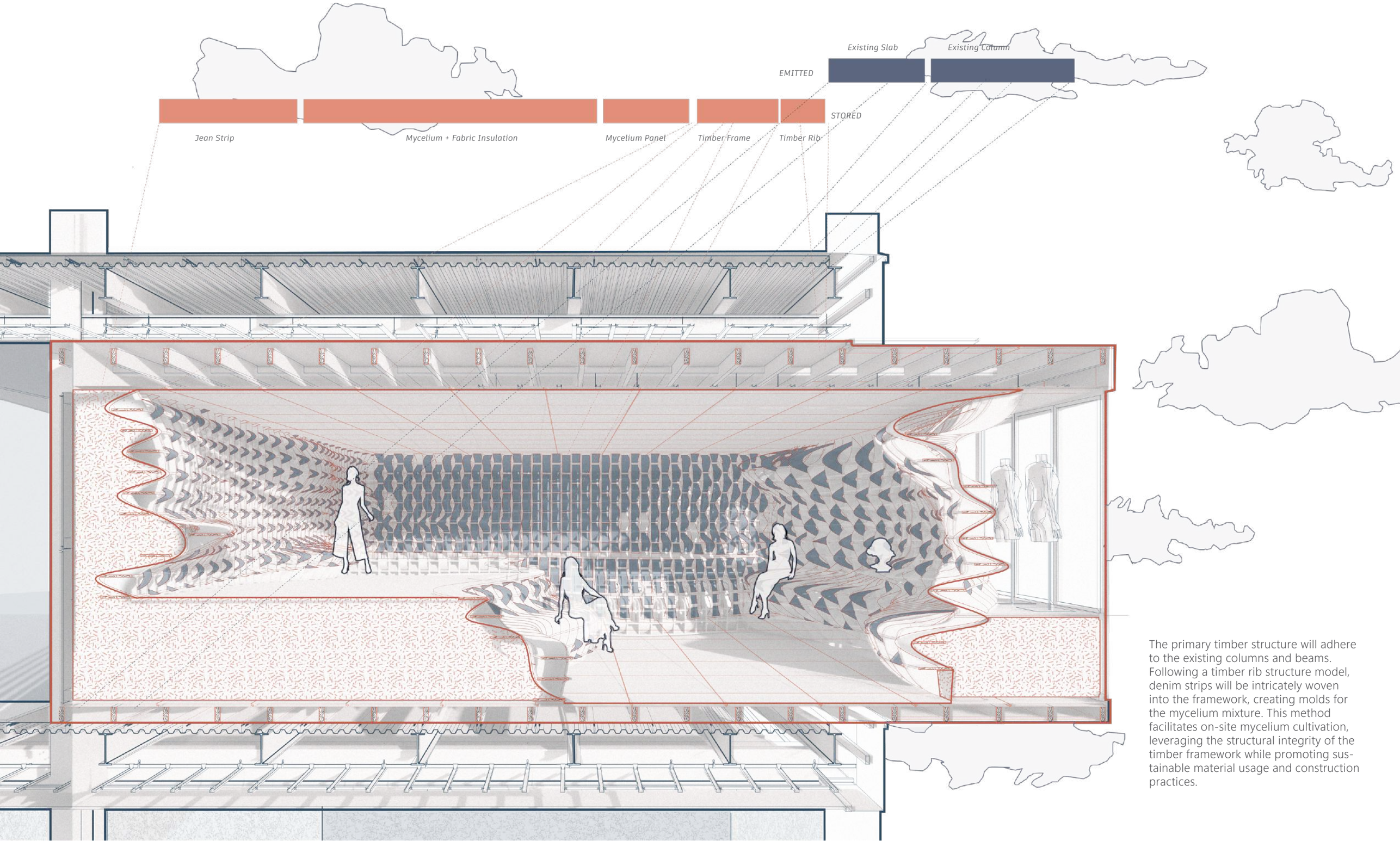




This illustrates the structural attachment of the Mycelium structure to existing buildings. Initially, a timber frame is affixed to the existing columns using angled joints. Subsequently, mycelium panels are applied to the outer surfaces of the structure. These panels serve the dual purpose of sequestering carbon and facilitating construction without disrupting the existing building structure.

Internally, the design showcases the properties of growing mycelium. Rib structures are employed to create an integrated organic space for furniture and walls. Fabric strips are intricately woven between the ribs to organically shape the interior space. Pouring Fabric mycelium material between the timber structure and the fabric-woven ribs allows it to solidify, forming the desired space. This approach ensures structural integrity while maximizing the aesthetic and functional potential of the Mycelium structure.

EMBODIED CARBON



The primary timber structure will adhere to the existing columns and beams. Following a timber rib structure model, denim strips will be intricately woven into the framework, creating molds for the mycelium mixture. This method facilitates on-site mycelium cultivation, leveraging the structural integrity of the timber framework while promoting sustainable material usage and construction practices.

MYCELIUM INSERT AS A EXHIBITION WALL

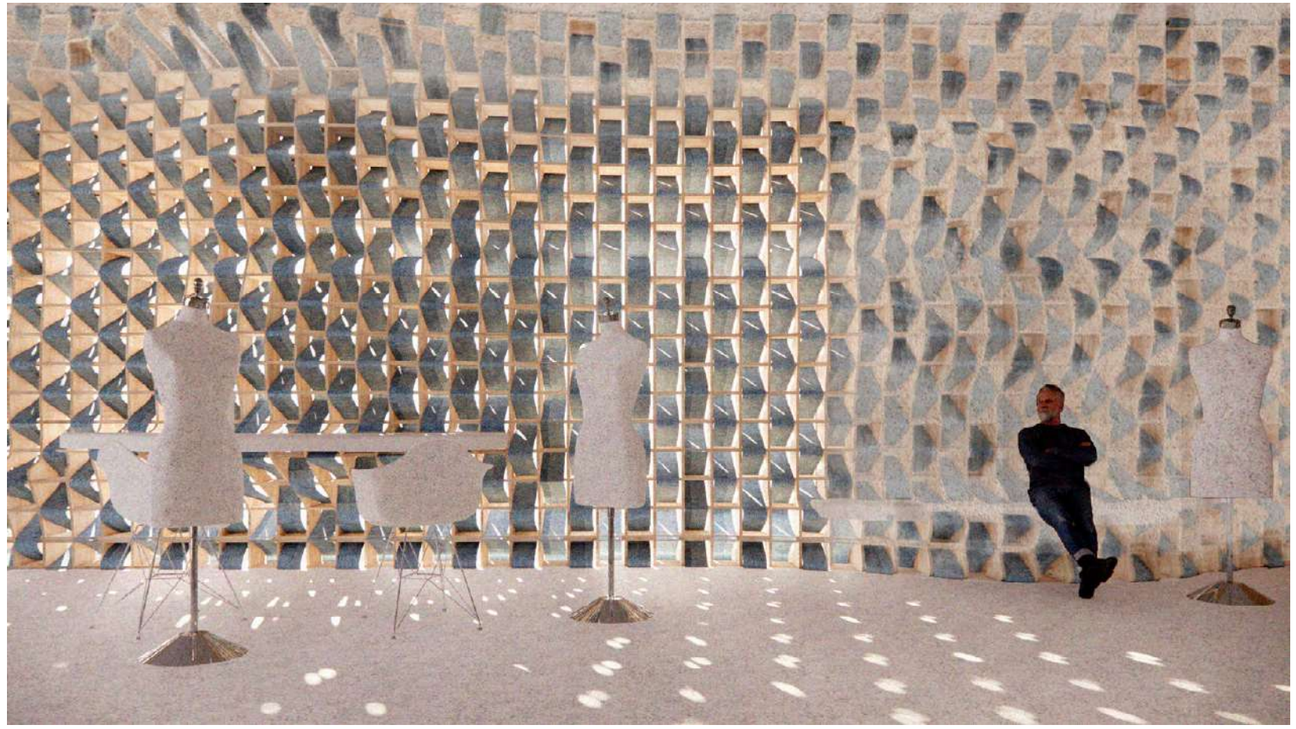
The interior space of the mycelium structure is designed with an organic approach to showcase the unique properties of growing mycelium. The walls serve a dual purpose, functioning as both seating and workspaces for students. Portions of the mycelium walls are intentionally left unfilled, allowing natural sunlight to filter through the structure.

