

Urbanism x Technology

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Master of Science in Advanced Architecture Design

Cornell University

Architecture + Urbanism | 2019 - 2020

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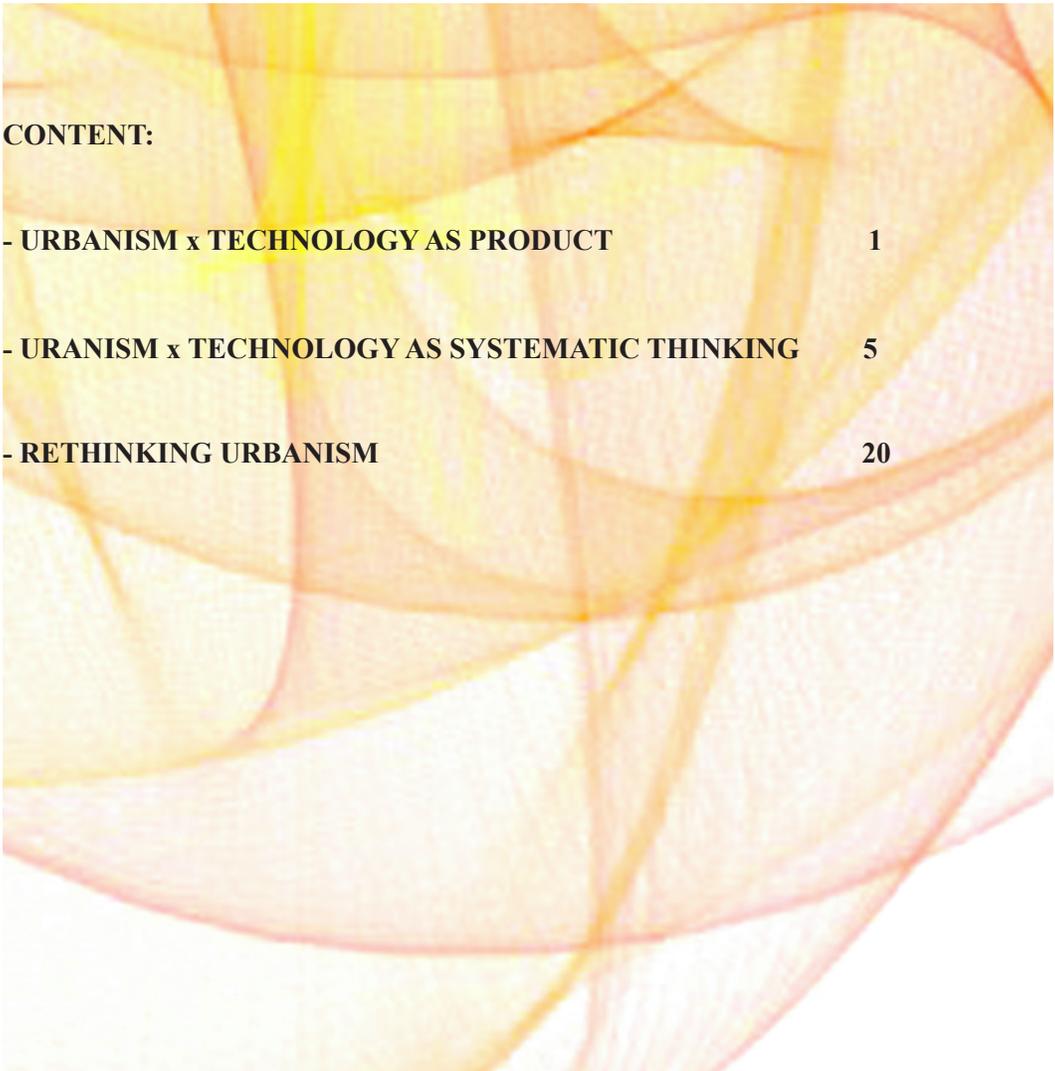
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ABSTRACT

Architecture and urbanism, as a collaborative subject, lie within the negotiation between different subjects.

Technology has always played a significant role in shaping cities. When urbanism interacts with technology, it is not only about the outcoming products but also new forms of systematic thinking.

In this paper, I articulate three different aspects in my research: the interaction between urbanism and technology as product; the interaction between urbanism and technology as systematic thinking; and rethinking urbanism.



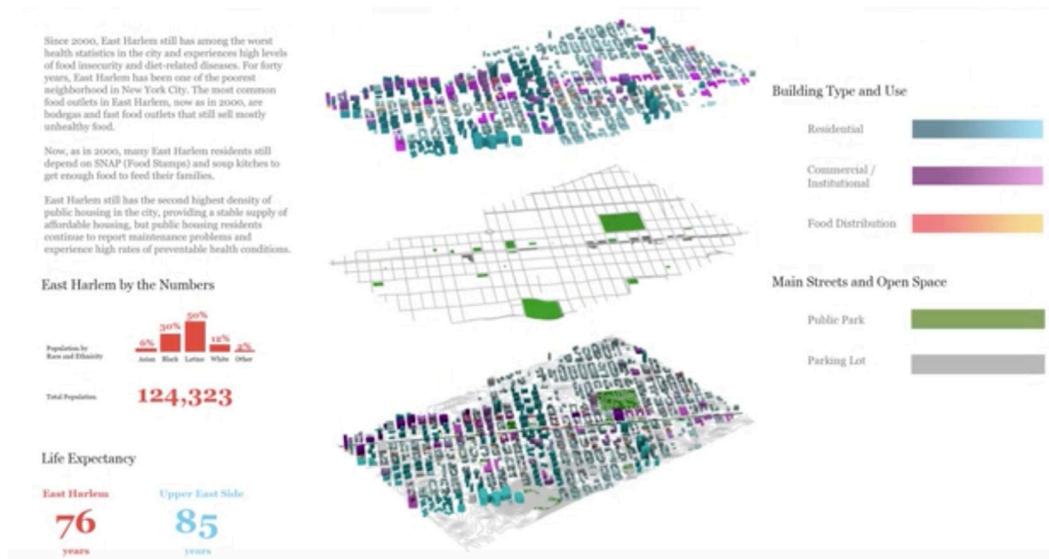
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Urbanism with Technology as Product

Technology has always played a significant role in shaping cities. With new inventions for networking, sensing, machine learning, artificial intelligence, and fabrication, technology fosters a revolution to urban life and lets people reimagine future possibilities.

During the summer class I took in New York, Professor Biayna Bogosian introduced us to the concept of Digital urbanism. From getting to know how to use Grasshopper and Rhino to get big data on city infrastructure for data visualization, Professor Biayna Bogosian showed us a new path to urban analysis. As a great quantity of data is being generated nowadays, the traditional way of constructing new infrastructure is no longer the most efficient way to solve urban issues. Professor Biayna Bogosian made me question how urban planning and design could effectively address data to build better cities.

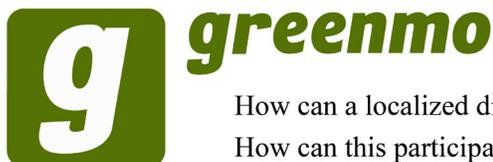


Location: East Harlem , New York City, NY
Summer 2019 | Studio Project
Instructor: Biayna Bogosian
Students: Akhila Arakkal, Olivia Calalo, Dora Lo,
Krishna Parikh, Zheng Yang, Pablo Zarama

Online media also offers new forms of social interactivity. When people find it difficult to interact with each other physically in the city, they prefer to be more active and meet with others online and the mobile screen replaces public space and street in the physical world. Using big data provided for the infrastructure and the technology of online social interaction, would it be possible to generate invisible systems that support locals with their existing problems, and develop practices and methods to help build great future cities?

Additionally, wireless applications like Airbnb, Uber, and Google Maps have significantly shaped our way of experiencing and behaving in the city. Urban life is now strongly connected with the use of smart systems that direct our decisions and suggest new paths for encountering the city. This new human connectivity has immense potential to solve spatial, social, and environmental problems.

To consider these potentials of digital urbanism, and to explore the use of big data specifically, our group for Professor Biayna Bogosian's studio developed a mobile application system named Greenmo for the East Harlem community in New York City. Greenmo is a localized digital platform that can be used to facilitate neighborhood wellness and contribute to revitalizing the economy of East Harlem.



How can a localized digital platform facilitate neighborhood wellness?
How can this participatory economy revitalize East Harlem?



