

FINAL PROJECT
Architecture and Urbanism

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Abstract

This portfolio contains the works during my study of architecture and urbanism as a M.S. AAD student of Cornell AAP as well as my perspective of architecture and urbanism which supports this academic journey. The critical text introduces and explores a Grand Unification model of architecture and urbanism. Grand Unification Theory is a model in the field of physics that tries to describe the universe using a single theory of physics to explain almost all the fundamental forces responsible for the movement of all objects in the universe. With the non-stop process of human exploration, the complexity of human perception of the universe rises but the mathematical and physical model of physicists in interpreting the universe gets simpler. Like the complex force fields of the universe, the city, the field for millions of people and countless human activities, is a complex system with incredibly large numbers of layers of interacting agents. To think of the urban environment as a system of interacting agents, look for interacting forces between the agents, and simplify the complex system with careful selection of key agents and key forces to a model that can be easily comprehended and even able to be manipulated. In other words, to decode the city, to abstract the city into matrices of agents and forces. The text that follows describes how I have explored this idea of a unified field or model in different courses, studios and seminars.

Contents

| | |
|----|-----------------------|
| 01 | Critical Text |
| 09 | Architectural Studios |
| 29 | Seminars and Lectures |
| 66 | Bibliography |

Decode the city:

Exploration towards a Grand Unification of Urban System

Critical Text

Territory of Investigation: Architecture and Urbanism

Grand Unification Theory is a model in the field of physics that tries to describe the universe using a single theory of physics to explain almost all the fundamental forces responsible for the move of all objects in the universe. In the history of physics, countless genius minds were dedicated to establishing something like the Grand Unification Theory to use simple elements, particles, forces or fields to explain the most complex phenomenon. With the non-stop process of human's exploration of the universe, the complexity of human's perception of the universe rises but the mathematical and physical model of physicians in interpreting the universe gets simpler. Like the complex force fields of the universe, the city, the field for millions of people and countless human activities, is a complex system with incredibly large number of layers of interacting agents. So, the question rises whether there is a Grand Unification of urban system. From my perspective, even there exists such unified model, it is still somewhere that is far from us and whether we can get to such point is uncertain. However, even the existence and accessibility of such model are unknown, the philosophy lies behind the exploration of such unified model may contribute to our understanding and manipulation of urban system. To think of urban environment as a system of interacting agents, seek for interacting forces between the agents, and simplify the system of complex with careful selection of key agents and key forces, or to say structures, to a model that can be easily comprehended and even able to be manipulated. In other words, to decode the city, to abstract the city into matrices of agents and forces.

Such exploration has long been in the history of architecture and urban planning. In the famous *The Image of The City* by Kevin Lynch, a model of the urban spatial qualities containing paths, edges, districts, nodes and landmarks was created to demonstrate the urban environment as a series of perceptible images. Similarly, in the scale of architecture, in responsive architecture, a model containing certain agents and forces of urban environment of certain region is created so that architecture can intervene in the context with a more flexible and effective gesture with its ability to change itself to react to the established model. Specially, with the help of computer graphics, virtual rendering and even technologies newly introduced into fields of architecture and urban planning such

as Virtual Reality and Augmented reality, a digital model restored in computers as series of 1 and 0 is able contain countless agents and forces of the city and present the model in a visible and even interactive way. As for architects and architecture student, the model here not only allows us to experience the city, but also to simulate and even to manipulate certain agents or forces to control and even to design or modify the urban system the model represents. I would like to include my undergraduate thesis as the start of my exploration towards such model.

During the undergraduate thesis, I tried to decode what agents and forces were affecting urban planners during their practice and what were the elements that contributed to a community or city with livability. And hopefully, after the decoding and rebuilding process, a generative urban planning process, in this case, a program should be created to help with urban designers to form a proposal answering to almost all the agencies lied beneath the ground of every urban planning and urban design project. The goal for the thesis was to achieve an automatic system which will generate an image of modern city, not just a spectacular one but also one containing a vision of a practical city image with livability with just a click of mouse. However, after several discussion with urban planners of different institutions, with government officials from different departments and with residents and future investors for a real land development project, and through investigations and participations of the process of land development and urban expansion, I found that modern city is a system too complex to conclude and decode and its complexity raises sharply with the understanding of it. Spatial problems and qualities which can be solved and achieved through rational urban planning and design method and through architectural design, were only a tiny piece of the formation and expansion process of city. To say it a small problem of the whole system does not deny the importance of spatial arrangement which we can contribute to. The complexity shown to me through my participation opens my mind to a systematic comprehension of the city and the architecture that form the spatial part of the city and I still believe that a thread exists to decode the complexity to reach the Grand Unification of urban system.

This 1 year journey of M.S. AAD program can be seen as my following exploration inherited with ideas from the undergraduate thesis. Through the process of this academic year, several courses and studios were chosen for me to seek for ideas and practices to supplement and modify the model of the dynamic urban system. And also by this means, I hope that a better gesture for architecture to sit in complex urban environment and also a better gesture for people to dwell in the buildings of the city.

To get a more comprehensive understanding of the concept that city is a dynamic system, I chose several courses that are related to this topic from the perspective of urban scale. The course Systems, Entropy, and Organized Complexity: Cybernetics in Architecture and Art 1946-1972 instructed by Branden Hookway used the perspective of cybernetics to talk about the history of architecture and urban practice after WWII. The concept of this course was closely related to my pursue of architecture and city. To be short, to view city and architecture as a dynamic system is similar to the idea of viewing architecture and city as machine, which includes the process of communication and control. Through several readings every week, those particular pieces of architecture and urban practice which appear a little bit strange to me at first got their historical background and theoretical basis from the reflections on the WWII. What interested me the most is the process of the application of military technology and theories into domestic fields including architecture. For example, the technology and tools which was born for war of intelligence were later being adopted to areas of studying biological system, and the emphasis of information transmission further bred the upcoming era of information. Specially, there was a passage concerning Groundcourse which was a curriculum under the creation and instruction of Roy Ascott. During this course, Ascott used "a theatrical strain of performance and set design that employed light, costume, sound and props" to design games that simulated processes and situations during WWII. Inspired by the idea, I was thinking maybe the system of modern city can be simplified and simulated through similar process, GAME. And since there are countless games, either in the form of video games or in the form of board

games already concerning the creation, expansion and even operation of urban system, there lie different philosophies and perspectives of the city. And because of game's nature of simplifying the reality into something that even people with no actual practice can easily understand, maybe by means of game, can an interactive of model of the complex modern city be created and made open to the public. And by the participation of the public, the complex problem that city may be confronted with can be interpreted and hopefully solved by the so-called big data. In short, to face complexity with complexity, to decode the complex city in a way more complex to contain its complexity. Also in this semester, I chose Naomi Frangos' Urban Fluxus which taught me to demonstrate the forces that beneath the surface of the dazzling urban spectacles. Through the process of this course, I tried to demonstrate NYC in another perspective through the lens of visual advertisement. I wanted to analyze the advertising in NYC from the perspective of what drove the existence and the expansion of those shining advertisement especially in the Times Square and also from the perspective of the commuters and residents of the NYC to see how the advertising affects their everyday life. But to be honest, though I tried working really hard for this seminar, the burden of trying to visualize data in the scale of the city overwhelmed me to further investigate in the area that may help me understand the system of city better. This course became only a boring practice on visual representation. And to get myself prepared for the complexity of the urban system, I chose a course of data science this semester.

Besides those seminars and practices in the urban scale, I also view the system from the perspective of architecture. To be situated in this complex city, architecture itself need to think about more, not only about spatial quality, but also about how it answers to the existing environment, how it answers to the surrounding landscape and how it answers to the need of the society. As mentioned before, I am kind of a believer in industrial production and massive duplication, I always seek for an architectural system which can be reproduced and translated to a building or pavilion answering to where it may be applied to. In the Architecture of Waste studio instructed by Caroline O'Donnell and Dillion Pranger, I proposed a pavilion which used rain poncho inflated by Helium as its covering and its

structure system. By this means, it not only solved the problem which many theme park and tourist attraction such as the Niagara Falls may face, but also created a system that can be easily applied and constructed when needed. And in the Rational Form Making studio instructed by Angela Pang along with Japanese structure engineer Yoshiyuki Hiraiwa, I studied the structural characteristic of Hyperbolic Paraboloid, which is a structure system used by famous Felix Candela. Through the study of Hyperbolic Paraboloid, I found that this structure system is of super effectiveness in terms of structure and material. Then I proposed an overlaying Hyperbolic Paraboloid structure system which can be anchored to the stones of the gorges and spread its wings to another side of the gorge. The observation deck cannot be seen obviously when walking on the bank, but when approached, its elegant form is gradually revealed. Also, in this semester, I took Philippe Rahm and Ryan Otterson's studio towards a climatic college, during which I am trying to translate the idea of a building of low carbon footprint into architectural vocabularies such as pre-fabricated building units and responsive load bearing system. Those explorations of architecture try to communicate between the complex urban environment and human perception, each of it answers to different question that we are actually facing now.

During my study in this School of Architecture, I discovered that my previous thinking of people in the topic of architecture was too abstract and at the same time too hollow. People's experience was actually the only thing that was considered in my previous architectural and urban project, but thanks to the seminar Body, Space and the In Between taught by Danica Selem, the concept of body, of people becomes clearer and even more vague at the same time. To think of body and architecture in the political senses is a very interesting topic for me. And under this topic, I summarized my social practice experience in designing a government building for a city in China. The efficient translation between the power structure of the government into spatial vocabularies is attracting me to dig deeper into this topic.

To conclude my journey of this year in Ithaca, I would like to describe it as a process of decoding the city, of positioning architecture, of understanding human and of seeking for a model closer to the Grand Unification of urban system than where I was.