Externally, these sections of the structure serve as showcase windows displaying students' work, promoting sustainability to the public. Internally, they function as exhibition areas for student projects. This design seamlessly integrates functionality with aesthetic appeal, maximizing the potential of the mycelium structure for both educational and promotional purposes.

MYCELIUM INSERT AS A OPEN STUDIO IN FIT

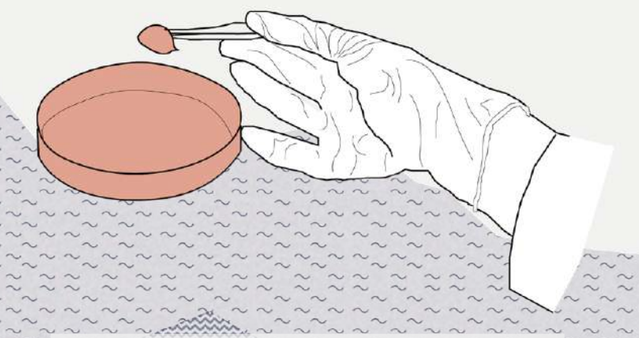
The interior space is structured with timber frames, characterized by an organic design. This space serves dual purposes, functioning both as walls and as furniture such as desks and chairs. Such an organic structure is routinely utilized as an open studio, showcasing FIT's new mission. Here, students delve deep into sustainability and gain a profound understanding of their responsibility in the fashion industry.

The areas filled with mycelium adopt a solid form, allowing occupants to experience the texture of mycelium within. Conversely, the spaces without mycelium allow natural light to filter in, creating a sense of openness. Additionally, the mycelium fabric mixture serves not only as insulation but also performs additional functions beyond its thermal properties.



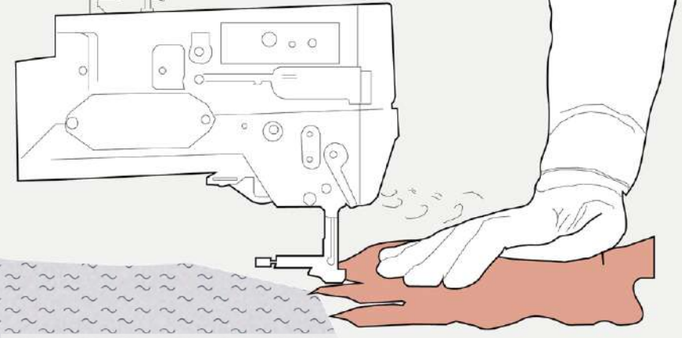
Showroom for Tailoring with Biogenic Material

The pop-up showroom functions as a dynamic center for promoting tailoring with biogenic fibers and environmentally-friendly materials. Skilled tailors demonstrate sustainable garment creation within our innovative module, challenging the fast fashion industry and sparking consumer interest in bio-friendly materials.



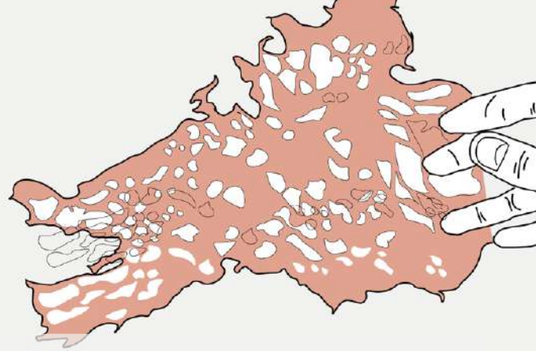
Bio-Lab

At the heart of the concept is the Bio-Lab, a dynamic space for testing biogenic materials like mycelium and luffa. The findings are showcased in an enlightening exhibition, providing consumers with insights into the material production process. Collaborating with local universities fosters communication and innovation between the fashion industry and academia, advancing sustainability efforts.



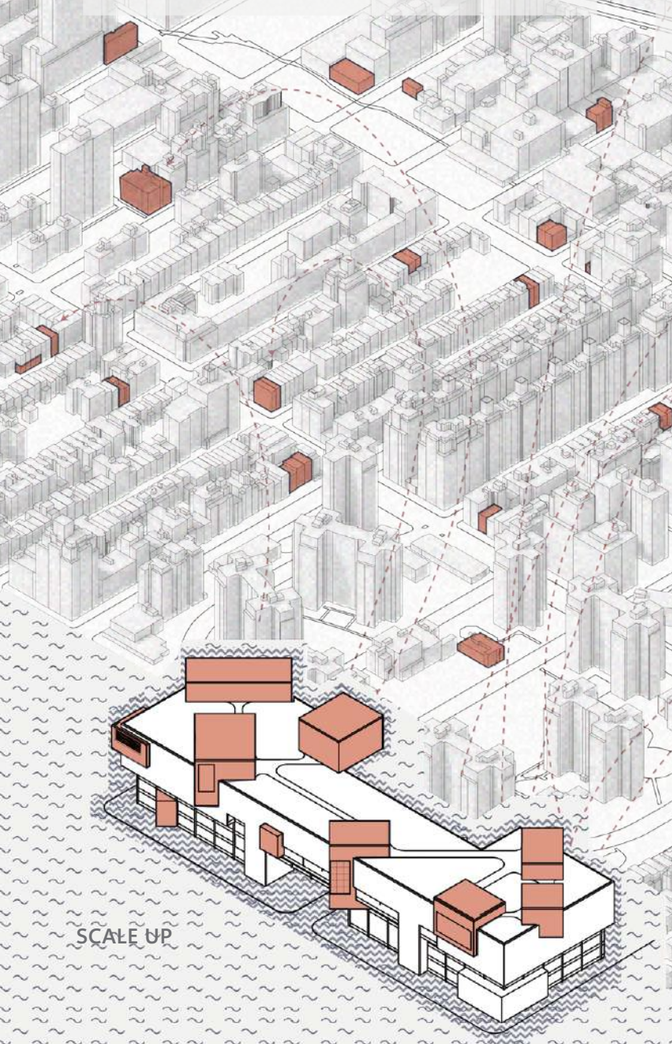
Customization

The venue offers a space for individuals to engage with bio-materials like mycelium-based leather and other sustainable options. Visitors can explore the versatility and potential of these materials through hands-on experiences, fostering creativity and connections within the biogenic community.