EXISTING PARKS AND
COMMUNITY GARDENS

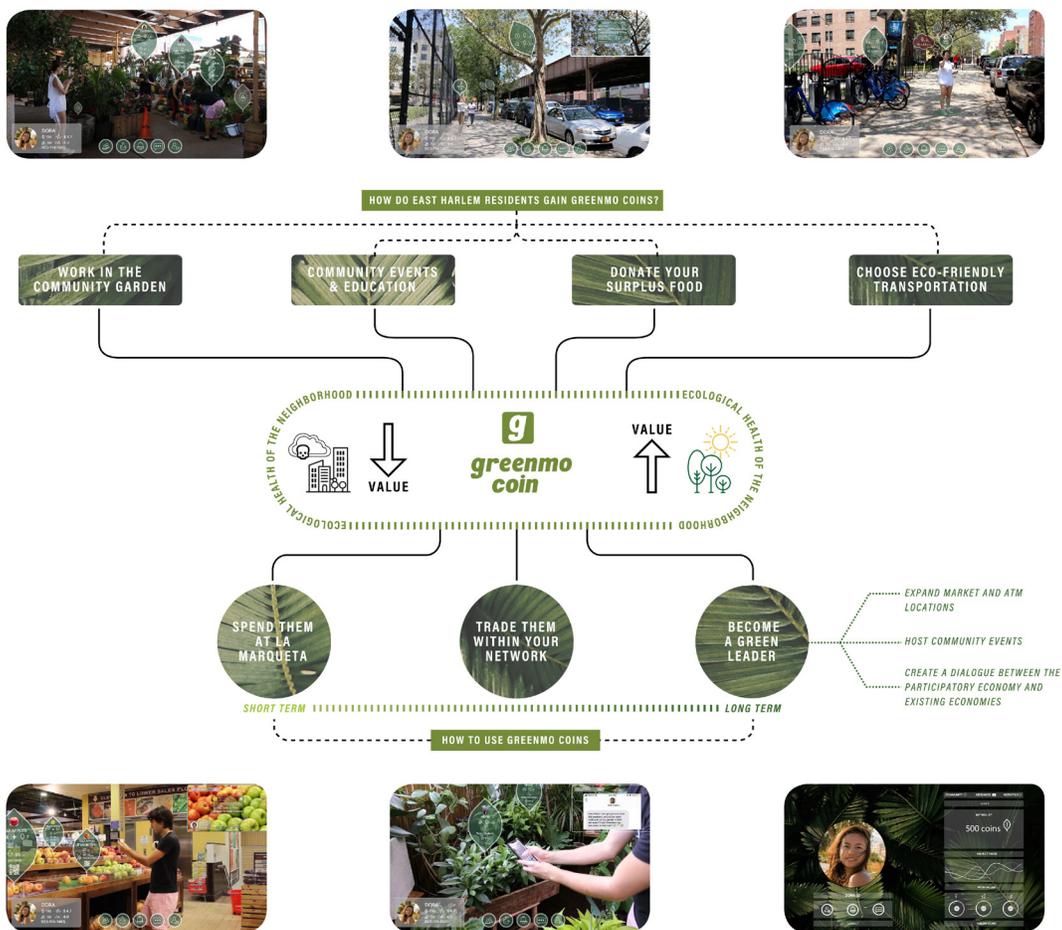


EAST HARLEM



EXISTING CONCENTRATION
OF FAST FOOD

Getting inspiration from the reward system in Starbucks, our group came up with the idea of a local reward system to motivate the entire community. Greenmo works as an Augmented Reality mobile application that enable the locals to gain “coins” that can subsequently be spent at the neighborhood market or traded with other users. Users can gain coins through various forms of neighborhood engagement. The daily value of the coin is dependent on the ecological health of the local neighborhood. Greenmo, as an online human connectivity platform, thereby suggested an alternate approach to interaction between community members to make them reconnect online. Furthermore, this platform saves time, effort, and the cost from the unnecessary physical connection between local community members, so it makes the contribution more accessible to all of the locals.

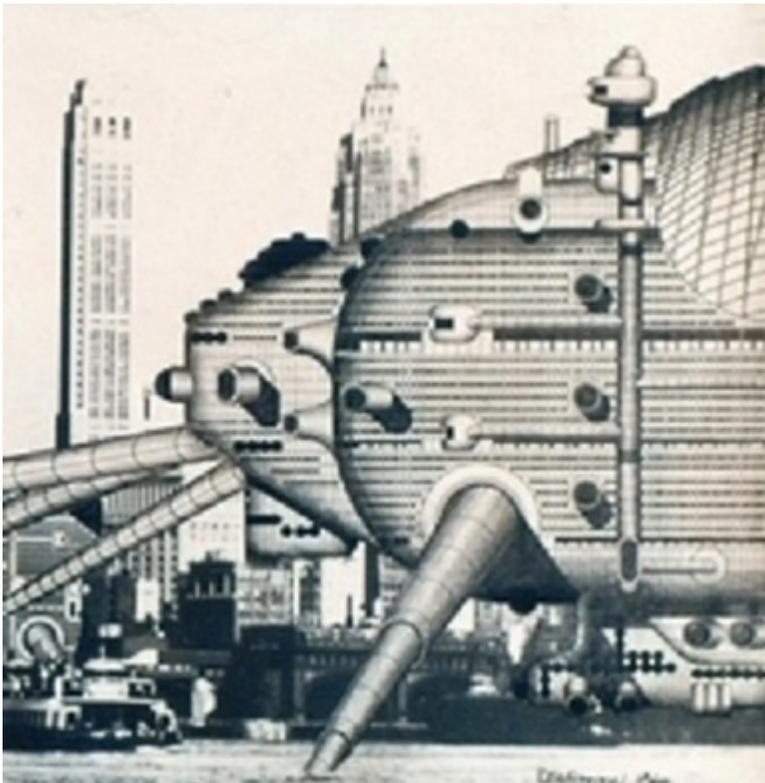


Urbanism x Technology as Systematic Thinking

Greg Lynn states: “Rather than merely outfitting buildings with technology [and...] rather than implanting empty boxes with artificial intelligence or retrofitting our cities for driverless vehicles, architects should [...] integrate large scale robotics into buildings and urbanism at the very inception of their creative and critical processes [...] to realize not just dynamism and interactivity, but envision new kinds of spaces and structures with a technological integrity that challenges the static status quo” (Greg Lynn 2016).

People usually regard technology as the devices and machines that were produced after the Industrial Revolution. However, the observation of objects being modified with technology could achieve dynamic intelligence, and contextual awareness makes people conscious of the effect generated by technology. People have started to pay attention to the methodologies that advanced technology uses to Work with the surroundings context.

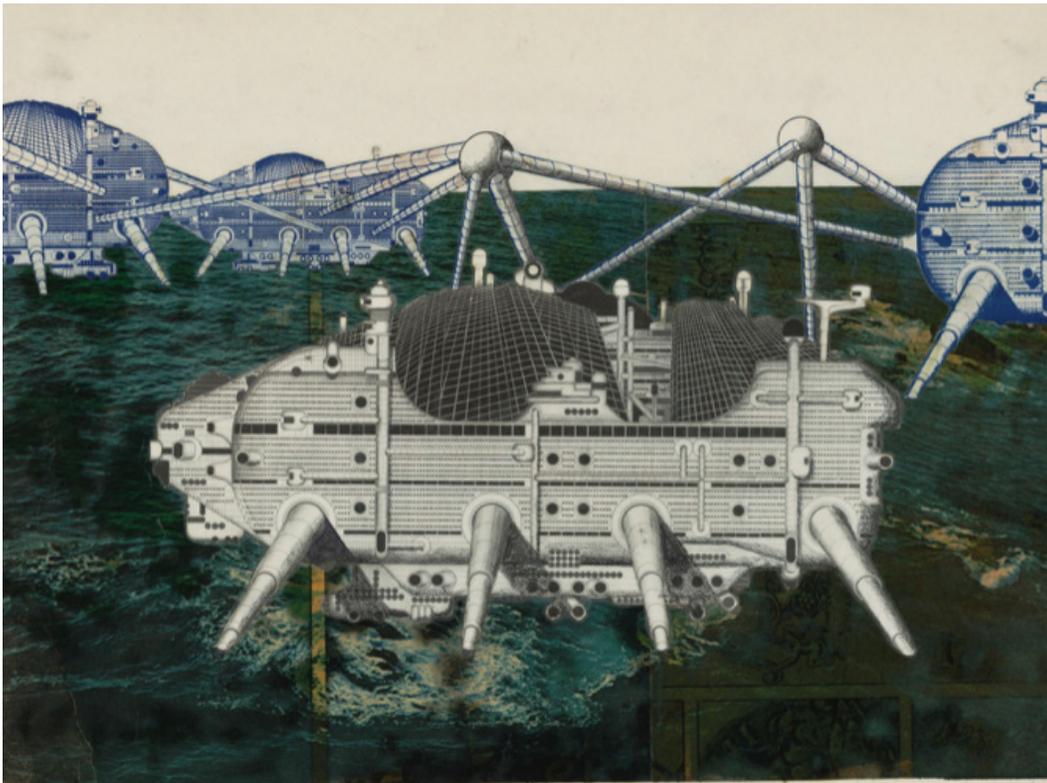
More and more scholars started to consider that technology could also be studied abstractly as a formless systematic discipline. Moving from that, when Urbanism interacts with technology, it should not just be about the products but more about systematic thinking.