Architecture Studios

I. reCYCLO: Architectures of Waste

Instructor: Caroline O'Donnell, Dillion Pranger
Summer 2019

II. Design Inquiry & Material Critique

Instructor: Laia Mogas & Jorge Duro
Summer 2019

III. Map to Measure

Instructor: Biayna Bogosian
Summer 2019

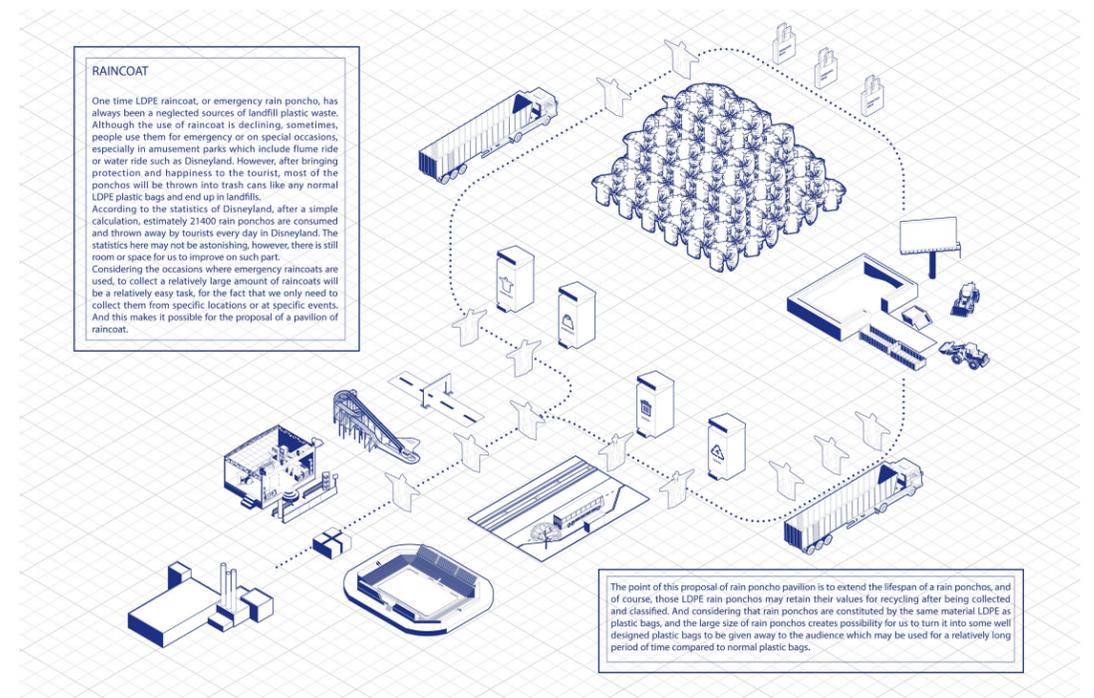
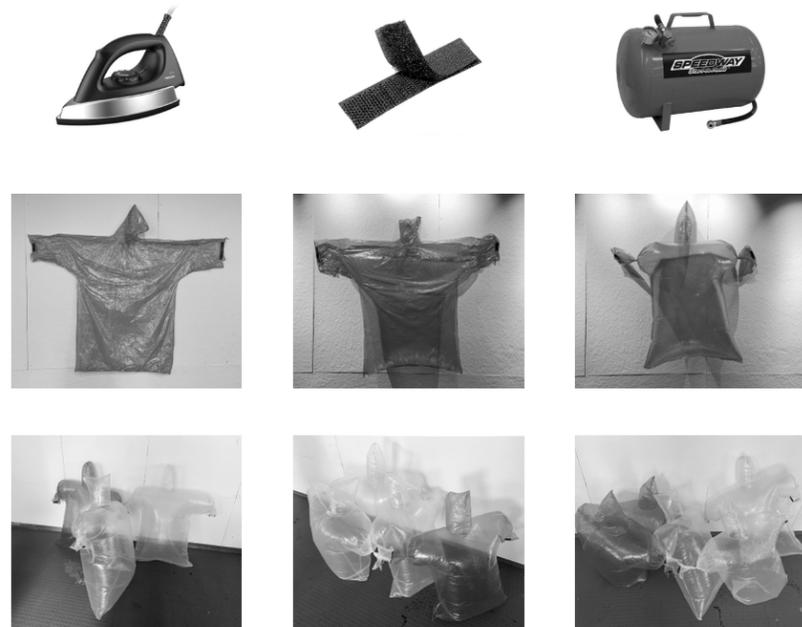
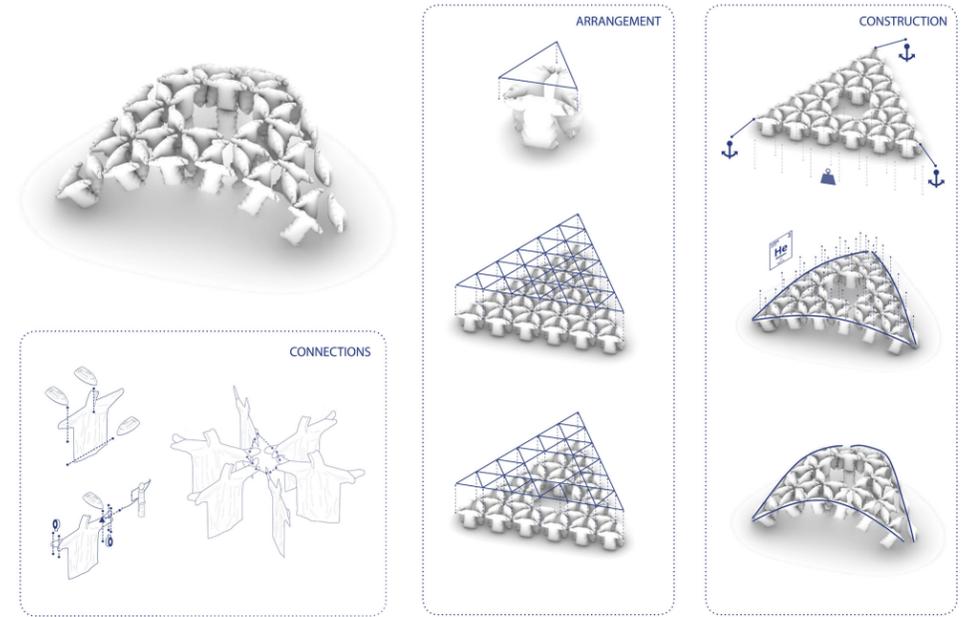
IV. Rational From Making

Instructor: Angela Pang, Yoshiyuki Hiraiwa
Fall 2019

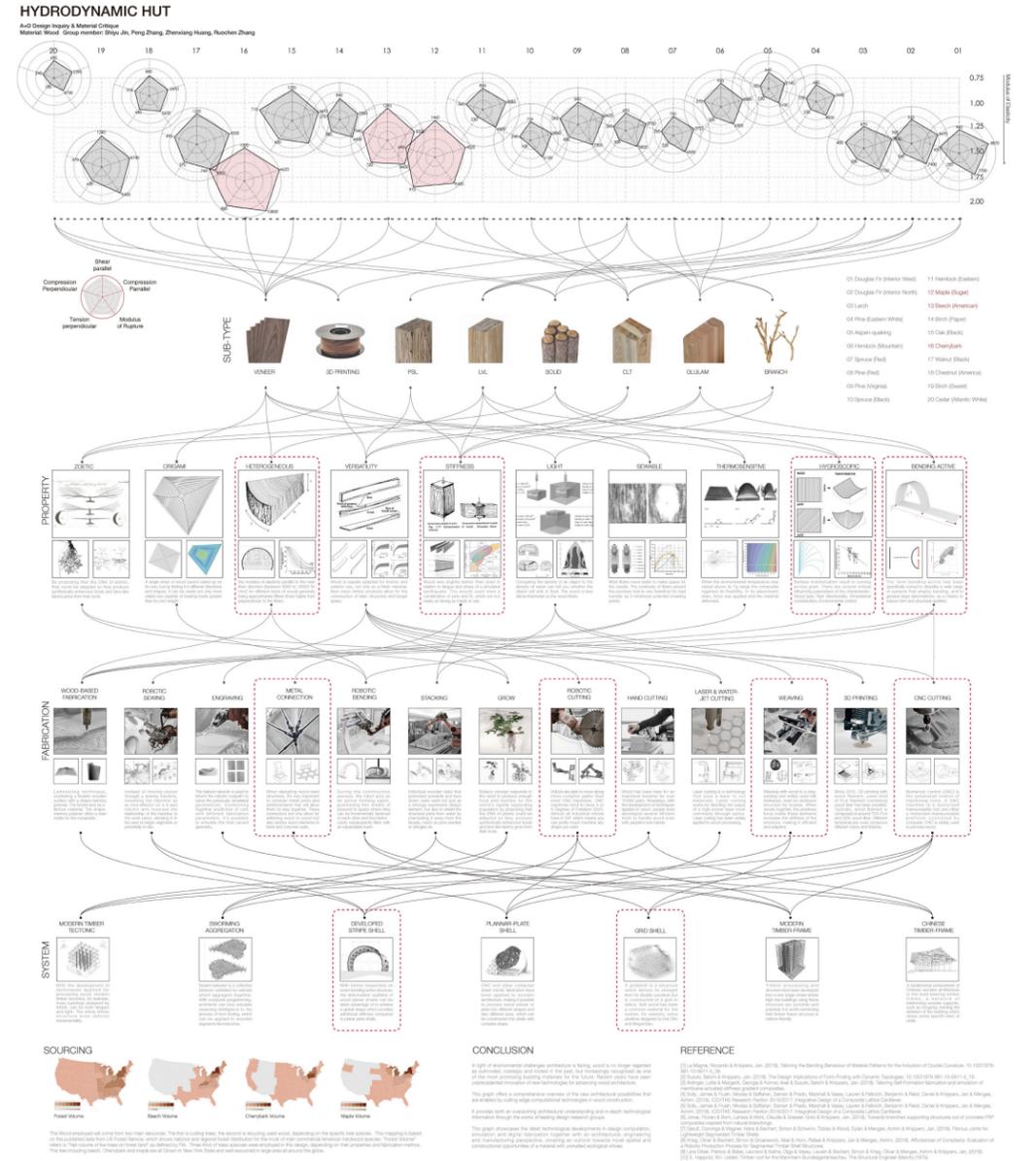
V. the College of Climaticism

Instructor: Phillippe Rahm, Ryan Otterson
Spring 2020

I. reCYCLO: Architectures of Waste
 Instructor: Caroline O'Donnell, Dillion Pranger
 Summer 2019



II. Design Inquiry & Material Critique
 Instructor: Laia Mogas & Jorge Duro
 Summer 2019



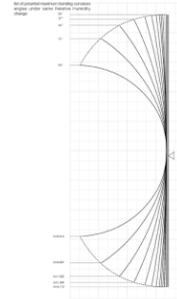
HYDRODYNAMIC HUT

A+D Design Team & Material College
Material: Wood Group member: Shiyu Jin, Peng Zhang, Zhenzhen Huang, Ruochen Zhang

CONSTRAINTS



CURVATURE MAPPING



BEHAVIOR

Timoshenko Bending Formula

$$\frac{1}{p} = \frac{6(1+m)^2}{3(1+m)^2 + (1+mn)(m^2 + \frac{1}{mn})} \frac{(\sigma_2 - \sigma_1)(c - c_0)}{h}$$