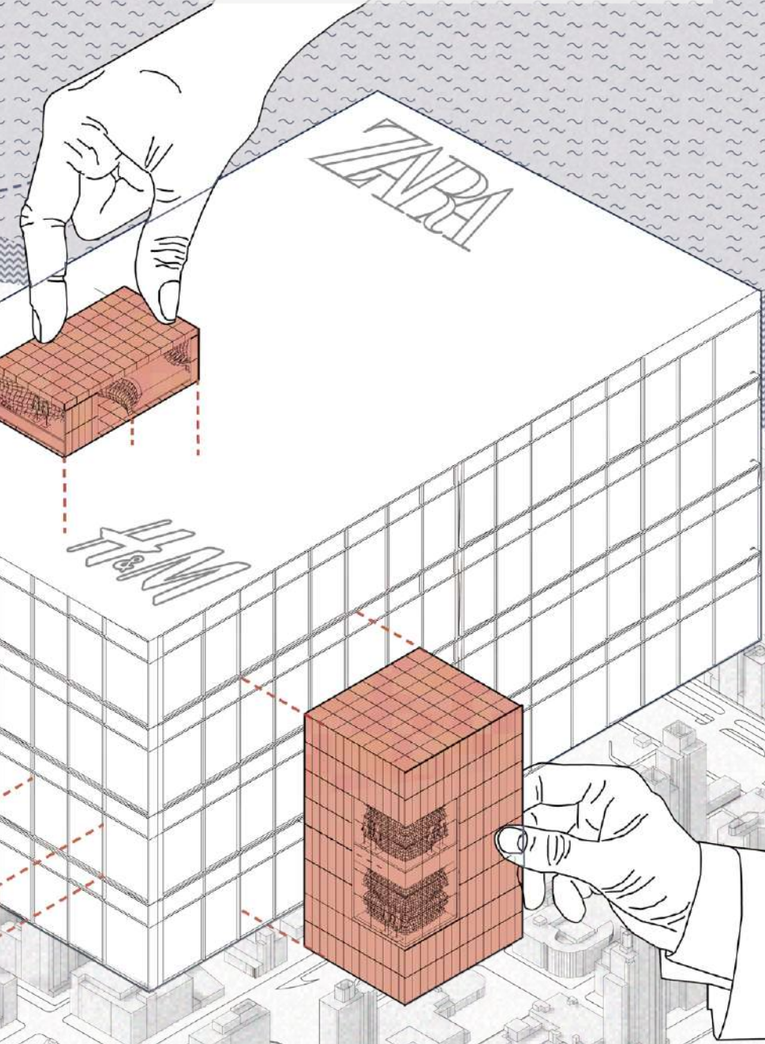


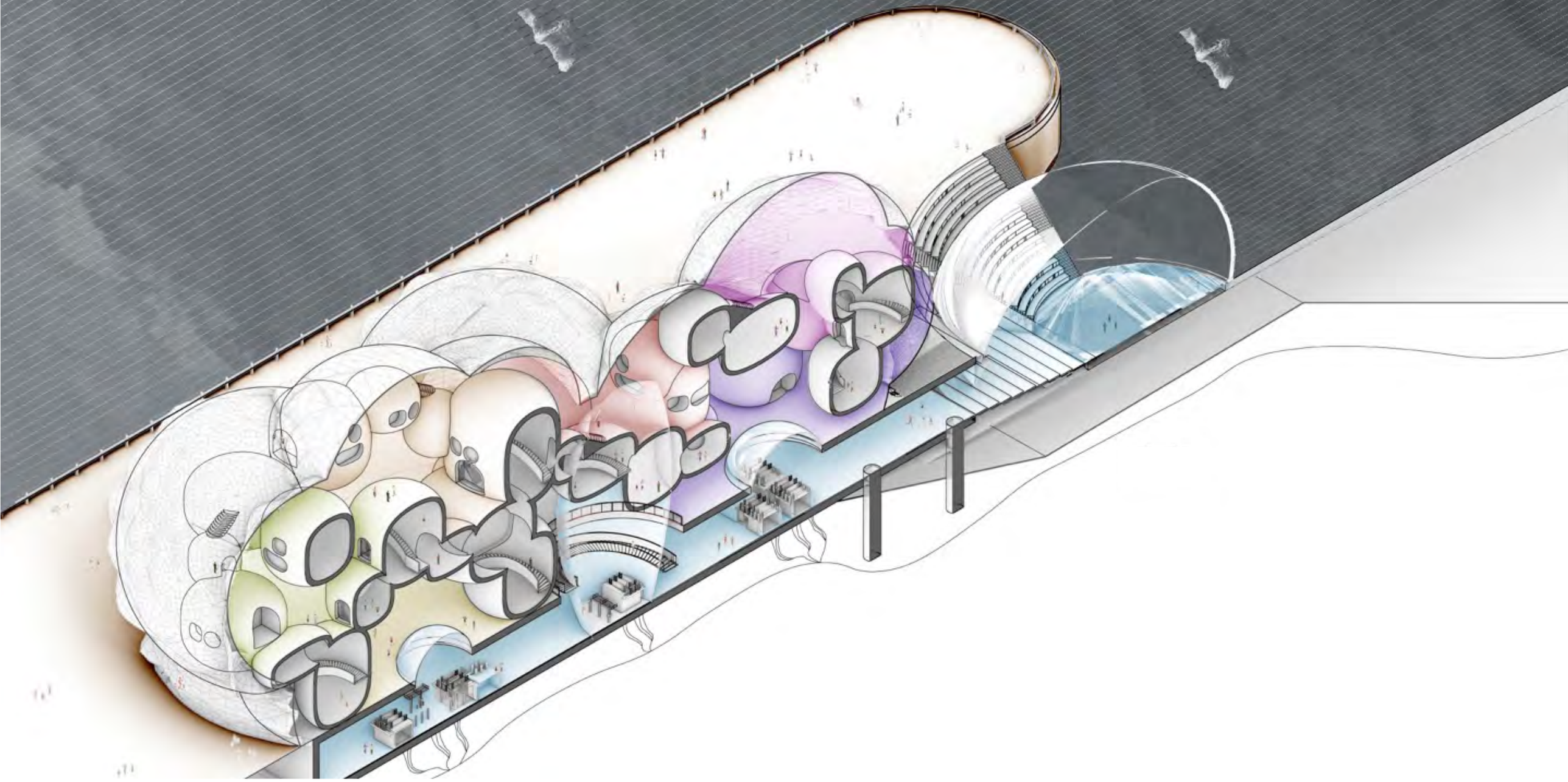
Material Lab

The pop-up showroom functions as a dynamic center for promoting tailoring with biogenic fibers and environmentally-friendly materials. Skilled tailors demonstrate sustainable garment creation within our innovative module, challenging the fast fashion industry and sparking consumer interest in bio-friendly materials.



SCALE UP



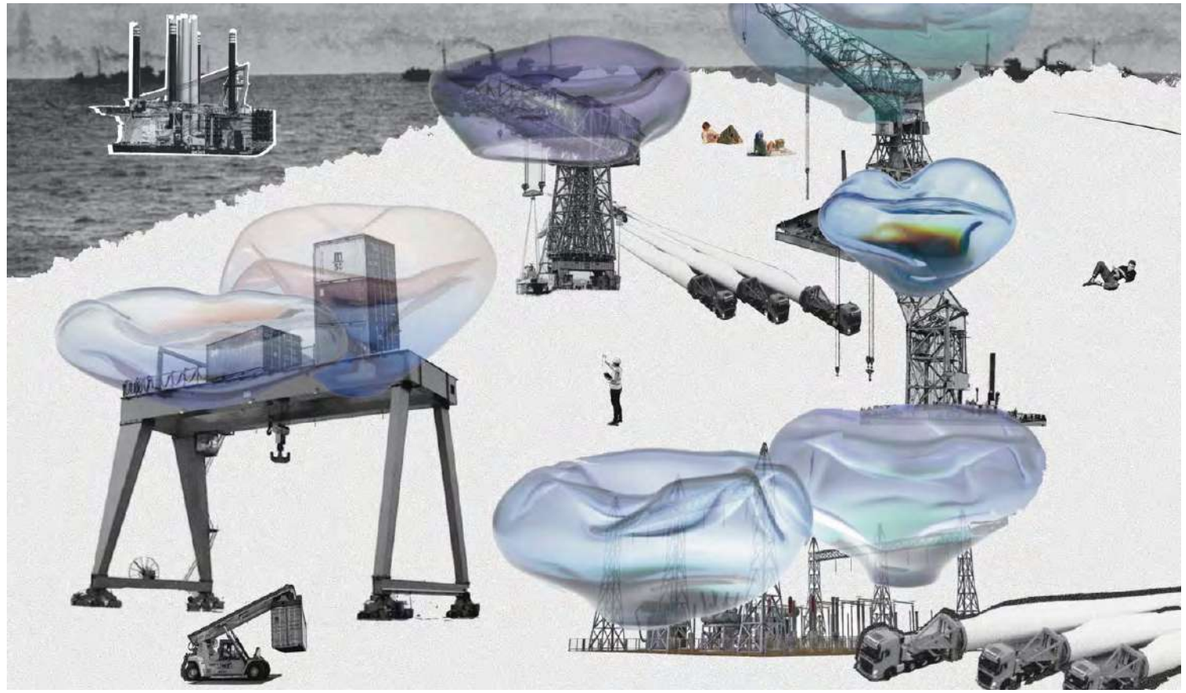


A NEW ARCHITECTURE FOR INVISIBILITY

Summer 2023
_2023.06~2023.08
_Columbia University GSAPP
_Individual
_Advanced Design Studio 4
Instructor Dan wood
_dxwood@work.ac