Section of Walking City, <https://Archigramwalkingcity.weebly.com/>.

The development process of the following two projects starts from discovering and utilizing emergent technology and moving forward to investigate design at an expanded scale by utilizing the technology's systematic methodologies.

The seminar I took with Rachel Dickey in the Fall focused on the relationship between architecture and technology through the lens of robot and cyborg. Not limited by the hands-on experience with physical computing and programming to generate data, this course also discussed how the invention of cyborgs and the usage of sensors prompted people to question the possibility of interacting with the surrounding environment. Back in the 1960s, a group of architecture students formed an organization named Archigram. These students observed the immense technological improvements happening in the society. They drew inspiration from revolutionary machinery technology to establish new urban realities, which they expressed through a project called "Walking City." "Walking City" sets up an imaginary scenario in New York City, suggesting a bunch of mobile infrastructures could adjust themselves to match the city's needs. This concept posits cities as being not static entities, but as ever-changing ones, and could be traced back to the theory of Metabolist Architecture in Japan between the 1950s and the 1970s.

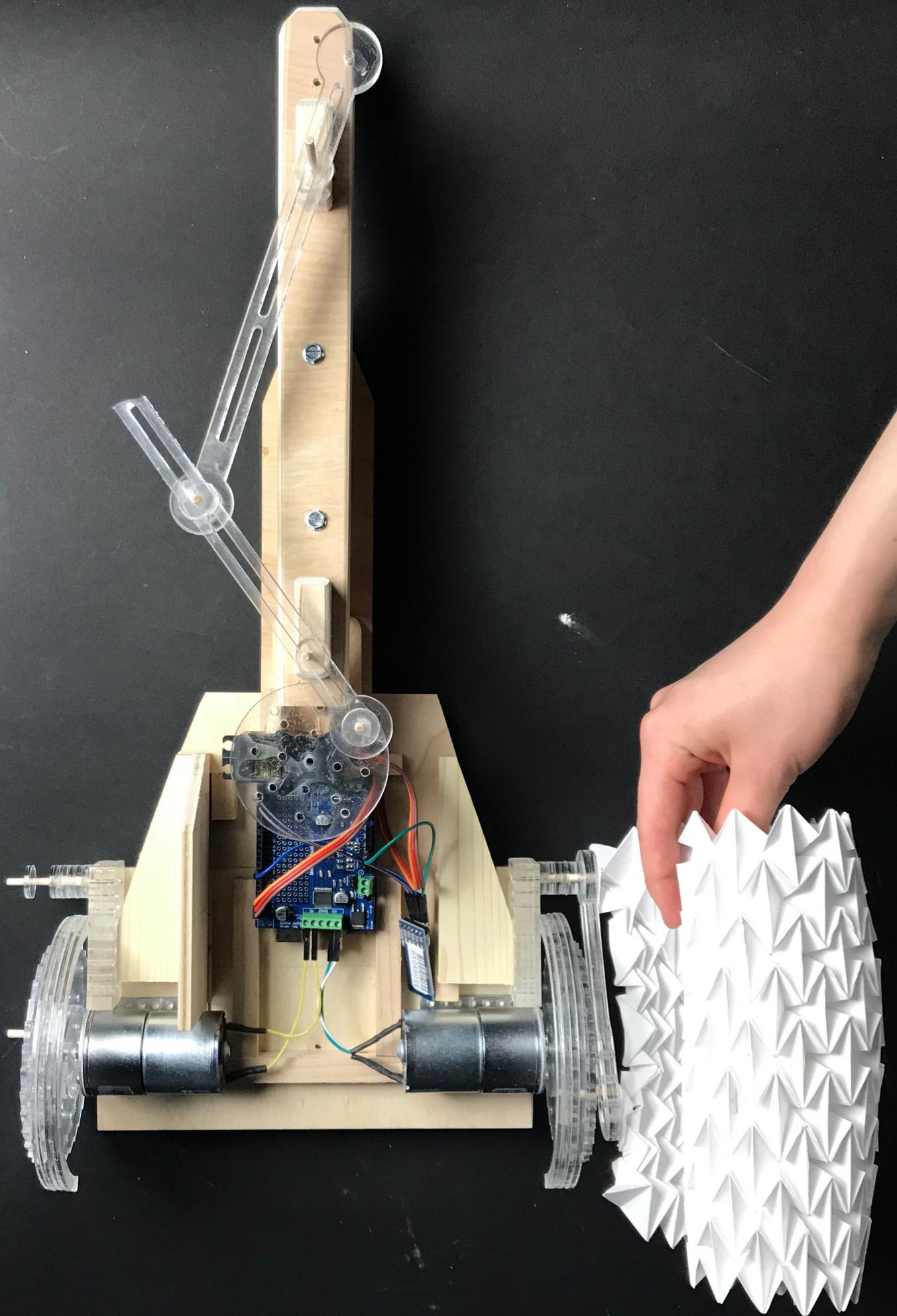


Ron Herron. Walking City on the Ocean, 1966. <https://www.moma.org/collection/works/814>

Understanding the relationship between technology and the ever-changing city, my project for Rachel Dickey's class, Robots, Cyborgs and Architecture, addressed the technology of origami to develop an architectural robot. With an aided proximity sensor, this construct demonstrates its essential qualities as a robot, tending to wag and move its body more frequently when approached by other objects. When envisioning the design of this robot on a larger scale of application, the flexibility and freedom quality of this system suggests the potential to work as mobile infrastructure serving cities. Most importantly, the flexibility of the structure allows the robot system to adjust to different forms for different contexts.



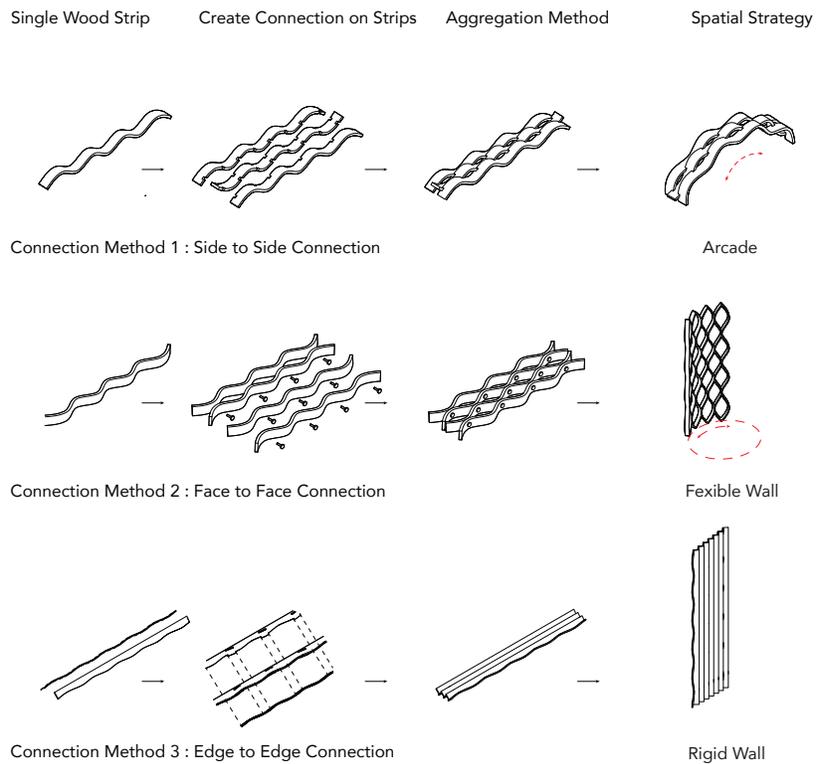
Location: Ithaca, NY
Fall 2019 | Robots, Cyborgs, and Architecture Project
Instructor: Rachel Dickey
Students: Hansen Sentosa, Zheng Yang





The studio that I took for this spring semester with Professor Leslie Lok focused on using emergent technology to build rural-urban incubators. After analyzing the digital and robotic construction technologies, the project required to form a material system integrating with the aggregation strategy for a rural housing proposal.