Calculation of variable m and n

$$m = \frac{h_1}{h_2} \quad n = \frac{E_1}{E_2}$$

m is relevant to ratio of h1 and h2
n is relevant to direction of force

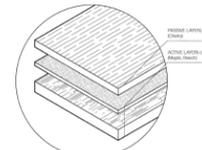
Utilized bending radius

$$p$$

Bilayer wood angular change

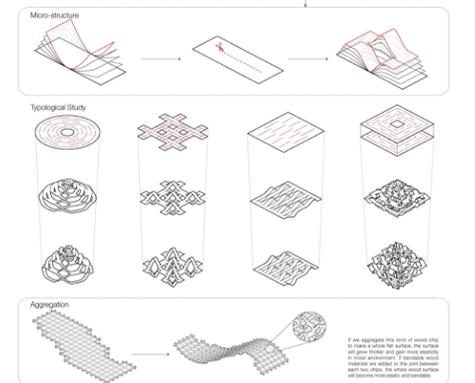
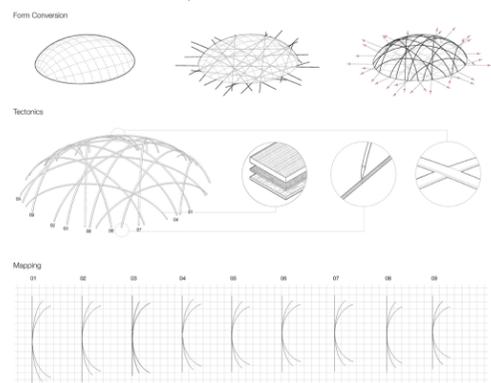
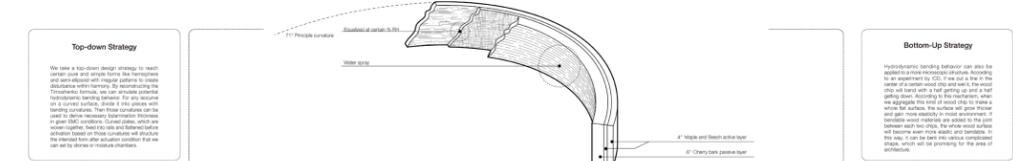
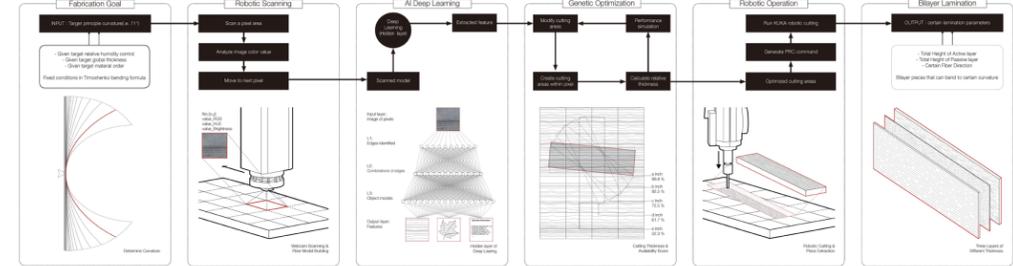
$$\alpha = \frac{1}{p} \frac{360}{2\pi}$$

VARIABLES



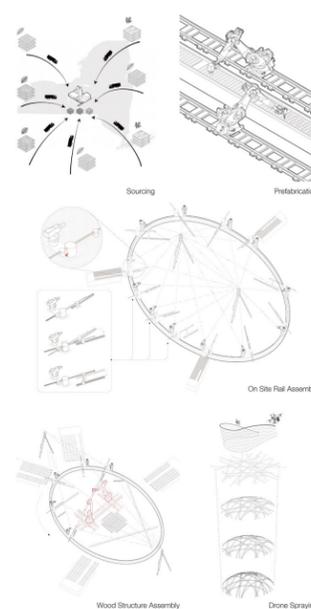
Different values of m

Different values of h

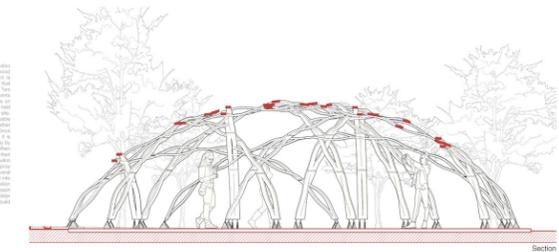
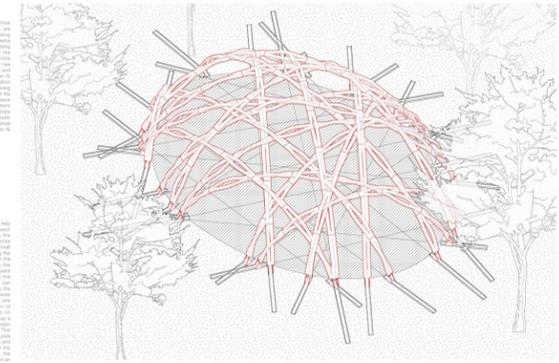


HYDRODYNAMIC HUT

A+D Design Team & Material College
Material: Wood Group member: Shiyu Jin, Peng Zhang, Zhenzhen Huang, Ruochen Zhang



The Wood structure is composed of three layers: active layer, passive layer, and global thickness. The active layer is made of maple and beech, the passive layer is made of cherry bark, and the global thickness is made of maple and beech. The structure is designed to be hydrodynamic, meaning it can change shape in response to environmental conditions like humidity and temperature.



III. Map to Measure

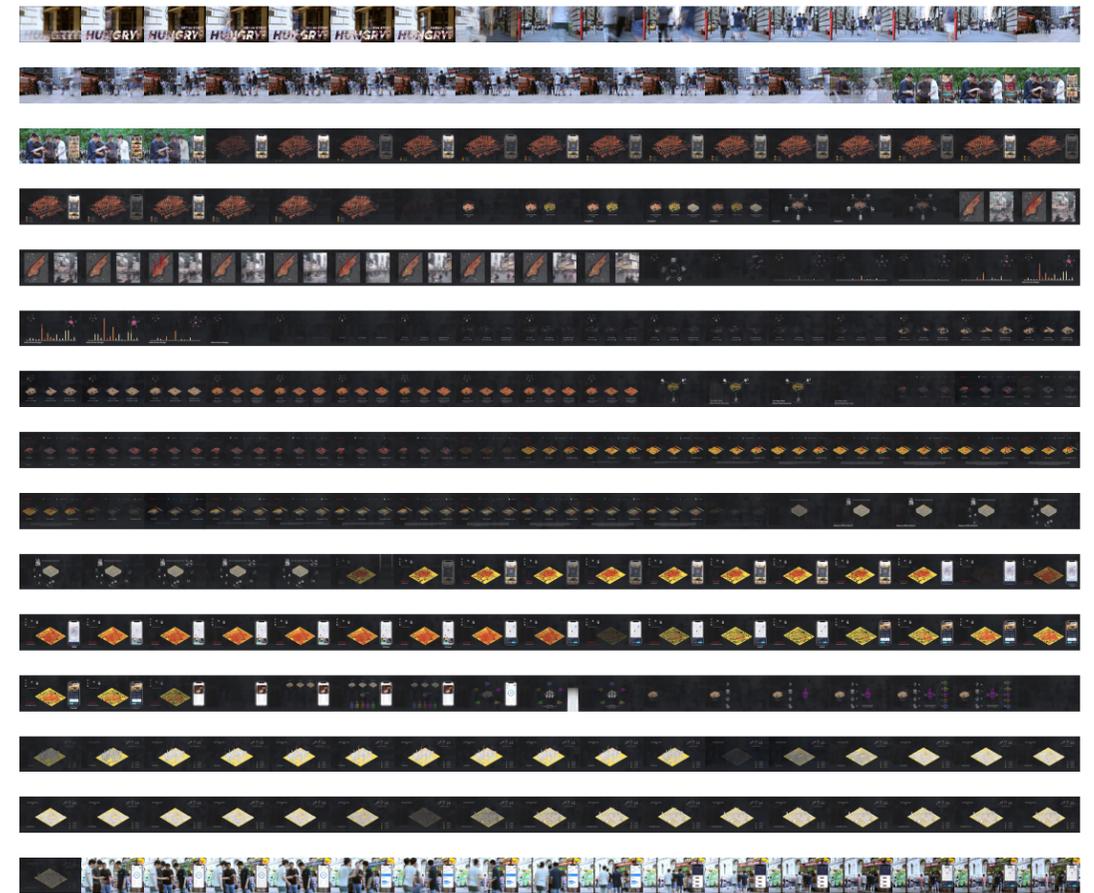
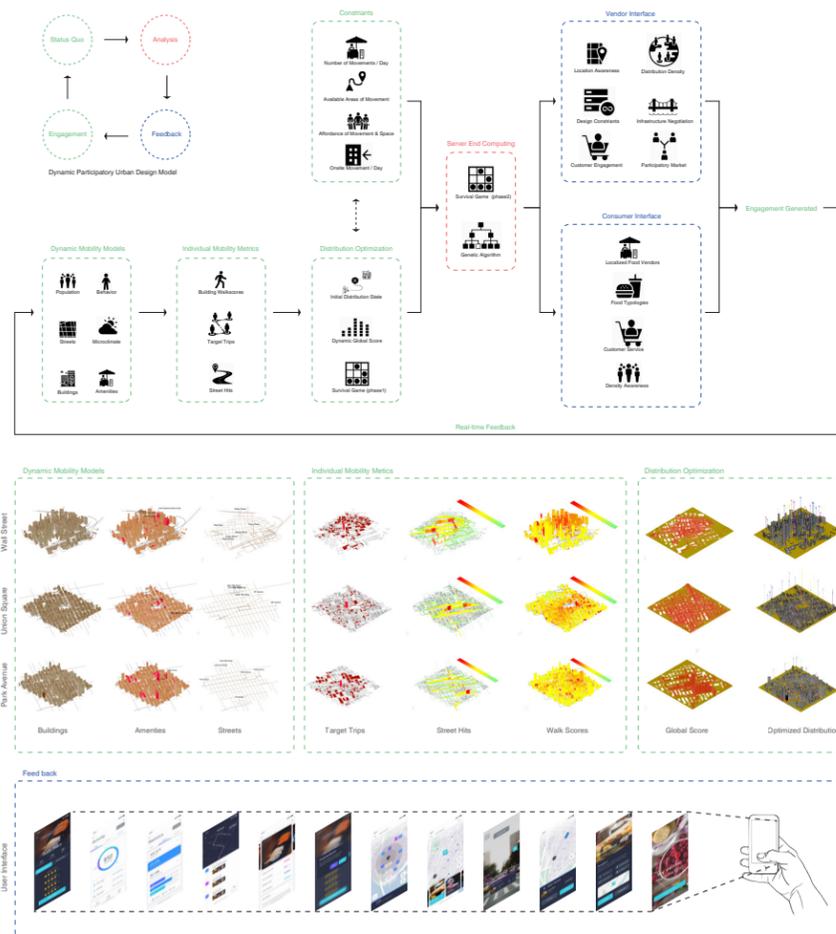
Instructor: Biayna Bogosian
Summer 2019

ARCH 7111: DESIGN A
A+U: MAP to MEASURE / MEASURE to MAP

Instructor: Biayna Bogosian
TA: Yang Yang
Students: Name Lastname, Name Lastname,
Name Lastname, Name Lastname, Name Lastname