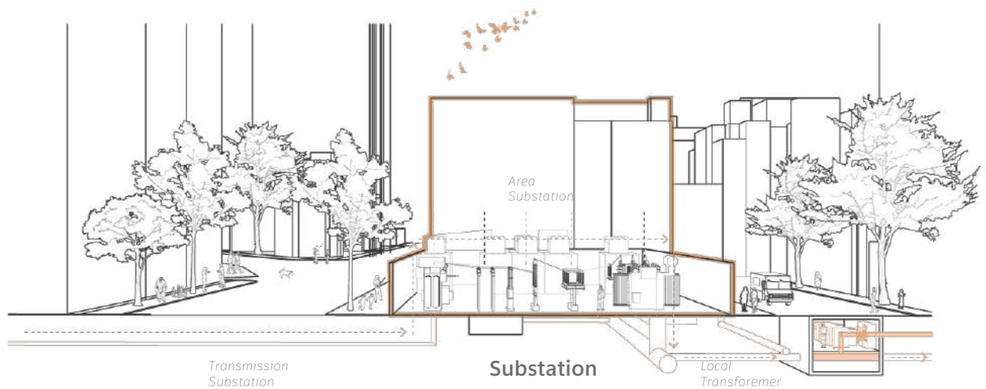
Invisibility Unveiled: Rethinking the Significance of Wind Power Systems and Electricity

This project emphasizes the often-overlooked significance of wind and electricity in architecture, exploring their unseen yet influential roles. It delves into the symbiotic relationship between wind and electricity, particularly in the context of combating climate change. The focus is on understanding the massive transformations happening in the electrical grid, especially with substation. This project also addresses the necessary support infrastructure on land and at sea, highlighting the invisibility of crucial systems and networks despite their immense importance.



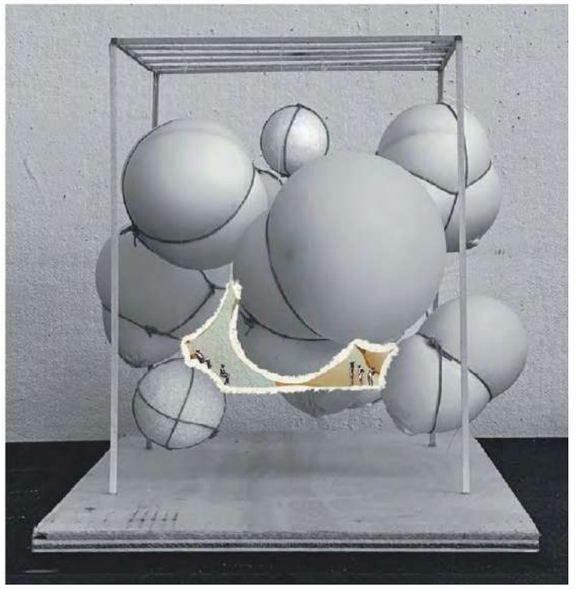
Definition of invisibility

The drawing illustrates the idea of invisible architecture, reimagining wind power systems by celebrating them instead of hiding their industrial appearance. The proposal suggests using inflatable bubbles to visualize the unseen energy of wind and electricity, seamlessly integrating these structures into the urban environment. The goal is to make the energy sources visible and appreciated rather than concealed.



Inflatable Bubbles:
Visualizing and Enhancing Windpower Substations

This project emphasizes the onshore substation's critical role in wind power systems, focusing on its primary function of modifying, converting, storing, and altering electricity. The concept revolves around associating this function with the inflatable structure, symbolized as "bubbles.". The concept envisions the bubbles expanding when the substations are highly active, indicating effective windpower electricity generation. The heat generation within each bubble is linked to energy storage, with fluctuations based on daily and seasonal electricity consumption patterns.



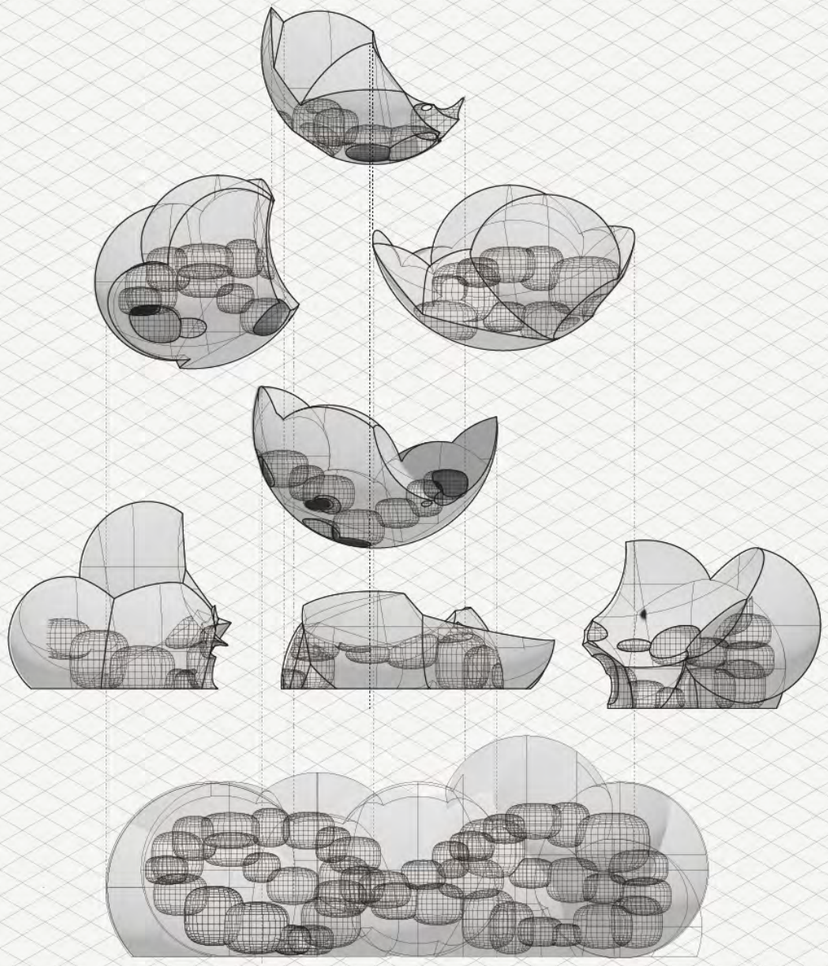
Bubble in Bubble

This drawing explores negative space possibilities, adjusting bubble sizes based on substation energy. It depicts a museum adapting to bubble expansion and contraction. The concept preserves bubble uniqueness, treating interior and exterior spaces as a continuous area without large slabs. Programs are divided into fixed/service space within bubbles and unexpected spaces like museums outside of bubbles. The sketch illustrates a structure of bubbles within bubbles, creating diverse interior and outdoor spaces. Transparent bubbles expand based on programs and substation capacity, offering unexpected negative spaces.