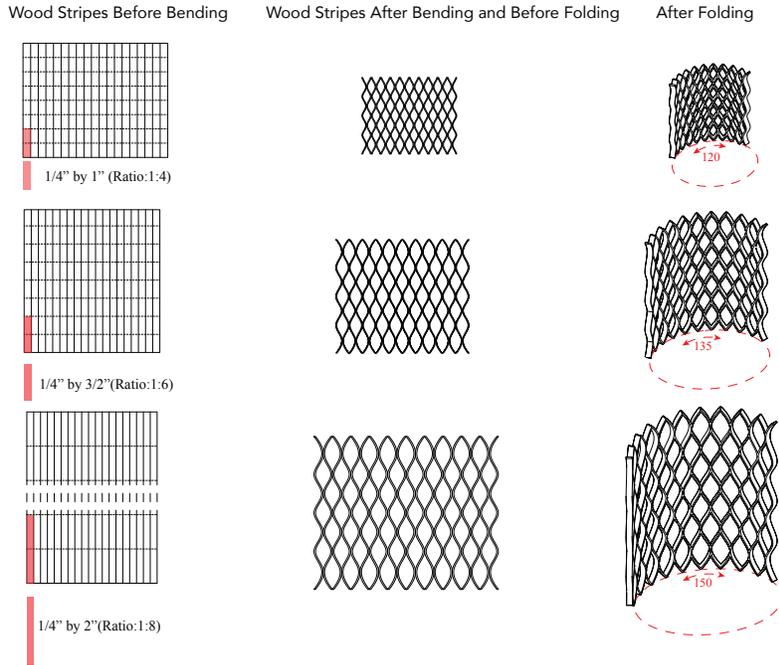
The material system for this project is entirely based on the elastic bending behavior of single plywood strips. After exploring different methods to connect single wood strips, the face-to-face connection system can achieve flexible spatial potential by utilizing the porosity of the system. In contrast, the edge-to-edge connection system can form rigid enclosures.



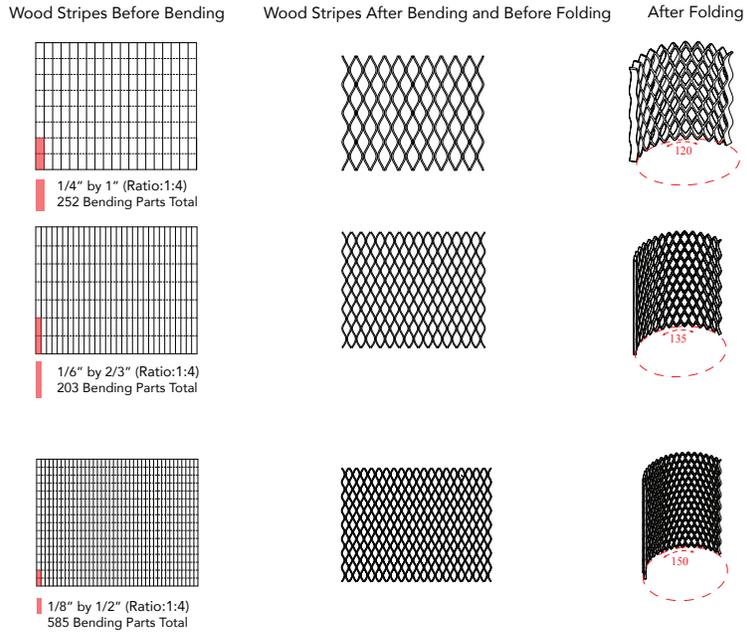
Location: Chongqing , China
 Spring 2020 | Studio Project
 Instructor: Leslie Lok
 Students: Shiyu Jin, Zheng Yang



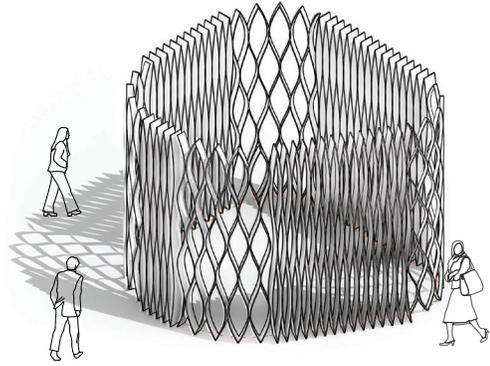
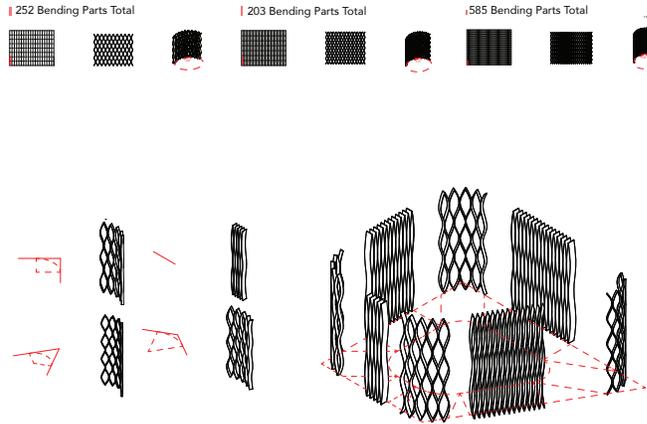
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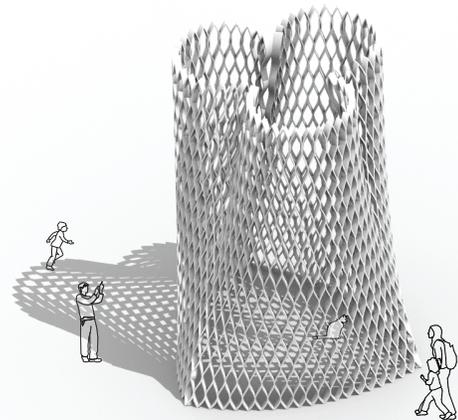
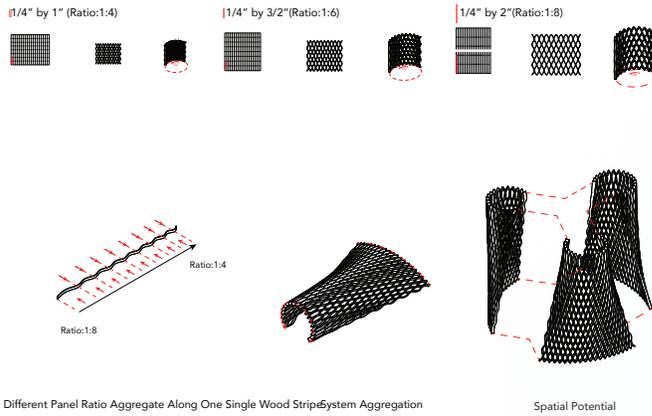
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Keep the Same Ratio of Each Bending Parts (1:4) & Change the Density of Each Panel