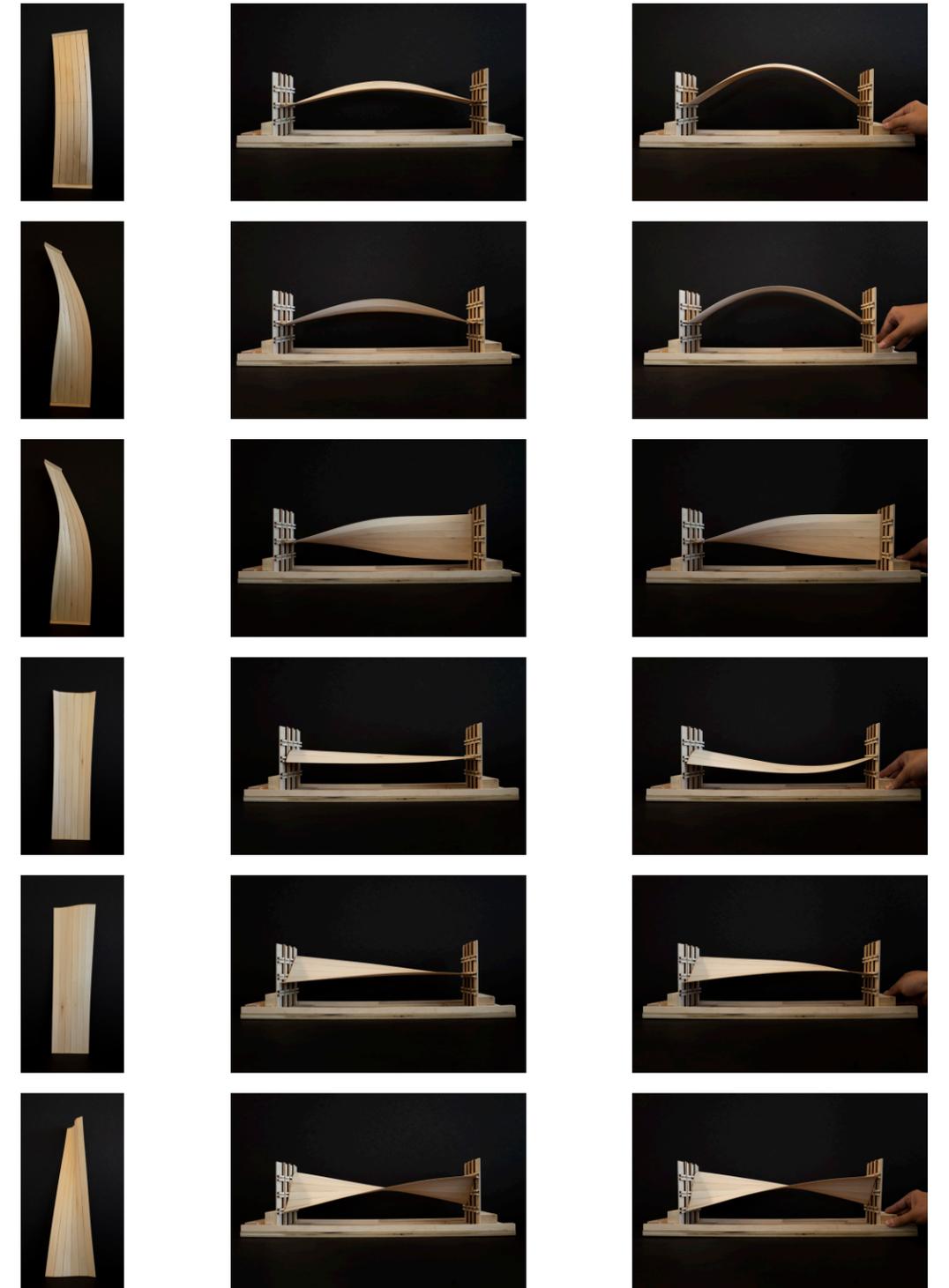
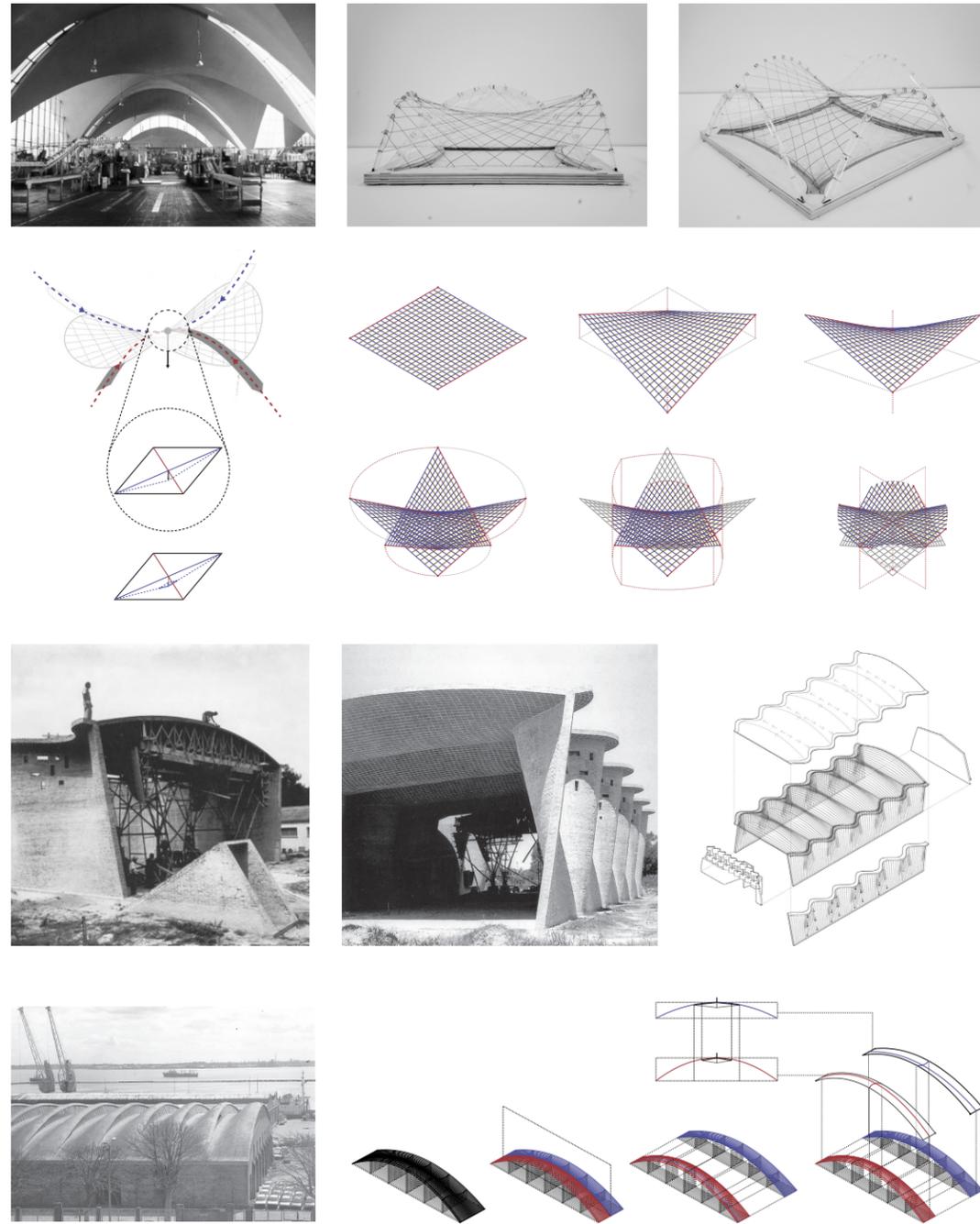
Project Title

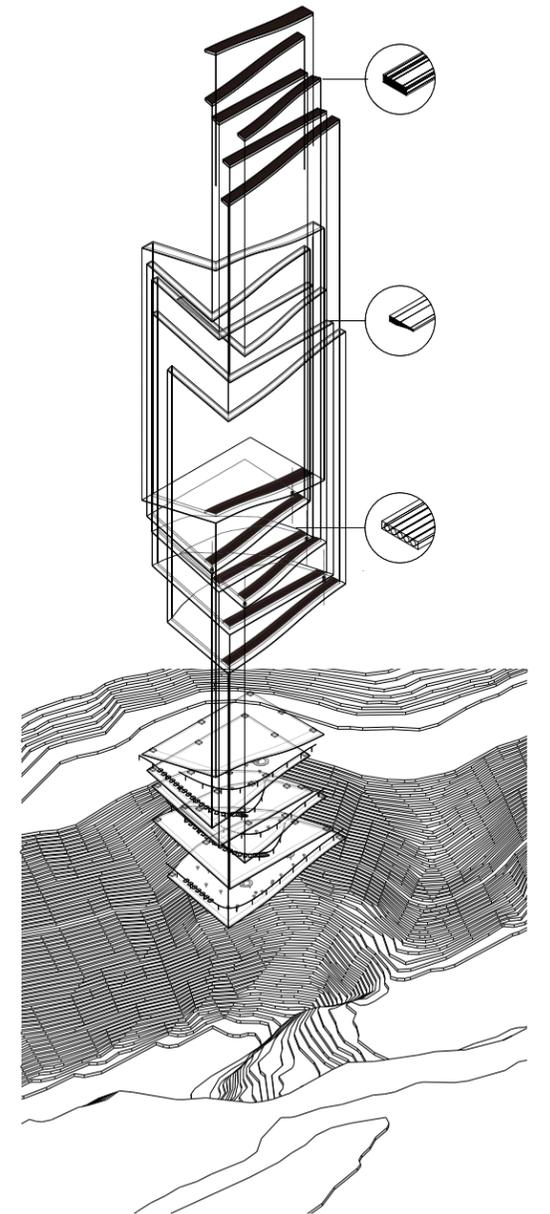
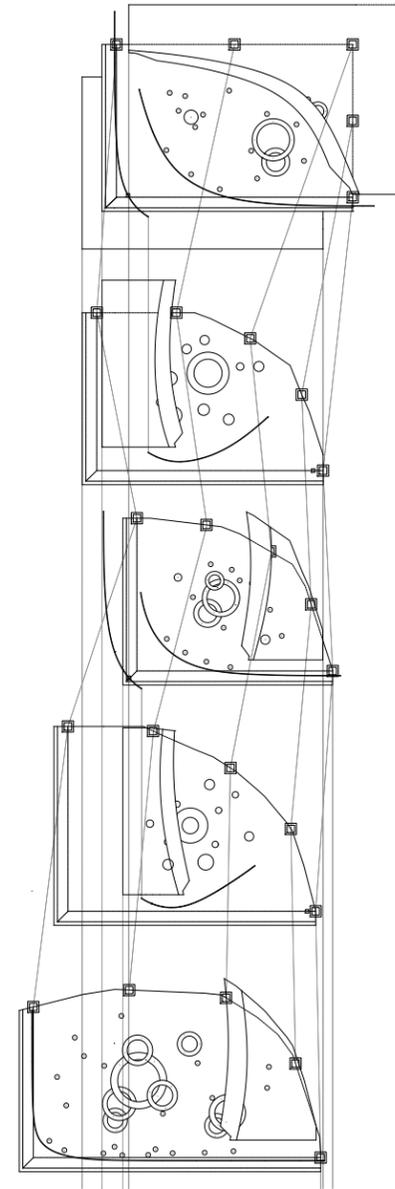
What is your design question? What is your design question?
What is your design question? What is your design question?