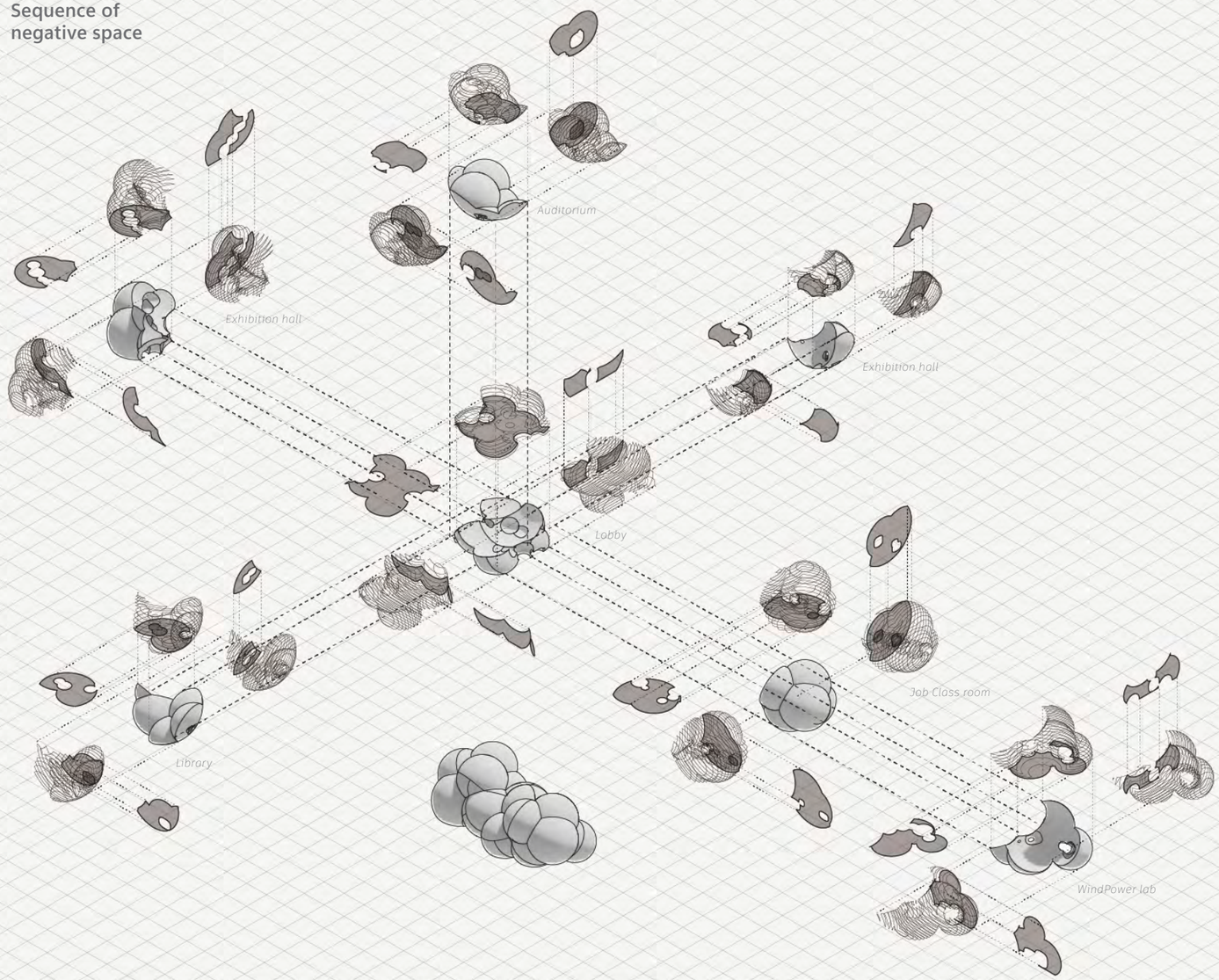
Negative space made by Inflatable bubble

The conceptual model explores the dynamic relationship between a substation and inflatable bubbles that expand and contract based on energy storage. Emphasizing the impact on external spaces rather than just interiors, the bubbles create negative 3D spaces, influencing circulation and scale. The substation's storage capacity determines bubble size, directly shaping the surrounding space. Bubbles can function as barriers, altering scale and obstructing circulation. The 3D model visualizes how these bubbles interact, influencing external spaces and their uses. Illustrated through a museum exhibition scenario, the concept demonstrates adaptability, transforming exhibition areas based on bubble expansion and contraction

Negative space
divided by inflatable bubble



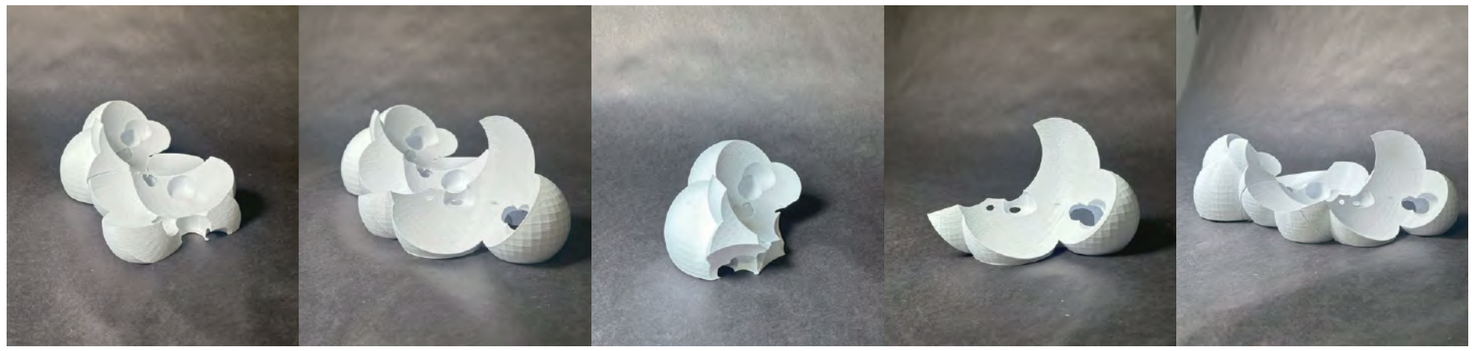
Sequence of
negative space



resin,3d printed model

Exploring negative space

The concept revolves around windpower substation bubbles and their impact on negative space outside the bubbles. The arrangement of bubbles creates dynamic negative 3D spaces, influencing the scale and circulation of the external environment. The model explores how these negative spaces, shaped by the expansion and contraction of bubbles, interact with surrounding programs. The transformative nature of the substation, adjusting space scales and obstructing circulation, is crucial in redefining the utilization and experience of the external environment. The emphasis is on the substation's role in altering negative space dynamics, affecting the overall functionality of the areas surrounding the bubbles.