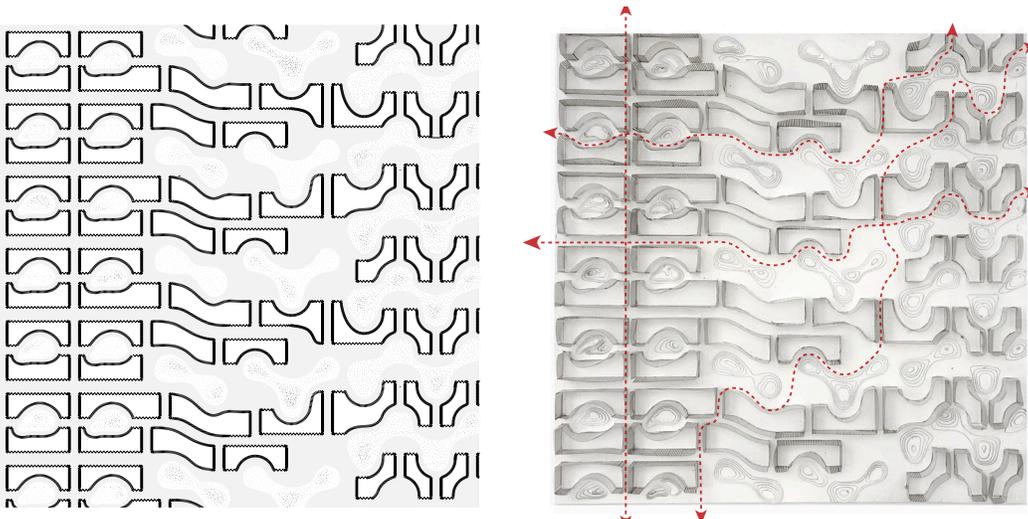
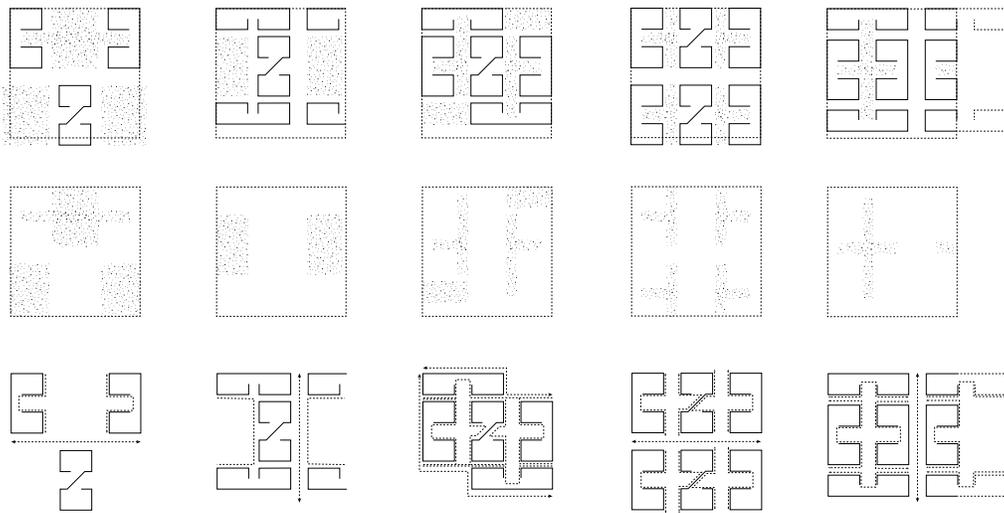


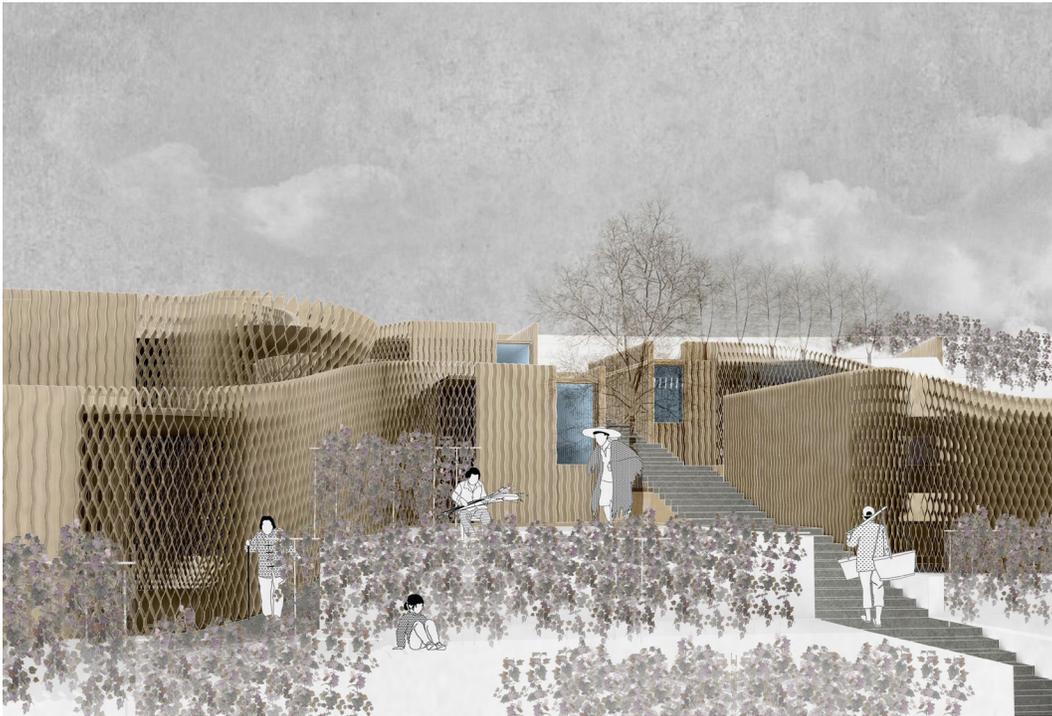
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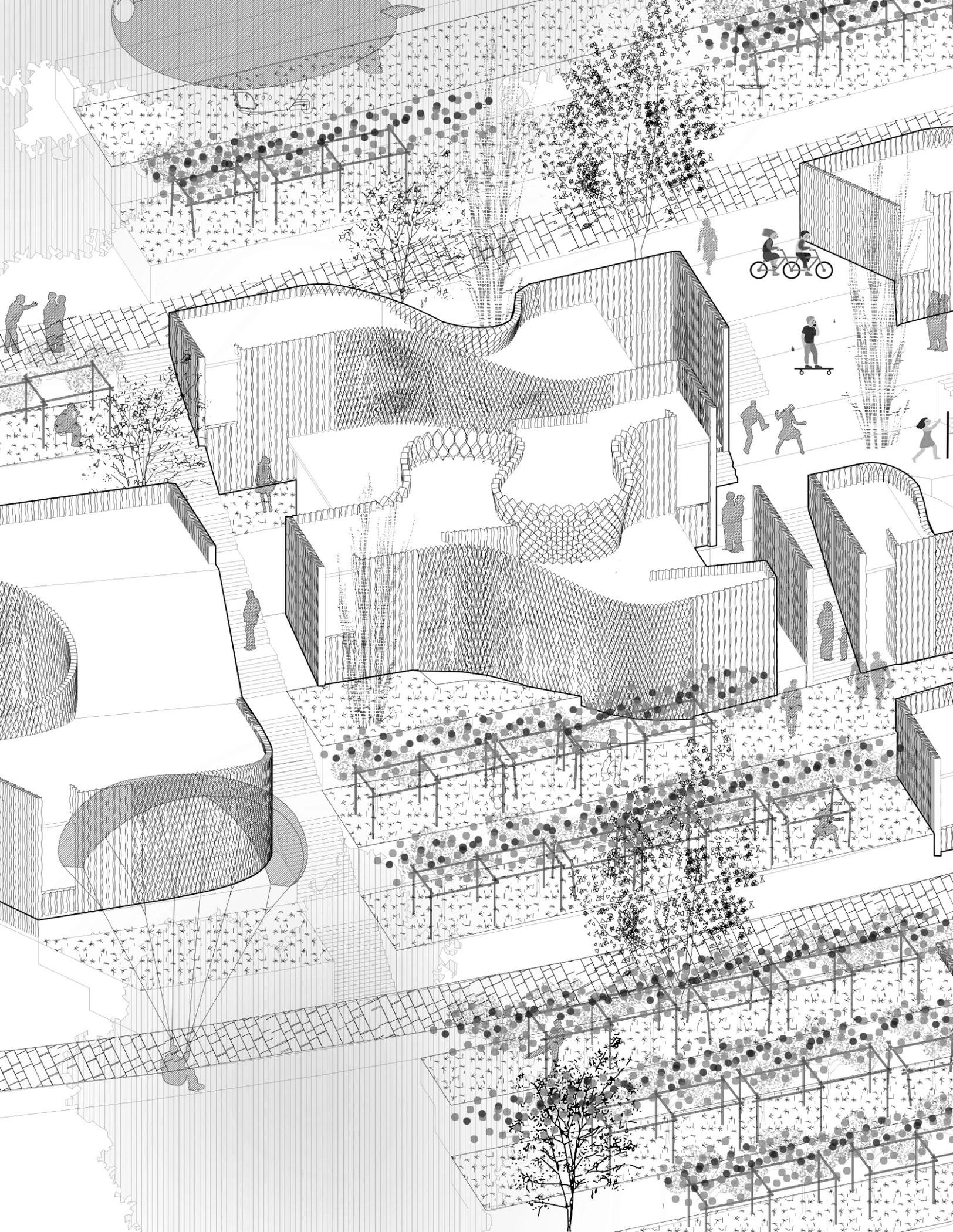
Equipped with an understanding of the behaviour of the material system behavior as well as the architectural and spatial potential, I continued by exploring the aggregation of the construction and material systems at an expanded scale by developing design scenarios of various growth patterns of an urban/rural fabric.