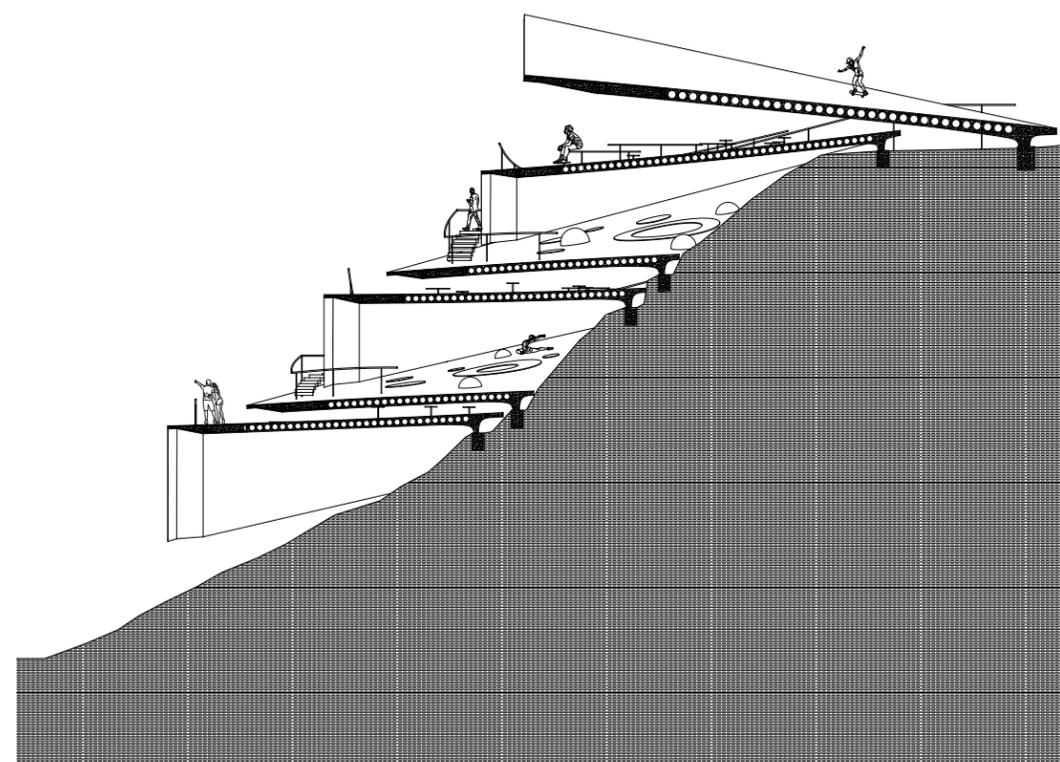


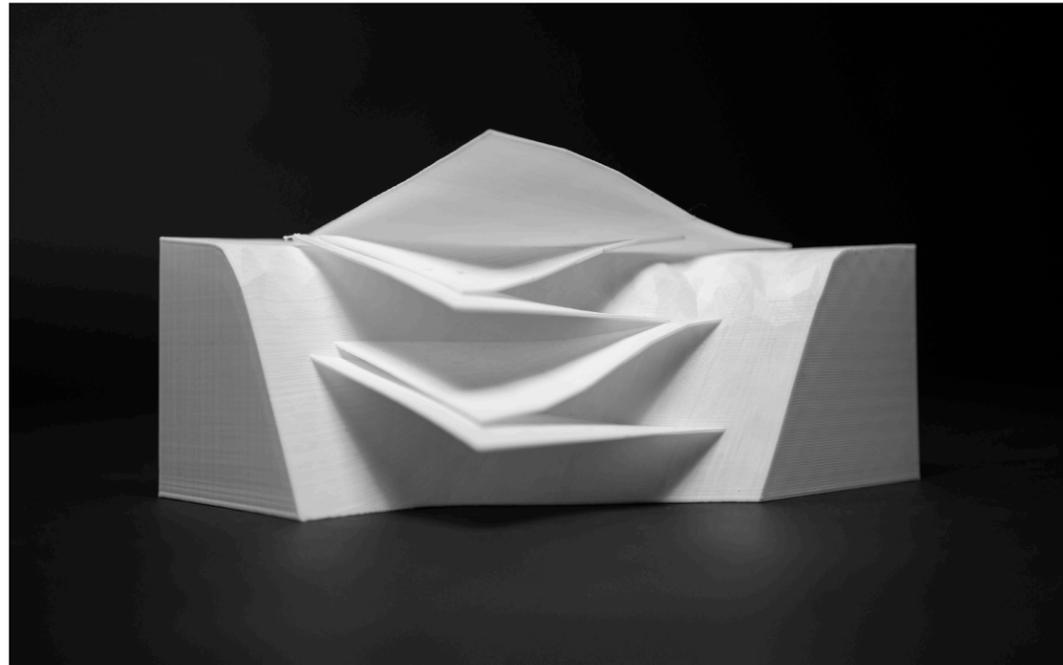
IV. Rational From Making

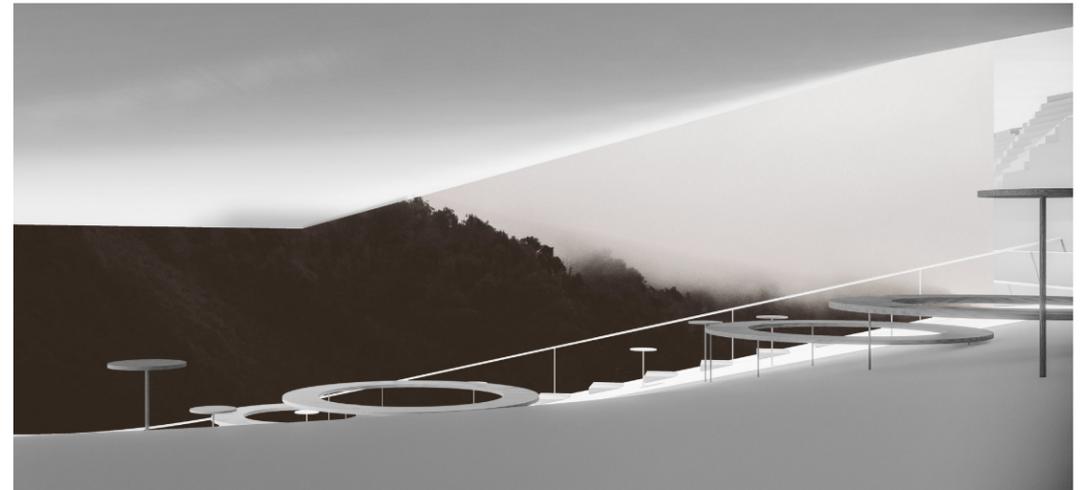
Instructor: Angela Pang, Yoshiyuki Hiraiwa
Fall 2019