3d printed model

MAKE

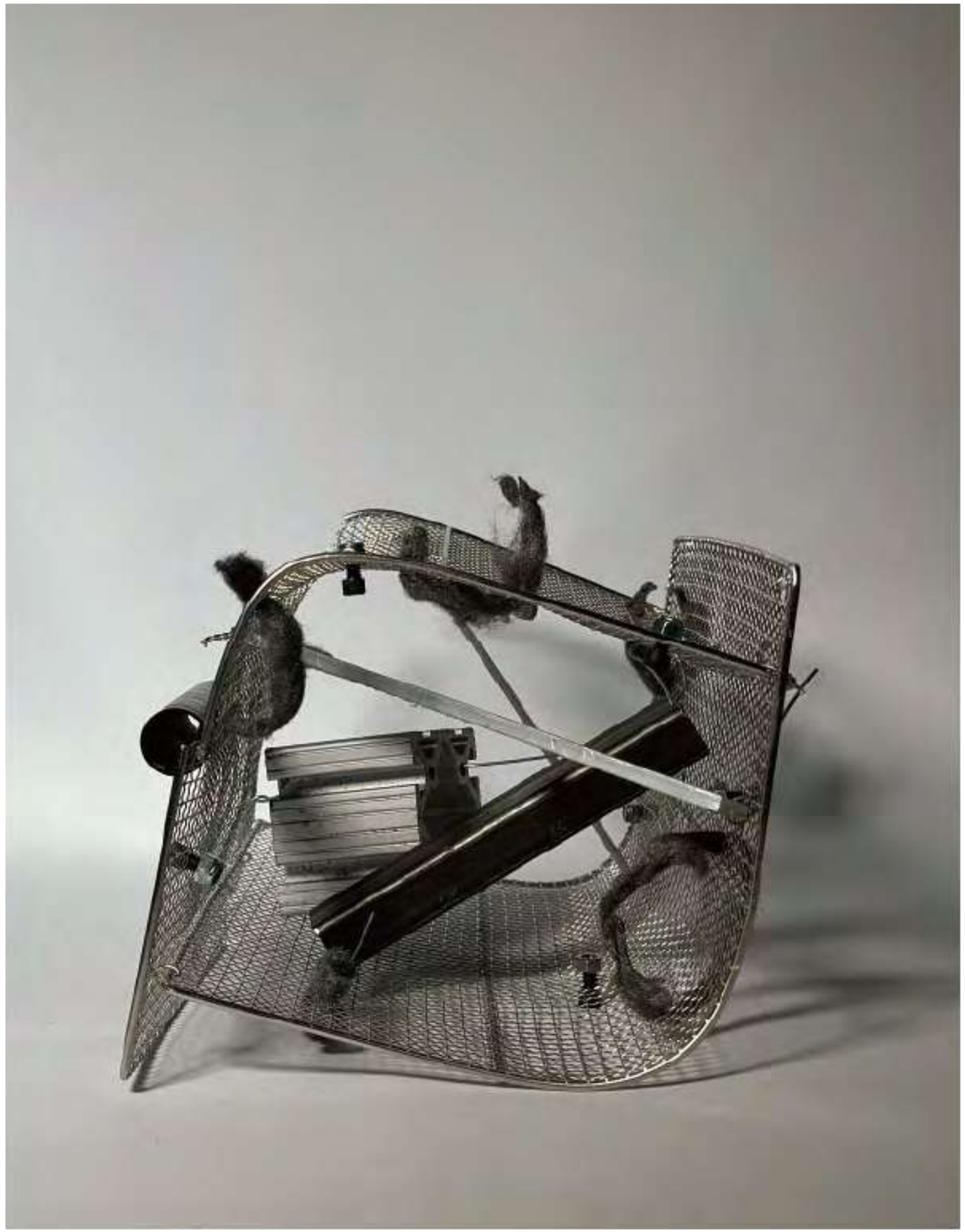
Columbia GSAPP elective

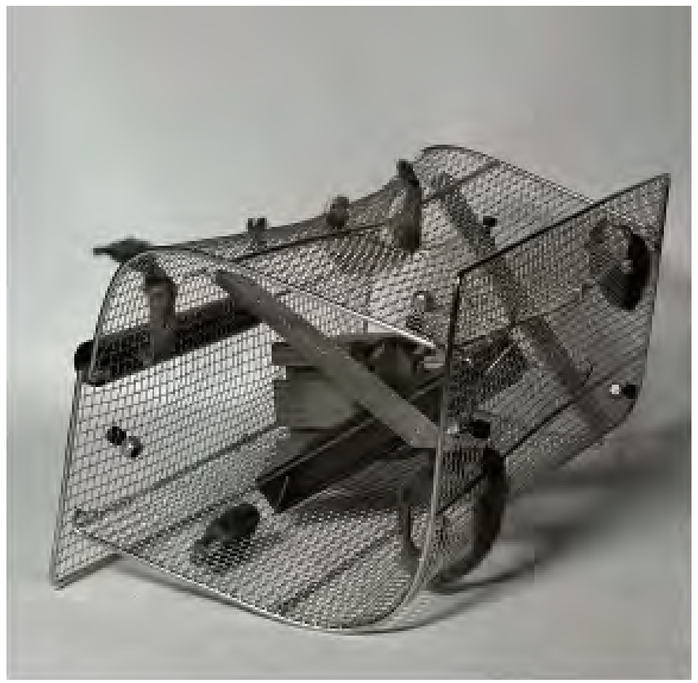
Fall 2023
_2023.09~2023.12
_Columbia University GSAPP
_Collaborative work with 2 member
_Tech elective
_Instructor : Ada Tolla + Giuseppe Lignano
_at2203@columbia.edu

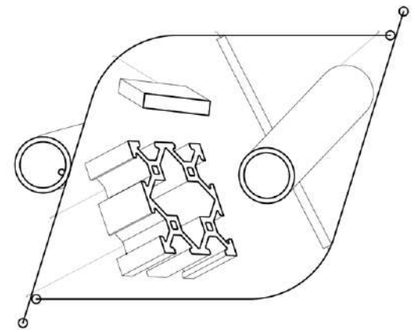
This workshop centers around the exploration of materials as a means of artistic and architectural expression.The process involves making, remaking, and documenting these volumes, with weekly discussions on personal vision, experience, and voice. The focus is on viewing art as both architecture and artistic expression, engaging in critical dialogue about the relationship between material and concept. The workshop emphasizes repetition and routine, fostering a supportive environment for personal discoveries and experimentation with materials as sources of inspiration and resistance.

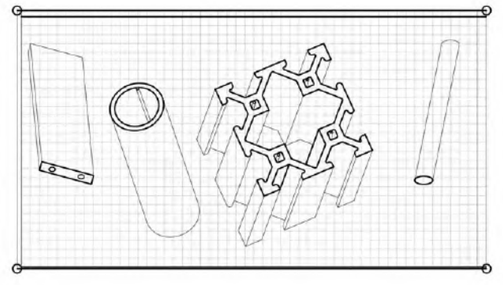
Metal *12X12X6*

BBQ grill grate, iron mesh, bolts and nuts, pipes, parts of rebar





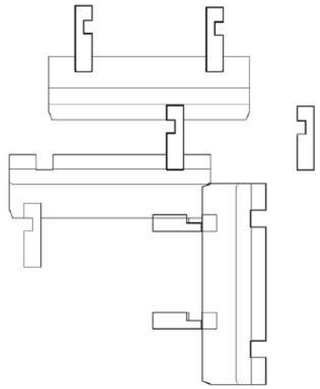


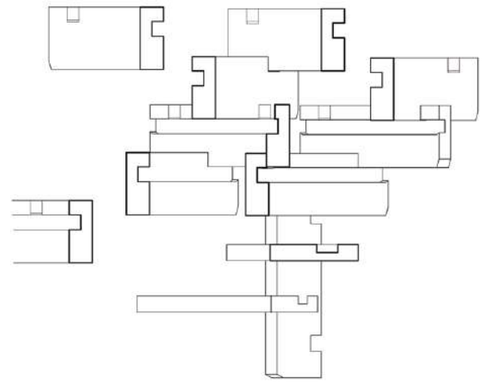


When contemplating the use of metal as a primary material, the primary challenge revolved around the joining process. There was initially considerable deliberation on the most effective method for disassembling and reassembling different metal components. The objects crafted from these materials were fashioned using leftover items sourced from the school's metal shop. Two BBQ grills were bent and interconnected using metal wire to form the foundational structure. My intention was to imbue the structure with a sense of suspended metal elements by threading wire between these grills

Wood *12X12X6*

Part of an abandoned wooden pallet, twine, wooden sticks, nails.

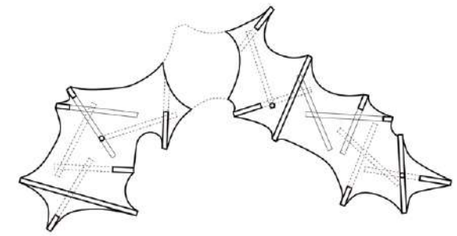


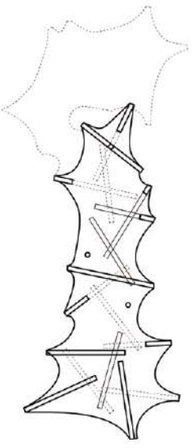


The Wood Object evolved from the idea of avoiding the use of glue or drills. It was created using discarded wooden pallets, furniture, cords, and screws. By making holes in the pallets and connecting them vertically with wooden sticks, stability was ensured using cords. Nails near the sticks were added for adjusting the rotation radius, allowing installation without glue. The process of assembling wood without screws or drills was especially intriguing in this project.

Fabric *12X12X6*

Half of black stocking, 6-7 inch wooden stick.





When contemplating fabric as a material, the first aspect that came to mind was its resilient and stretchy nature. Consequently, the material that initially stood out to me within the realm of fabric was elastic stocking. As a result, this object was crafted using half of an elastic stocking and 6-7-inch wooden sticks. The inner structure was established by securing the wooden sticks with elastic bands, and the exterior was enveloped in stockings, thus forming a structure with a tension surface.

TENSION/COMPRESSION SURFACES IN ARCHITECTURE
TACTILE METHODS FOR ARCHITECTS

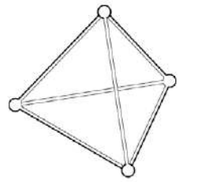
Columbia GSAPP elective

Fall 2023
_2023.09~2023.12
_Columbia University GSAPP
_Collaborative work with 2 member
_Tech elective
_Instructor : Robert Marino
_rem3@columbia.edu

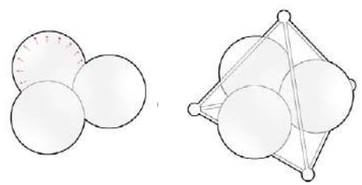
TENSION/COMPRESSION SURFACES IN ARCHITECTURE

This workshop is designed to delve into the concept of the Platonic Ideal in architecture, concentrating on optimizing material and labor efficiency, intelligent spatial organization, and precise structural concepts. Through the workshop, it underscores the examination of shells as a prime illustration of this design philosophy. My involvement as a participant in the semester-long project, I took an active role in constructing a shell. Throughout this endeavor, I assumed responsibility for formulating and assuming ownership of the theoretical form, fabrication techniques, and material selection.