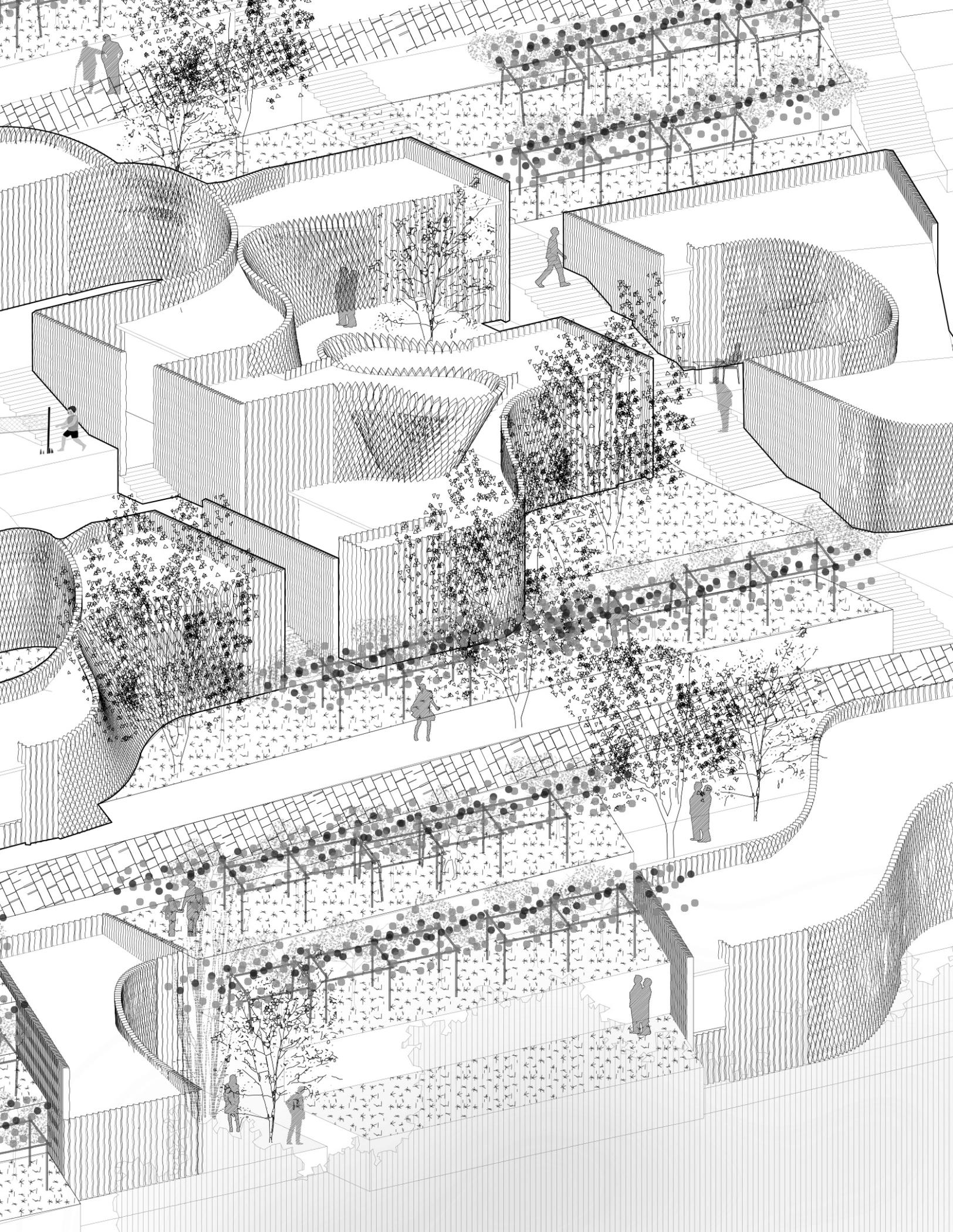
The urban fabric scenario is established with both a rigid opacity wall and a curved wall system. The curved wall is the wall that can adapt to different curvature. Zooming out and looking at the fabric scale, I set up different abstract contextual clues that would inform how the building bends. The organization of these units starts from the regular horizontal module and gets distorted into different geometrical shapes, and finally, adding the data on topography, the modules are developed into vertically oriented units.