Seminars and Lectures

I. Robots, Cyborgs, and Architecture

Instructor: Rachel Dickey
Fall 2019

II. Urban Fluxus

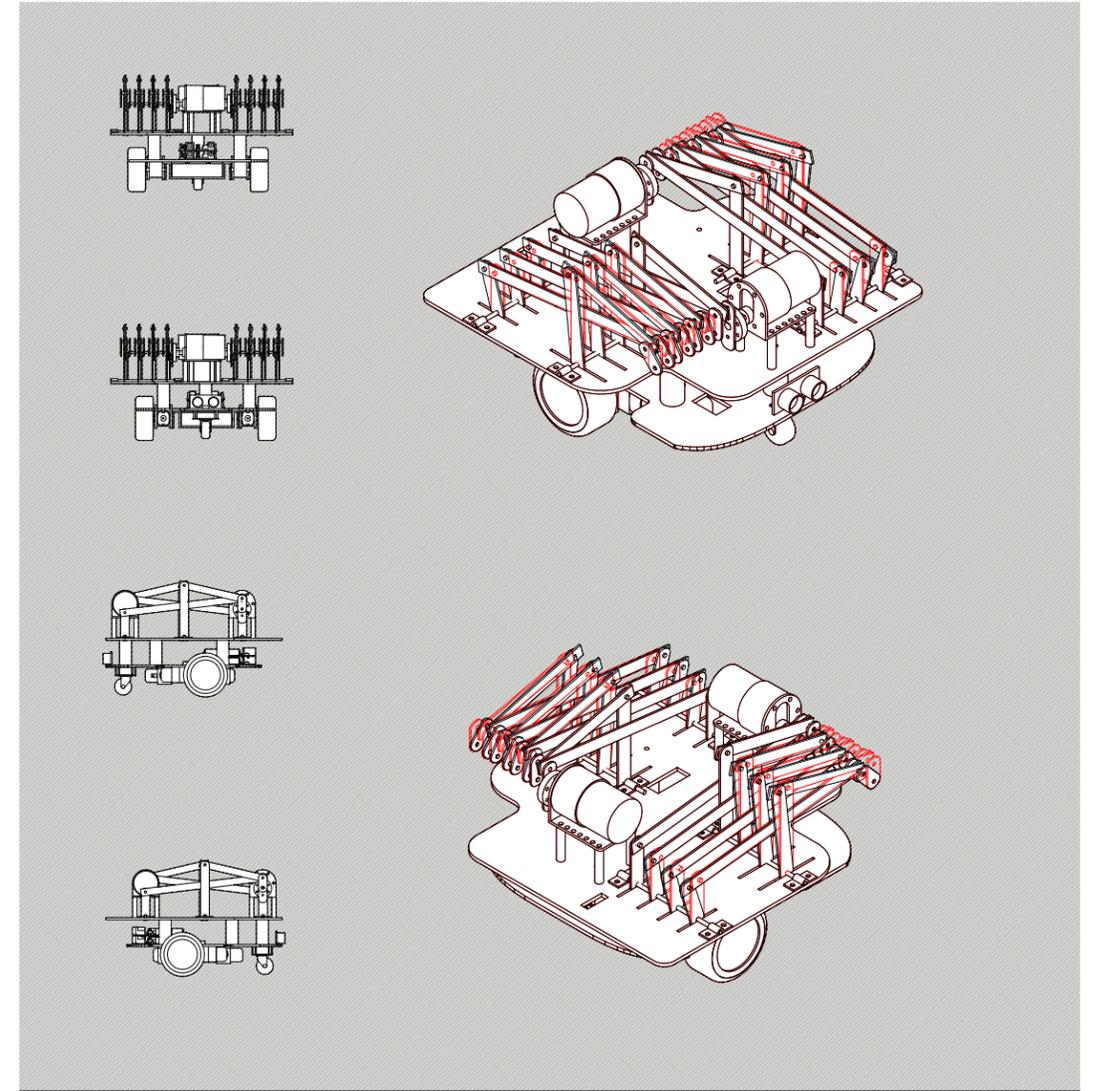
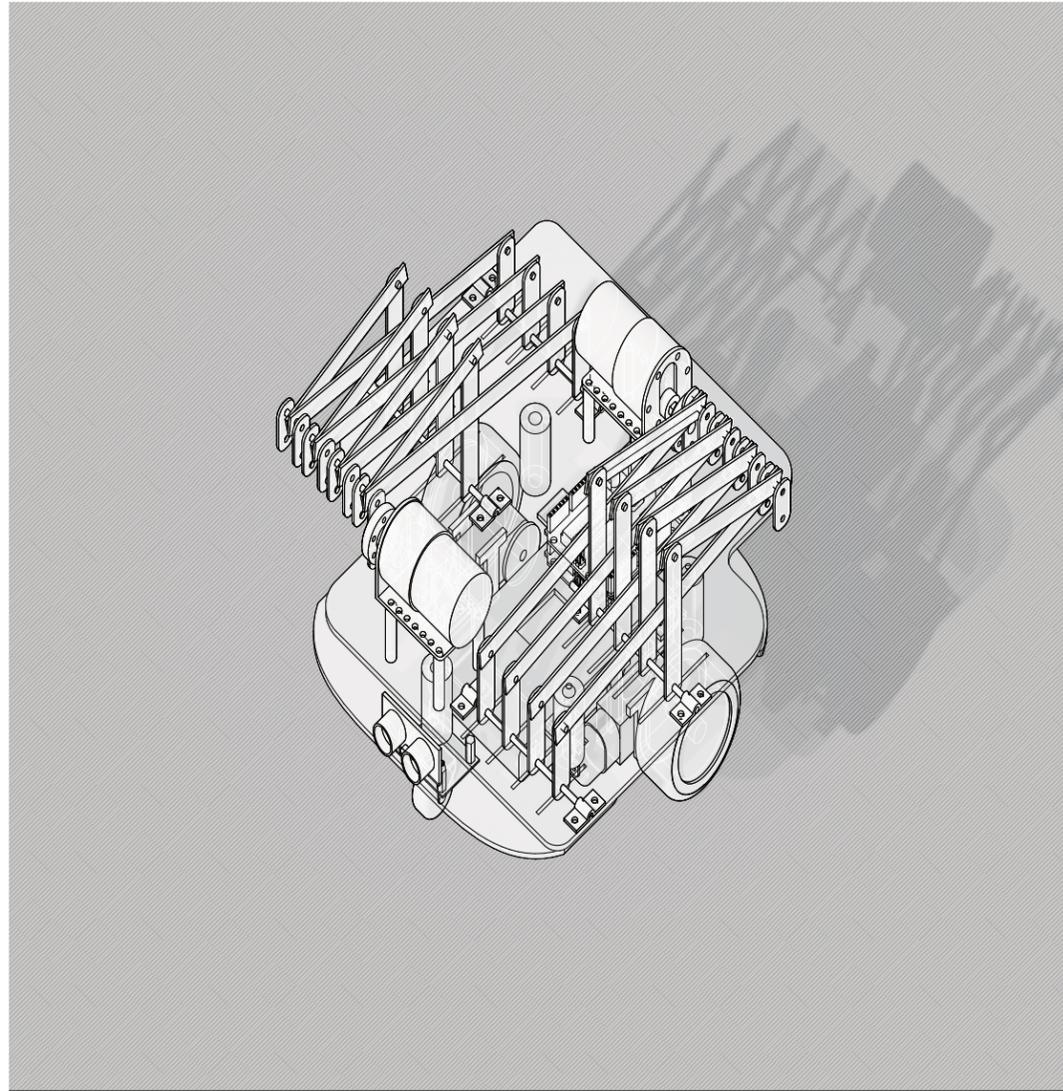
Instructor: Naomi Frangos
Fall 2019

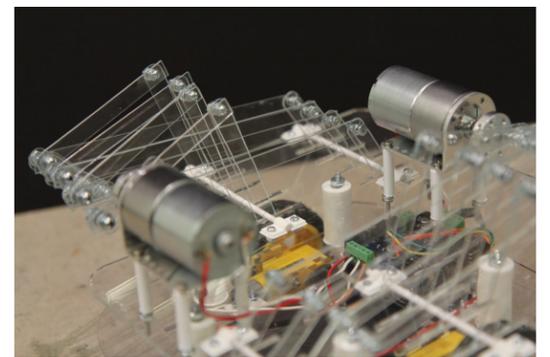
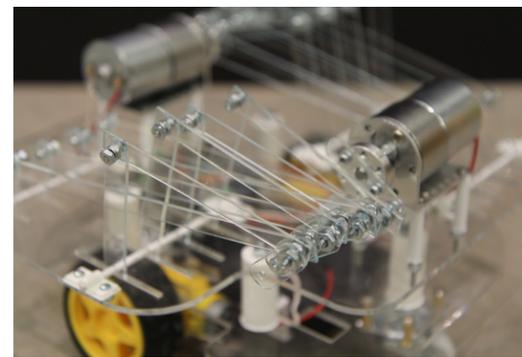
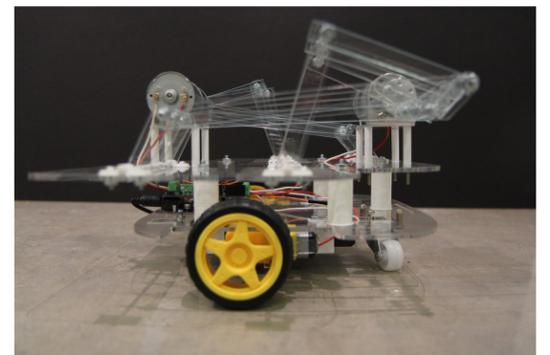
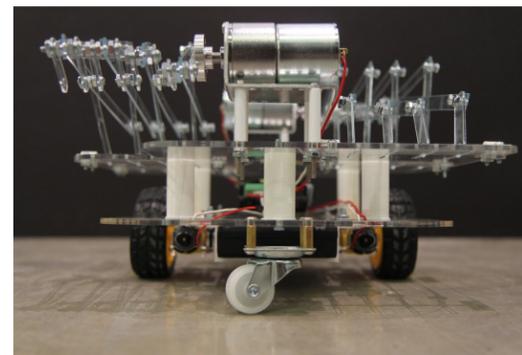
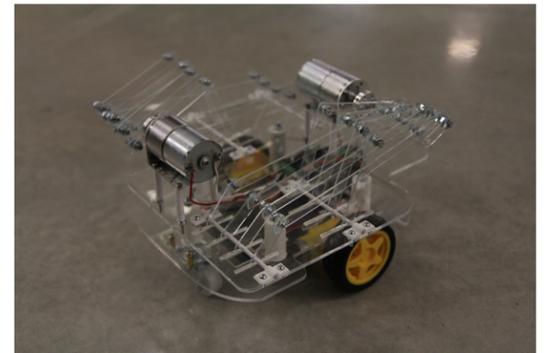
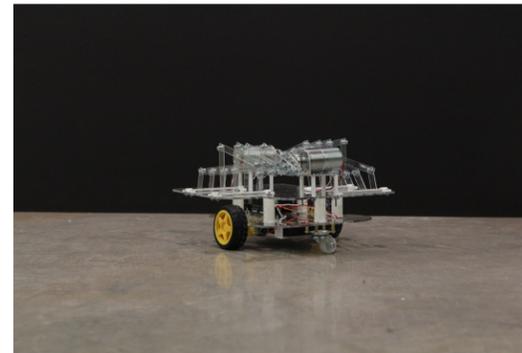
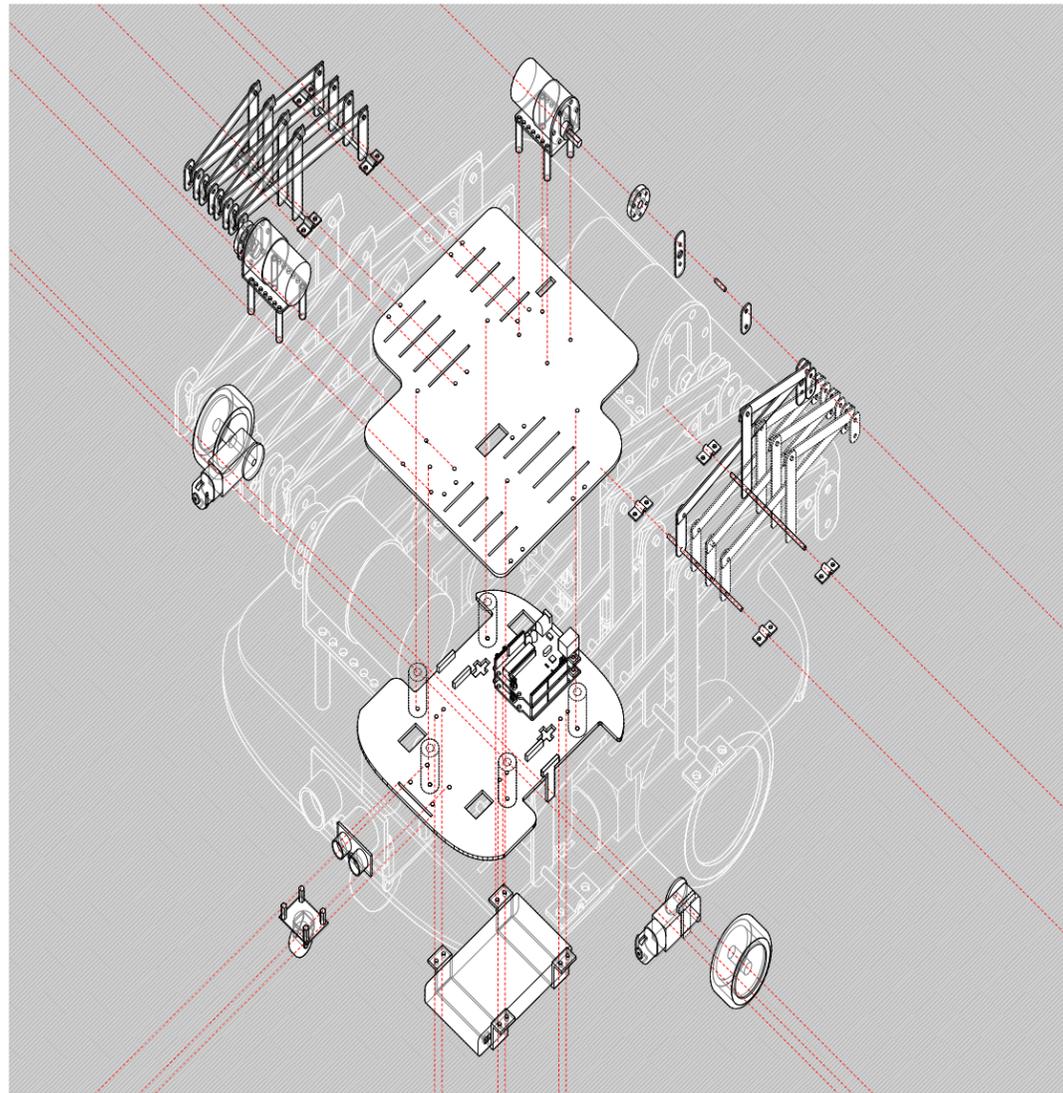
III. Systems, Entropy, and Organized Complexity: Cybernetics in Architecture and Art