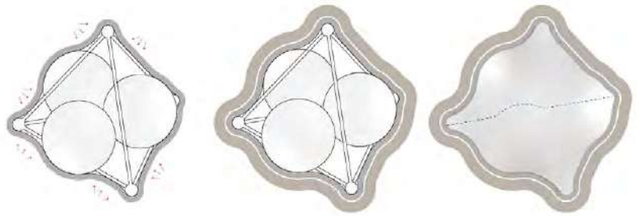
Process



Boundary Conditions



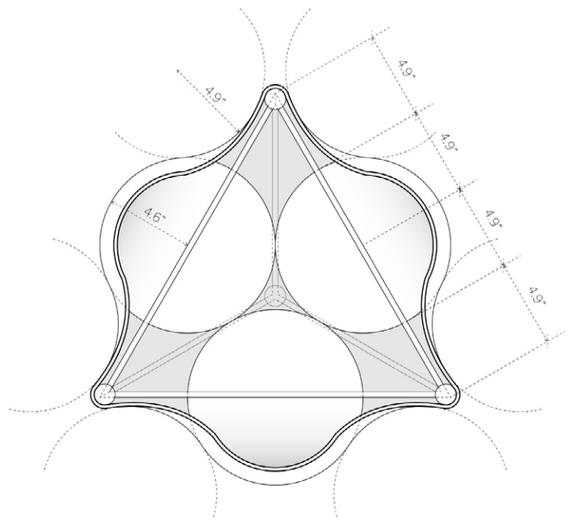
Inflatable Balloon

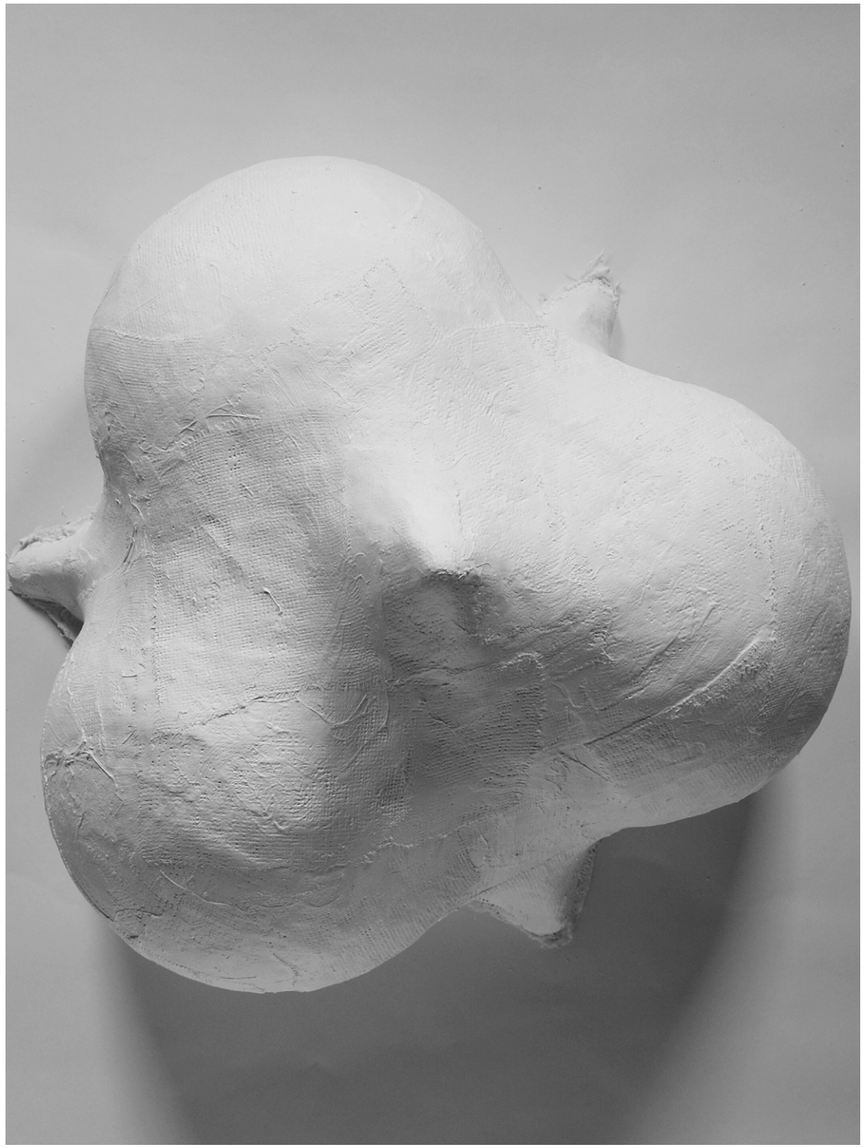


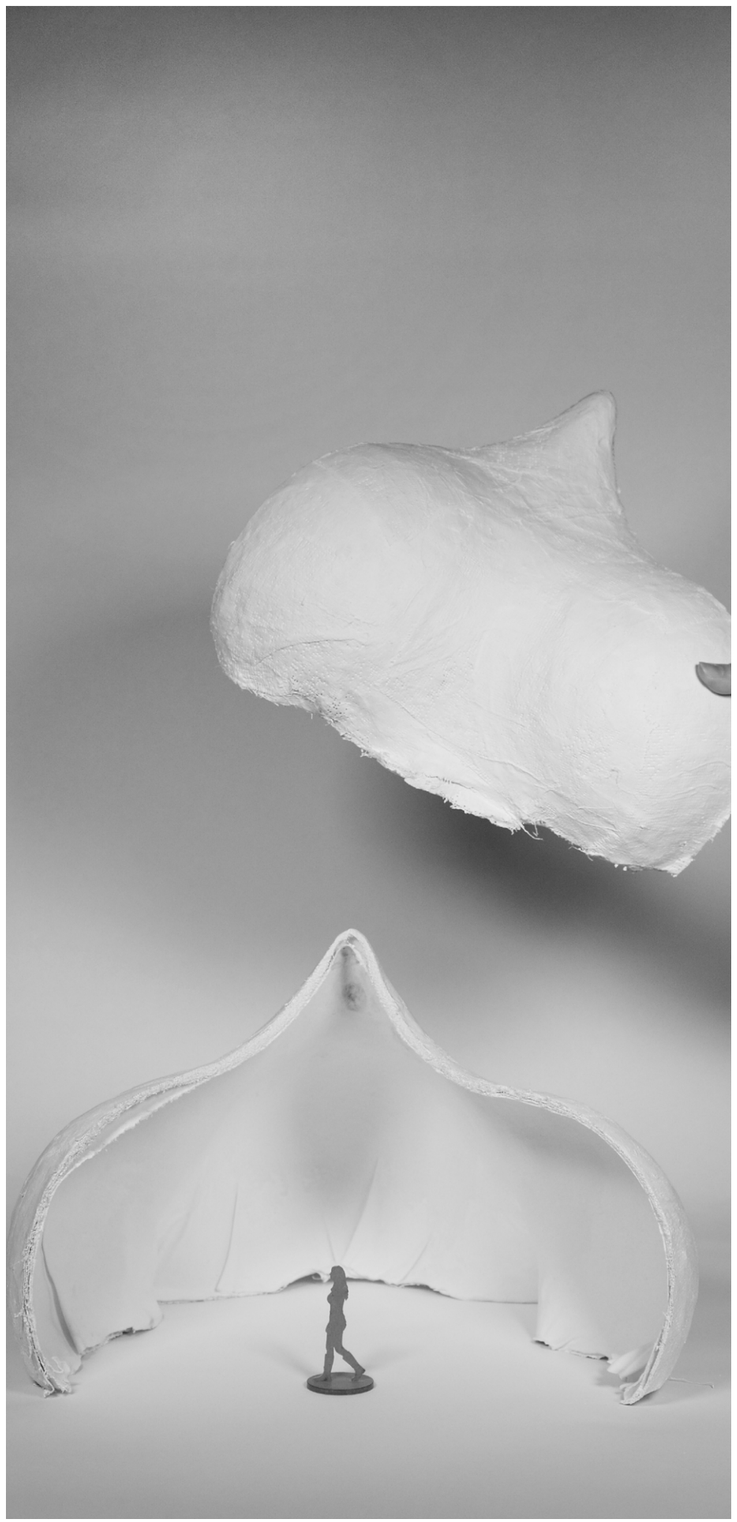
Wrap with fabric

Add plaster
+ Remove structure

Plaster shell + Fabric







Adaptibility of Tension surface

Tension surfaces, characterized by their flexibility and adaptability, offer a myriad of design possibilities in terms of shape and size. This inherent flexibility enables them to be tailored to specific needs, allowing for modifications in structure size or form to meet evolving requirements or respond to changes in environmental conditions. Moreover, the versatility of tension surfaces extends across various domains, encompassing a wide spectrum of applications such as tents, canopies, sports facilities, exhibition spaces, and temporary event venues. Their capability to serve diverse functions positions tension surfaces as dynamic solutions within architectural and design projects.

The multifunctionality of tension surfaces emerges as a pivotal aspect, contributing significantly to the creation of innovative architectural forms and the enhancement of existing structures. By offering adaptable and versatile solutions, tension surfaces empower designers and architects to explore new design paradigms and address complex spatial challenges effectively. This versatility not only fosters creativity and experimentation but also facilitates sustainable design practices by optimizing space utilization and resource efficiency. As a result, tension surfaces emerge as indispensable elements in the contemporary architectural landscape, driving forward the evolution of architectural design and construction methodologies.

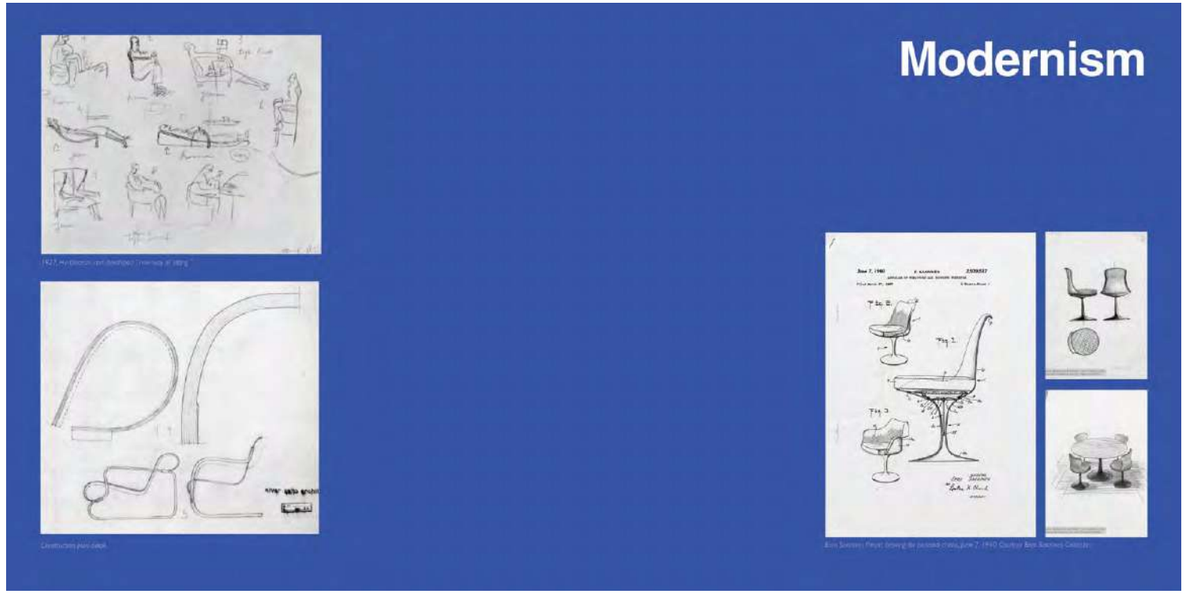
ModMidContempo

GAP I: Design & Typography

Spring 2024
_2024.01~2024.04
_Columbia University GSAPP
_Individual
_Elective
Instructor Yoonjai Choi
_yc2940@columbia.edu

The Credibility of Blue in Conveying Information