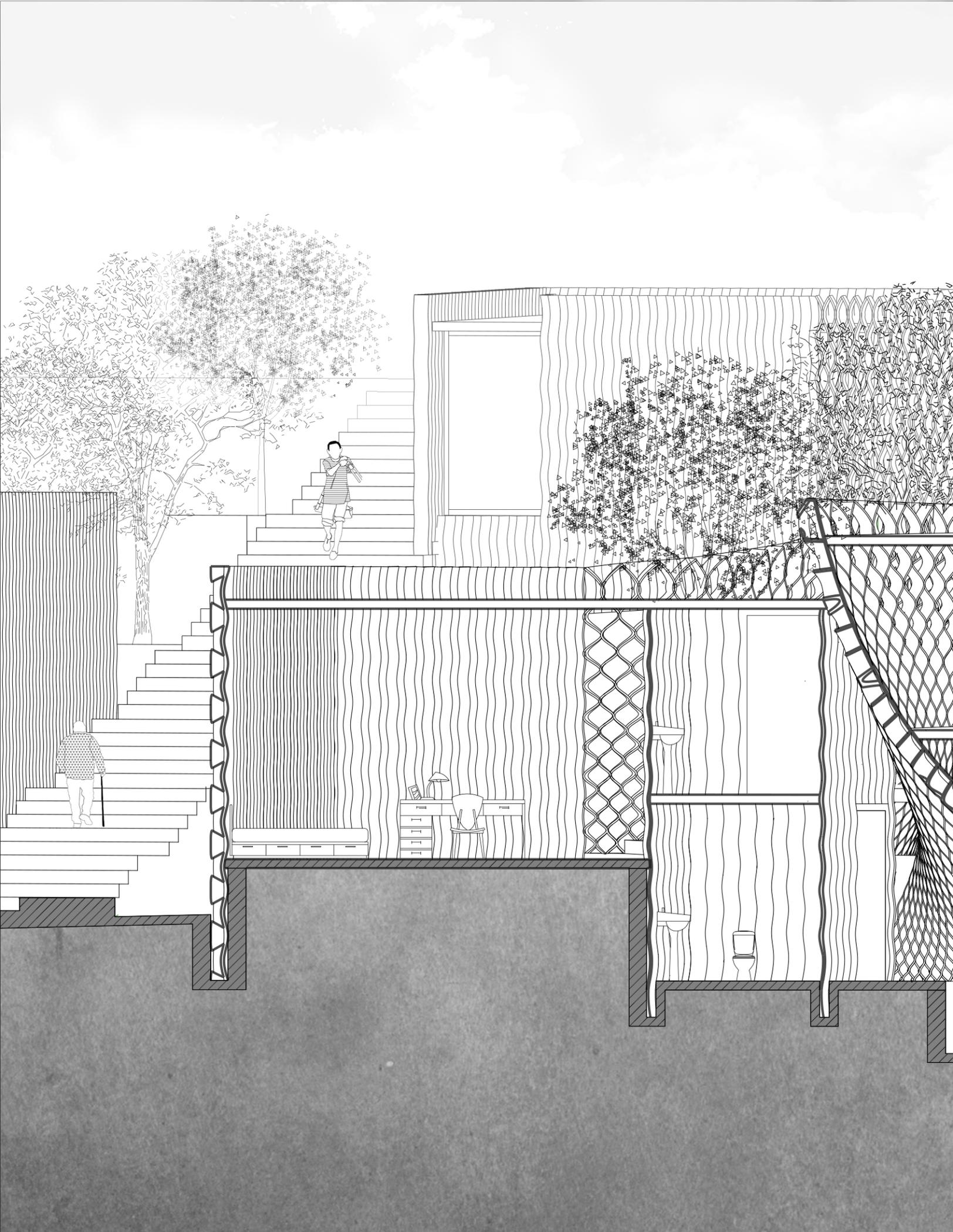


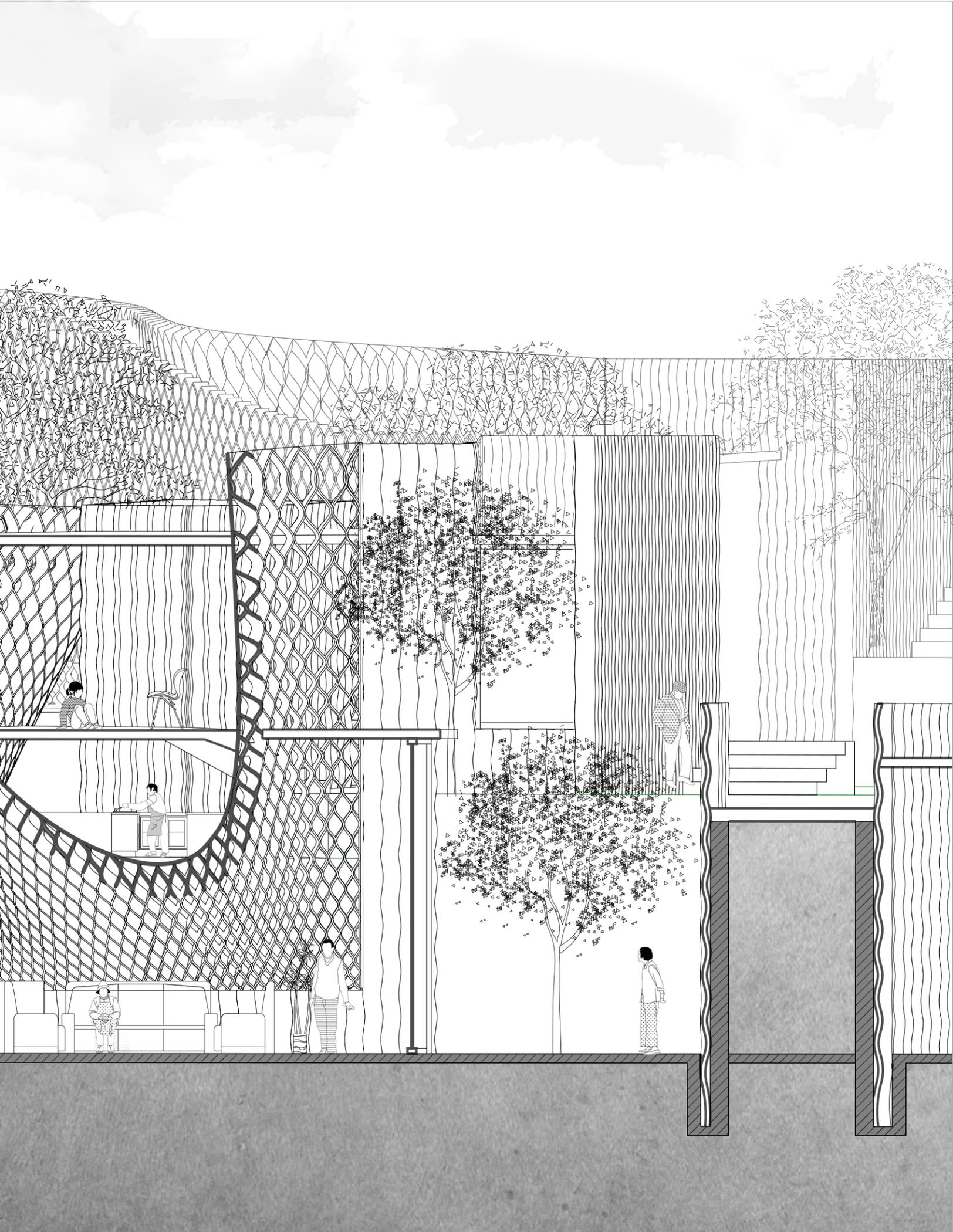












Rethinking Urbanism

On March 13th, Cornell decided to cease in-person instruction in Ithaca after spring break and announced that students should practice social distancing to mitigate the spread of COVID-19. These decisions and announcements had a huge impact on all the students in terms of their living and studying conditions. As an architecture student, this unexpected change allows me to consider architecture and urbanism in a virtual age.

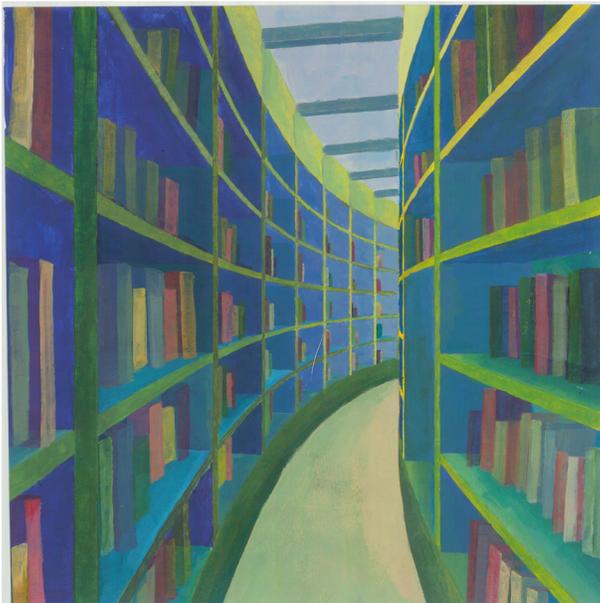
While being quarantined in Ithaca, just like many others, I have ordered grocery delivery from online apps, attended Zoom and Slack meetings for study and communicated with friends through online social media. My life still somehow manages to follow the normal flow as usual. But when I noticed that the Uber eat application system helped local restaurants to survive by not charging for the usual platform service, I realized that the internet-based society helped local communities to survive during this pandemic. The coronavirus crisis is showing us that digital technology is still capable of pulling people together and online social interaction tools help strengthen our real-world ties when we are facing a broken reality in the physical world. Digital urbanism is truly proving its strong positive potential to help our society during this coronavirus crisis.

Since Digital urbanism is so necessary for current urban life, it is also important that everyone, especially the older generation and people in low-income communities, has access to these tools. However, as we looked at people trapped in New York City at this time, countless homeless people and people with low income can't find a place to stay and their access to food and security is so limited. I can feel that their life shifted dramatically. They are not only threatened by the possibility of being infected by the virus but also by the tragic living conditions that surround them. Digital urbanism could provide a lens to solve parts of these urban issues. However, online technologies cannot fully replace the powerful and beneficial effects of physical interaction in the real world.

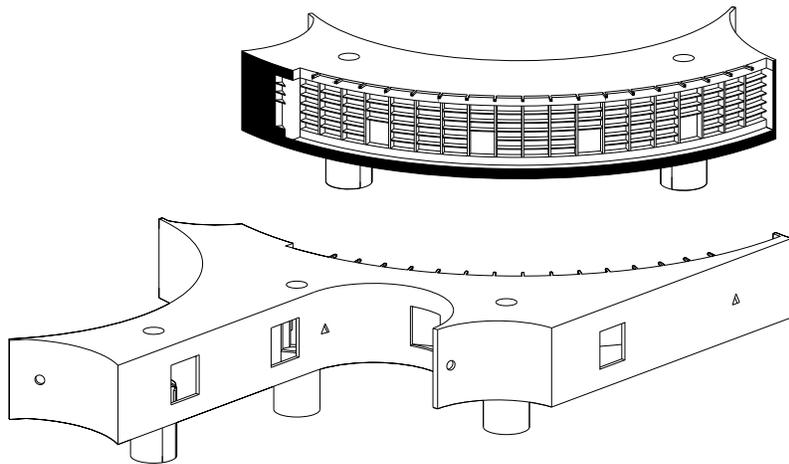


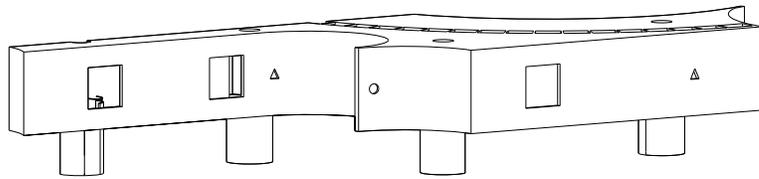
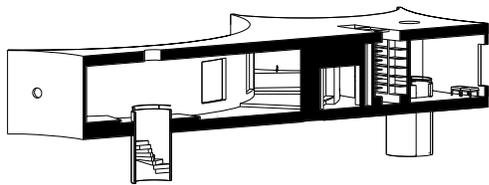
Well, the inequities wouldn't be solved only in physical interaction if governments and societies don't already believe that it's important to address social and economic disparity. What Covid does is aggravate the inequities because technology requires money and access. Furthermore, technologies aren't necessarily designed for social equity - that has to be built into projects, tools and inventions.