Instructor: Branden Hookway
Fall 2019

IV. Body, Space and the In Between

Instructor: Danica Selem
Spring 2020





Masked City
 New York
 ZHANG, Ruochen

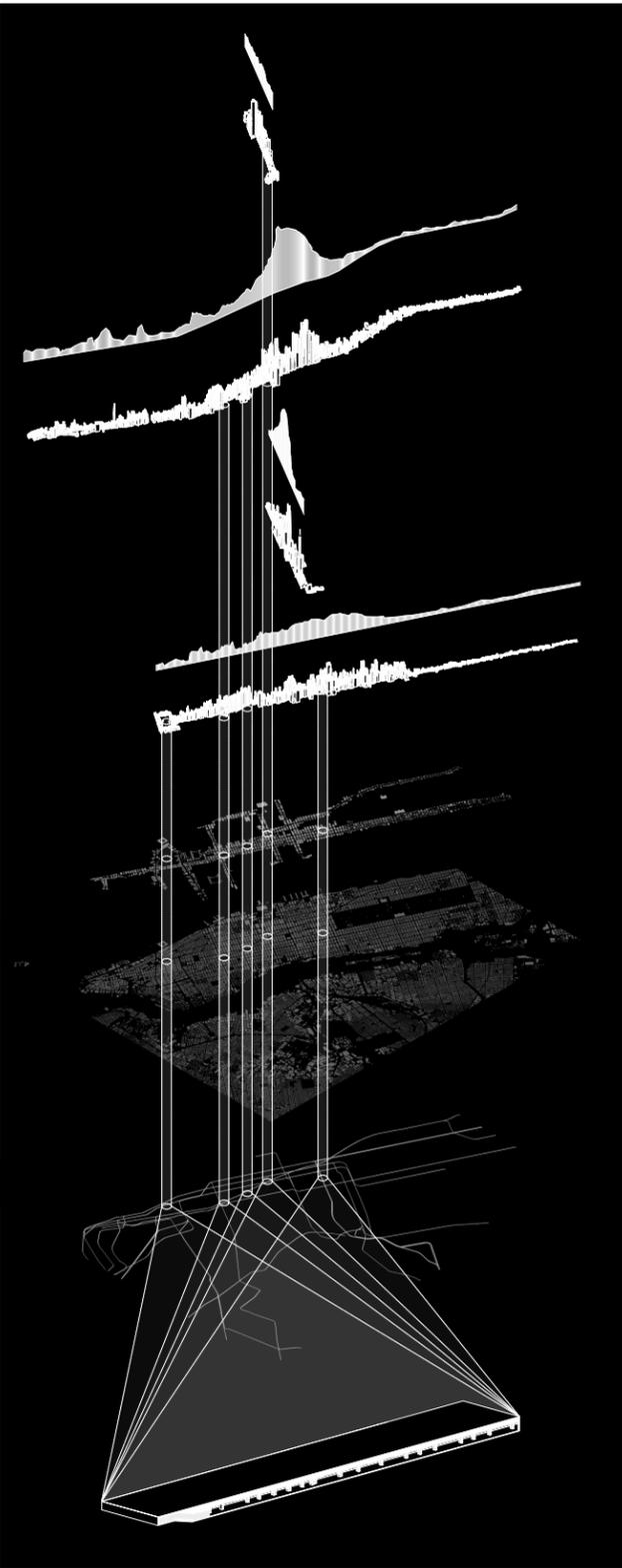
Advertising, specifically commercial advertising, as it spread across the city in different forms, constructs a modern spectacle or visual pollution. By covering almost every available urban spaces, from small posters on the garbage can to the shining LED billboards of the Times Square, from the subway carbin to the corners of the office buildings, outdoor advertising masks urban environment from its original appearance. Commuters, tourists and drivers are surrounded consciously and unconsciously by those constantly changing signs of capital flows, of modern civilization, which deconstruct and then reconstruct the perception and memory of the city in a dynamic and mostly unconscious way. As the sun comes down, the dazzling LED billboard advertisements stand out, invading citizens' vision, hiding those well-designed building details in the contrast between shining light and the dark. What is the urban environment in citizens' perception after the invasion of advertising happens? How advertising, as a significant sign of the city, deconstruct and reconstruct public memory about city, especially those public spaces?

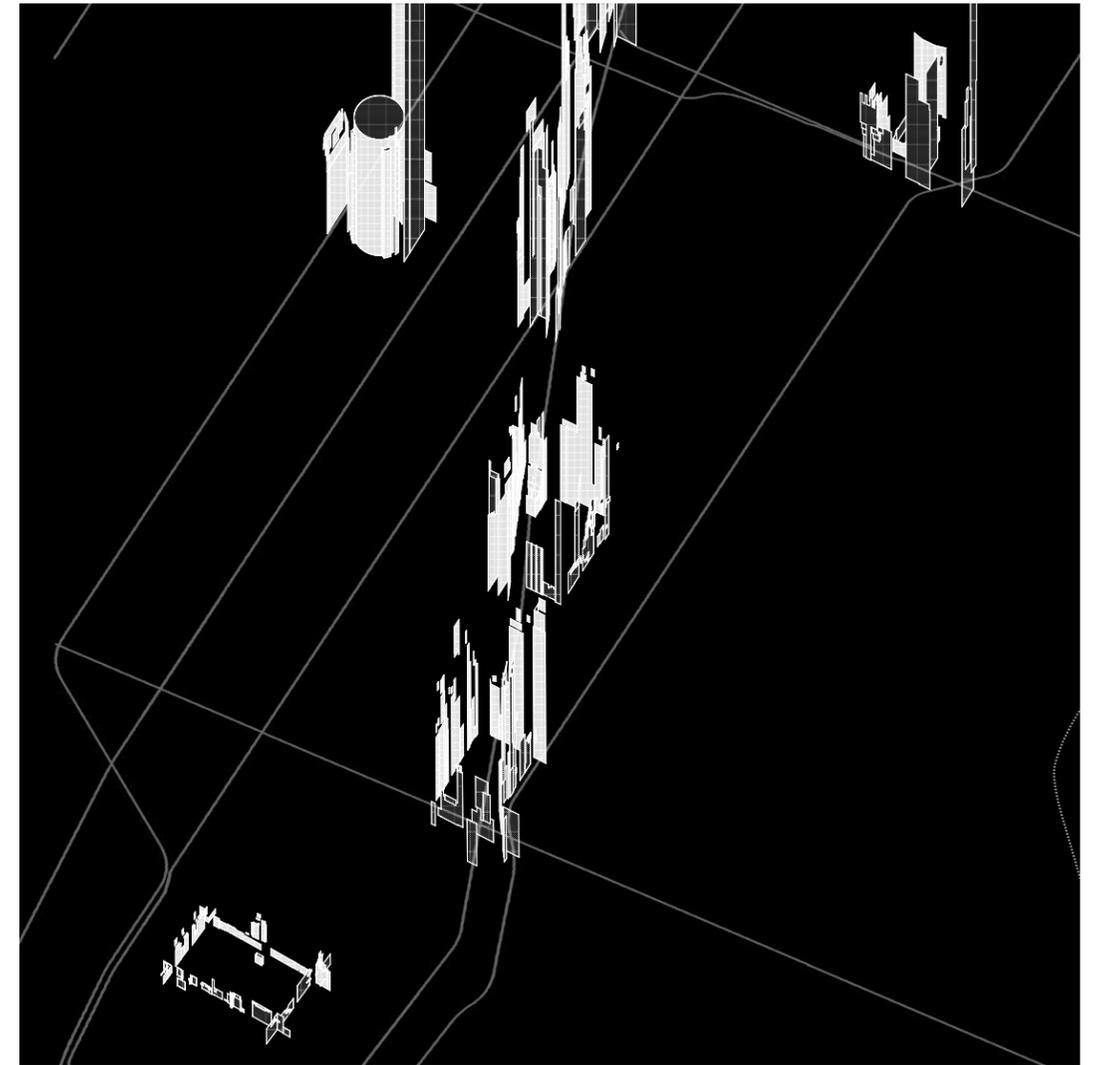
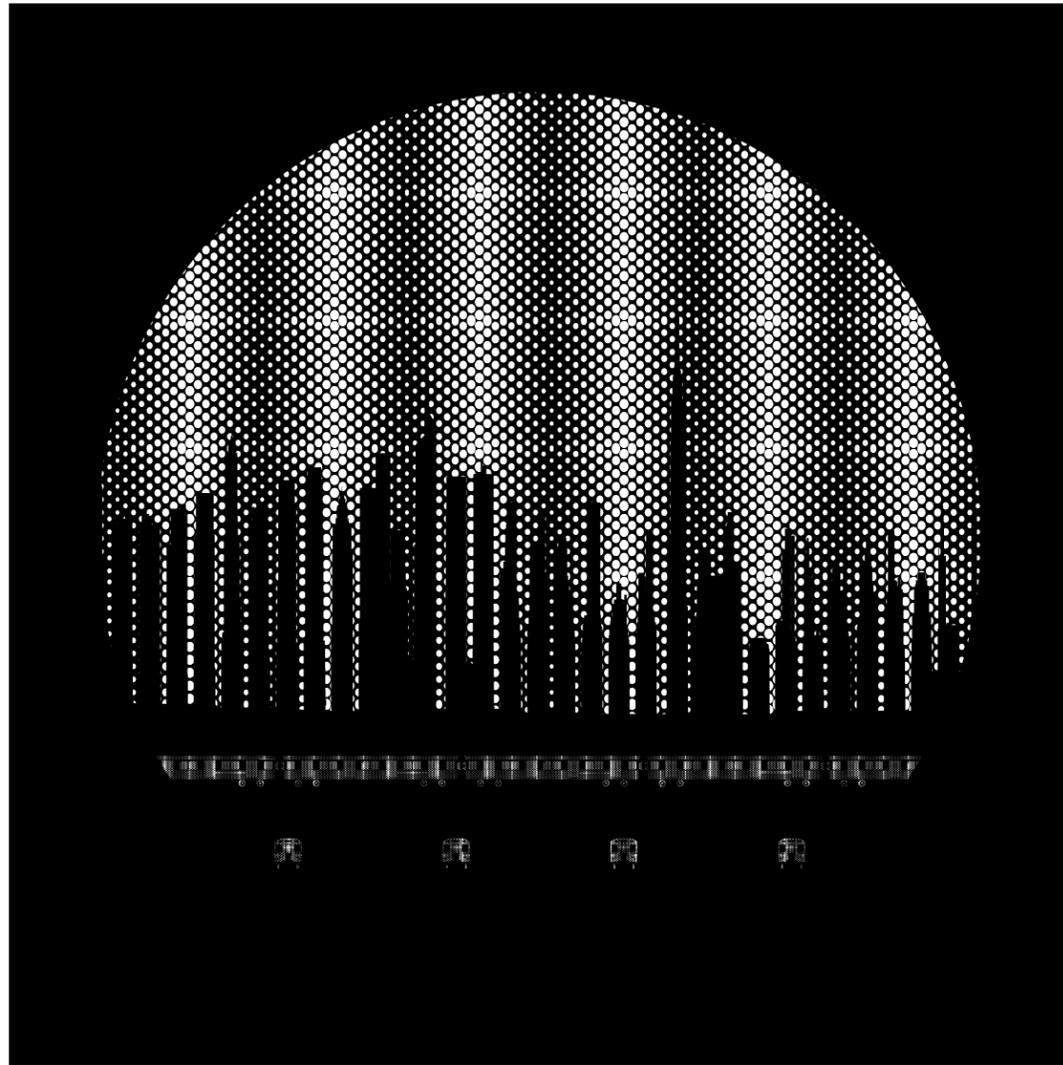
This research explore those problems and questions on New York City, the ideal paradigm of modern city and modern civilization, to map out a city that has been deeply affected by advertising and the culture behind it. In this study, those famous streets, squares and other public spaces are demonstrated and reinterpreted as the container of advertising with the combined data of advertising density, distribution and price. Except the world that is above the ground, the underground world is mapped to form a continuous system from commuters' stepping out of their living spaces to stepping into their working spaces.