This project originates from the intuitive impression evoked by the color blue. Recognized for its association with conveying information and instilling trust, blue serves as the foundation for creating a furniture collection book. The aim is to leverage the characteristics of blue to effectively handle information pertaining to designers and architects who have contributed to furniture design from modern to mid-century to the present day. By emphasizing the color blue, this project endeavors to convey information in a manner that is both logical and objective.



Color of Blue

Blue is often perceived as modern, progressive, and trustworthy due to its use by reputable institutions like Columbia University and prominent corporations such as Samsung and IBM. This perception is rooted in the psychological response to the color blue, which evokes feelings of calmness, stability, and dependability. In the digital age, blue's prevalence in user interfaces further reinforces its association with modernity and reliability. Therefore, blue is considered suitable for conveying modern and trustworthy information.

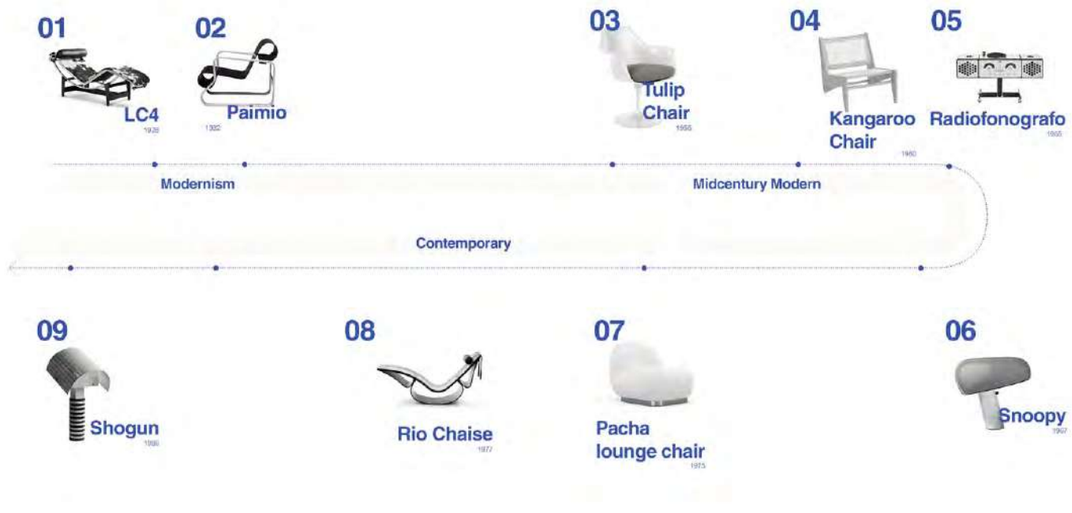


Table of contents

In the table of contents, readers will find comprehensive details about renowned furniture designers, including their founding years, thereby offering insights into the evolution of furniture design and the significant contributions made by these designers over time.

Museum Book

Museum books provide information about a specific museum's collection, exhibits, or particular topics. These books typically offer insights into the museum's history, an overview of its collections, details about special exhibitions, artists, or specific artworks, along with visually appealing images showcasing the exhibits. The visual aspect plays a crucial role in conveying the museum experience vividly to readers and stimulating interest in art and culture.

Layout of Collection

From a typographic perspective, this collection utilizes visually appealing fonts and text layout to convey information effectively. Headlines and subheadings are noticeably large and emphasized, while body text is composed in readable and clean fonts. Typography is considered as part of the design, complementing the style and feel of the furniture. It often combines harmoniously with images, capturing readers' attention and stimulating interest in furniture and interior design.