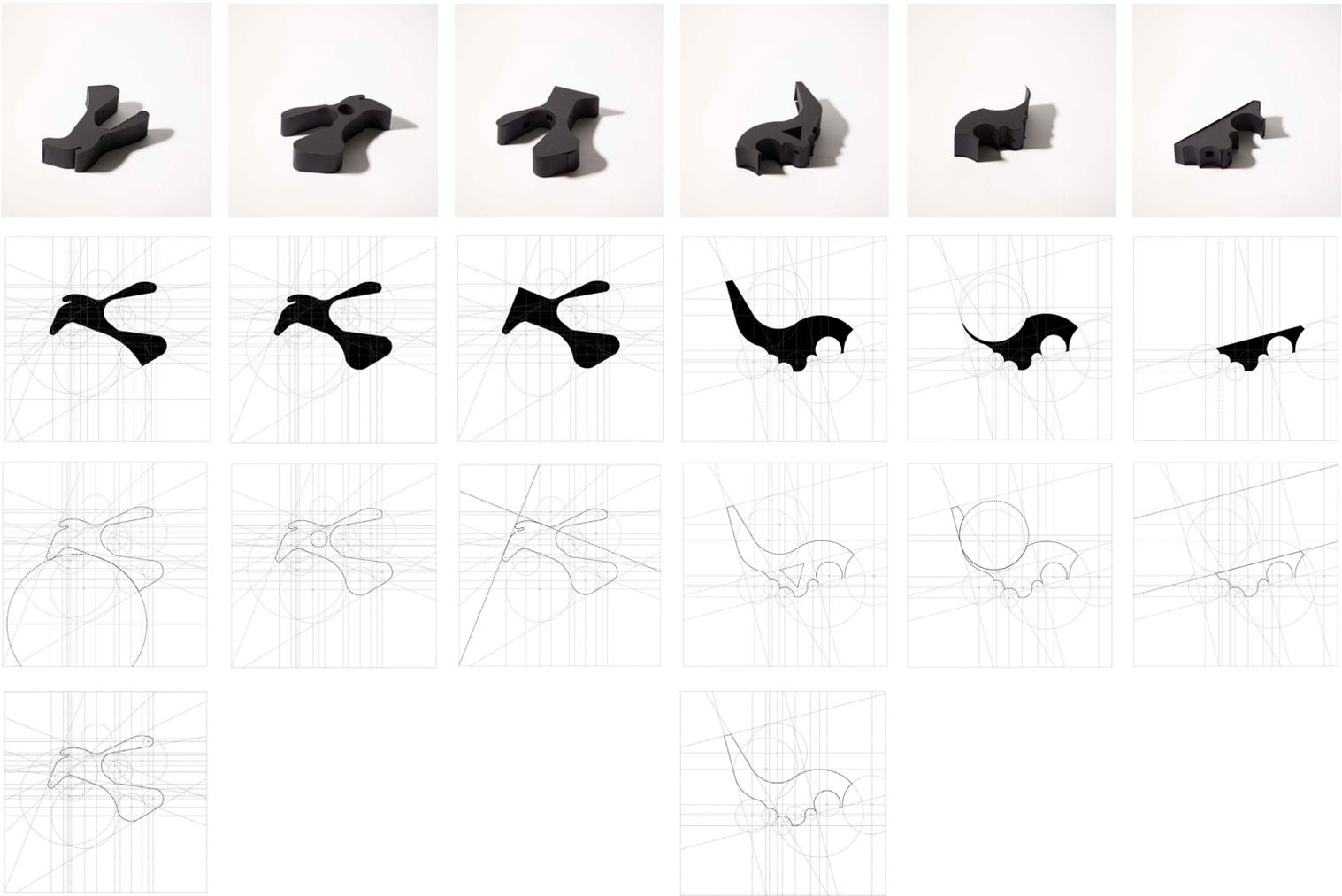
From the lecture given by Caroline O'Donnell during the summer semester, we learned that Architecture is a wicked problem for all of us and architecture modernism has already lost its faith that Architecture can solve everything. During this pandemic, I started to question the overall concept of efficiency for putting more than 5000 people inside one skyscraper. Besides, I was drawn to rethink the idea of sustainability as envisioned in theories of the Garden City for maximizing the commercial density inside the central part of a city, leaving the green space to the suburbs. The coronavirus crisis acts like an extra lecture for me in this semester and really allows me to rethink all the architecture and urbanism theory which I have been taught in the Architecture School.

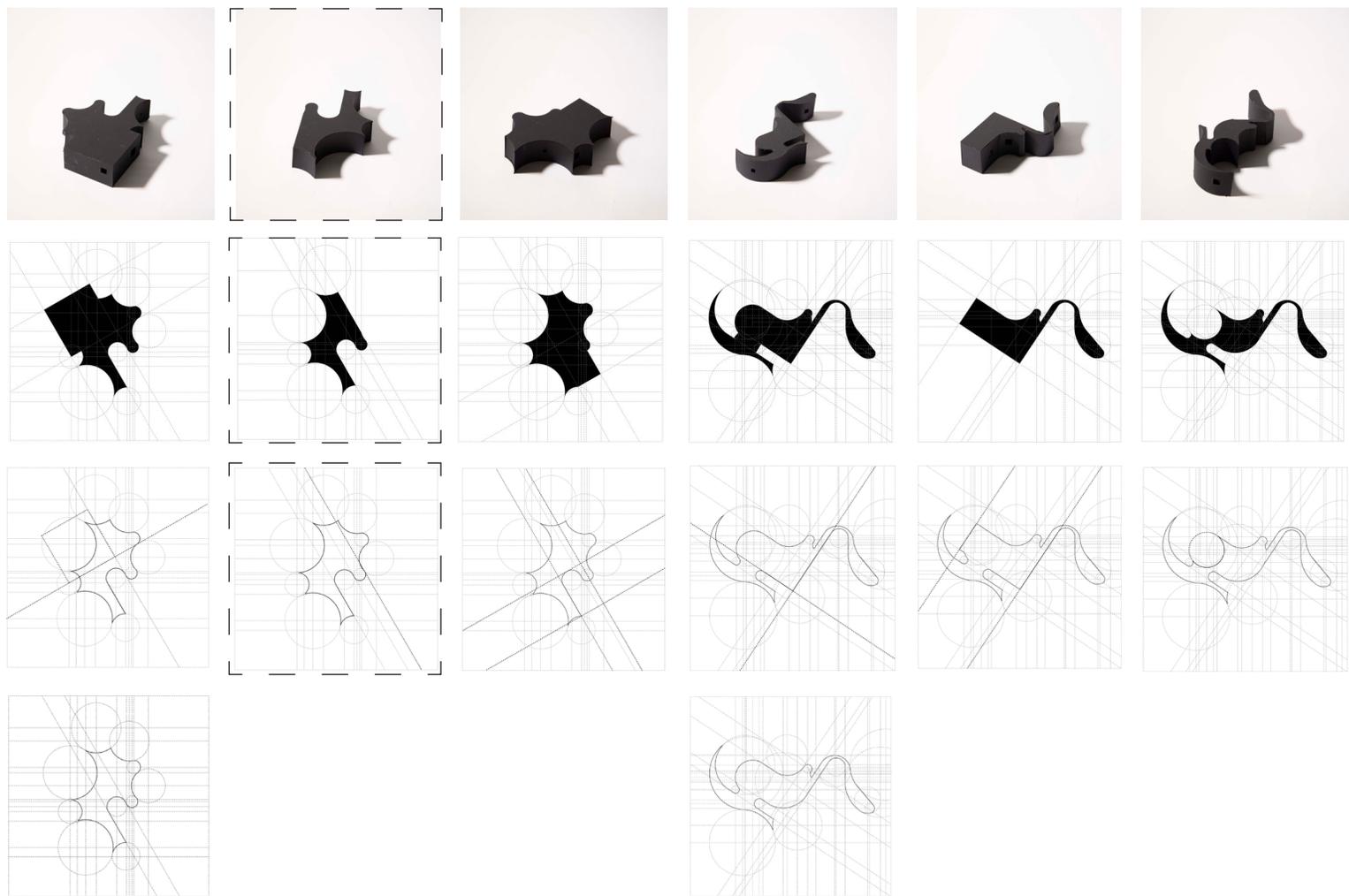


Location: Fire Island, NY, USA
Academic Work | Fall 2019
Instructor: Pezo Von Ellrichshausen
Individual Work from M.S.AAD at Cornell University









Work Cited:

1. Ron Herron. Walking City on the Ocean, project (Exterior perspective). 1966, MoMA Website, Moma.org, <https://www.moma.org/collection/works/814>
2. Archigramwalkingcity. Section of Walking City, <https://Archigramwalkingcity.weebly.com/>.
3. Greg Lynn. Form. 2016, July 27. UCLA Architectuer and Urban Design. <https://www.youtube.com/watch?v=Y5xmWqV4Ckk>.