Also, the question raised after those mapping process: what will be the world of advertising in the future, especially when VR and AR changes the way people view the city. Is there still a need for those physical advertising or there is a new way for advertising to interact with the physical world of urban elements?

| | |
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| | 4 |

1. Constellation Exploded Axonometric
 2. Advertising Reconstructs Public Spaces
 3. Advertising Masks Urban Structure
 4. Advertising in Future World of AR





Game Theory in Architectural and Urban Design: from Groundcourse to Reddit Place

1. *Introduction*

From the day that human first created their house or more precisely their shelter, architecture has been always evolving with the development of technology. Although it may take a while for those technologies can be applied to the field of architecture. Fortunately, as the time period between the creation or discovery of a theory and the application of certain technology sharply decreased after World War II, especially during this age of information, architecture is finally able to absorb some nutrition from the newly developed technology, for instance, Machine Learning and Artificial Intelligence. Also, with the help of the modeling software which can translate physical architecture model into data inside computer, the very process of architecture design has been a new testing ground for those trending technologies. We can see those generative architecture designs and projects everywhere in this world. However, even applied with the newly technology, the actual procedure of architecture design hardly changes. The architects sit in front of a computer, with the render perspective on their left screens and the grasshopper interface on their right, slowly and carefully move the tiny buttons of the number sliders, hoping to get a form or

just shape that is satisfactory. There is no actual difference between this process and our drafting on the paper. Nothing changes. Architects draw shapes. Architects make forms. Architects do translation. Architects make decisions. But developers invest. Workers build. People live. There still exists a huge gap between the design process and the people who actually use and judge the buildings. What if there is a way more interactive for them to participate in the design process or even become designers or at least some of the designers even though they do not have a background of architecture? In other words, is there a way to release architects from decision making? Game theory, a study or model which involves strategic decision making that has been discovered or developed for a relatively long time, may serve as one of the insights related to the situation.

2. *A Brief Introduction of Game Theory*

Game theory is the study of mathematical models of strategic interaction among rational decision-maker. (Myerson, 1) Game theory was first introduced to the world in 1928 by John von Neumann with his *On the Theory of Games of Strategy*, where he used Brouwer's fixed-point theorem on continuous mappings into compact convex sets. However, the history of applying game theory as an insight into solving problems can be traced back to Plato's *the Laches and the Symposium*. By the mouth of Socrates, Plato describes a situation where a soldier is confronting with an enemy attack. There is a decision to make, here, to run or to fight. If the enemy's power overwhelms the soldier's army, the best choice for the soldier is to run from the fight to avoid unnecessary sacrifice, since one single soldier cannot do much to turn the outcome around. But on the other hand, if it

is a win to be, then, the soldier's possibility of dying or wounding will decrease, but then, the soldier may not contribute much to the battle, so why risking his life? In all the situation, whether the soldier is going to win or not, the best decision he can make there is to run from the battle. And think about the situation where all those soldiers come to the point to think of this problem. It may cause a failure of the battle any way.

The structure of a Game Theory model involves a few elements. They include Game, Players, Strategy, Payoff, Information Set and Equilibrium. Game refers to any set of circumstances the result of which is tightly related to the actions of decision makers. And the decision makers involved in the Game is called Players. The set of actions that each Player makes are Strategy. Payoff can be seen as a representative of the result or outcome of the Players' actions or Strategy. The information set can be understood as the information accessible at a certain stage of the Game, which is usually used in the game with a sequential component. And Equilibrium refers to the point where players reach a certain outcome through decision making.

Today, with the development of Game Theory and the application of this theory into different fields, Game Theory becomes a term that contains a large set of mathematical or conceptual models that relates to the science of logical decision making. Zero-sum game, cooperative and non-cooperative game, symmetric game, infinitely long games and et... Those theories or models abstract and even enlarge the conditions of certain problems into a simplified but more concentrating model. By thinking through or running the theory or model, the complicated situations in reality become easier to understand and solve. In other words, those abstract model offers a simple simulation of a classified certain problem. And today's definition and application

of Game Theory can be viewed as a method of simplifying and abstracting certain complicated decision-making problems into situations that are logically clear. In short, Game Theory is a systematic simulation of the reality.

Architecture design, a process containing countless decision-making situations between architects, developers, dwellers and even between each group themselves, seems like a perfect field where Game Theory can be applied to. However, due to the information and background divergence between different groups involved in architecture design process, the translation from architectural language which describes the situation confronted into language that can be read by other groups cost a lot, thus causing the lack of the creation of game or simulation that abstracts the actual decision making stage in architecture design. That is to say, the information exchanging and retroaction system in the process of architectural decision making is postponed for the lack of the same dictionary or code book which can be read by all the involving groups. The similar conditions also exist in urban planning and urban design process. But is it possible for Game Theory to take place in the process of architecture design and urban design? Is there a way to abstract at least some stages of the procedures into a clear systematic simulation that can be an interactive board for designers and other groups involved? To seek for the opportunities to involve Game Theory into design situations, we can take a step back to search among the simulations that are not directly related to design process but indicate the potential to be applied to architecture and urban development.

3. *Groundcourse*

In 1961, Roy Ascott began his pedagogical experiment at Ealing and Ipswich Art Schools, which is under the name of *Groundcourse*. Games and play formed one of the most important elements of the *Groundcourse* curriculum. (Sloan, 1976) Ascott, his colleagues and his students used “a theatrical strain of performance and set design that employed light, costume, sound and props” to design theatrical games that simulated processes and situations of that time, especially some military operations and actions, for example, *Operations Room* which simulated the decision making and coordinating process which happened in the Battle of Britain. During this game, players surrounded a map on the board with a long wooden sweeper and a headset for them to receive information from teammates at the radar screens. This experiment formed a cybernetic system where the flow of information between agents are made visible.



Figure 1. *Groundcourse* at Ealing Art School.

Through experiments and games like this one, some situations which involved decision

making and information exchanging are simplified and reinterpreted into games or plays where players participated to make a simulation of the actual condition. Particularly in the *Groundcourse*, as it is an art pedagogical experiment, atmosphere created by set of stages, backgrounds and even costumes were added to the model. Though architecture and urban design is not included in the *Groundcourse*, it offers us the vision of the application of interactive games and plays to simulate what happens during negotiation of design between groups. From this perspective, games, in the form of either video games and board games which relate to the system of architecture and urban environment, may offer us with a new insight into the problems raised before. Here, as urban planning and design contain more decision-making situations, more information transfer and translation conditions and less aesthetic approaches which are extremely complicated when comes to simplification and simulation, compared to conventional architecture design. The following examples involve more urban situations.

4. *SimCity* and *Cities: Skylines*

When thinking of games that relate to the simulation of urban system, the name *SimCity* and *Cities: Skylines* appears in mind as the apparent answer to this question. Both games provide players with a well-structured urban system including zoning control, road placement, taxation, public services and public transportation.



Figure 2. *SimCity* (left) and *Cities: Skylines* (right).

In the games, players take the role of the governor of the city, in other words, decision maker, to develop the city from a simple system containing only land to a complicated metropolis model which resembles the city in real world to an extent that balances both recreation and education. Both games become the paradigm of the urban simulation games. However, as the purpose of the research is to seek for the potential to turn the game system into something can be used to the process of architecture and urban design, the two games lack this particular potential because the translation between real situation and virtual system is too straight forward, which means that the simplification and abstraction do not reach the limit because of the fact that computer's ability to process incredibly huge amount of data resulting in no necessity of simplification this way. Also, by playing the role of the supreme governor of the city, the negotiation process is ignored, which means that the information transfer process in reality is not well translated into a set of rules in this game.

5. Board Games

Board game though seems less charming than video games like *SimCity* and *Cities: Skyline*, has

potentials in developing into a system that provides a platform for groups to negotiate and cooperate to reach a rational decision. Because of the relatively low ability of calculation compared to computer, the design of board game requires more translation from the complicated real situation into something can be played through relatively simple calculation. And with different understanding and different perspective regarding the complicated architectural or urban system, different board games set the game system in different ways, offering a variety of simulations of the existing urban system.

Board games concerning architecture and mostly urban planning simulations span almost a century of public and academic interest. Board games, though recreational in nature, all have certain potentials to develop into educational purpose and further develop into a system that can be practical in the real situations. Early games were basically based on a linear approach to urbanism, focusing on only one or two urban elements. *Monopoly*, probably the most famous and profitable board game ever in history, was first introduced in 1933 with its precedent *the Landlord Game* created by Maryland Quaker Elizabeth "Lizzie" J. Magie in 1904. Both games were created based on the process of buying lands, upgrading buildings and making profit by rent, which can be viewed as a extremely simplified version of urban development. Players play the role of tycoons and to concentrate capital is their only goal in this game.

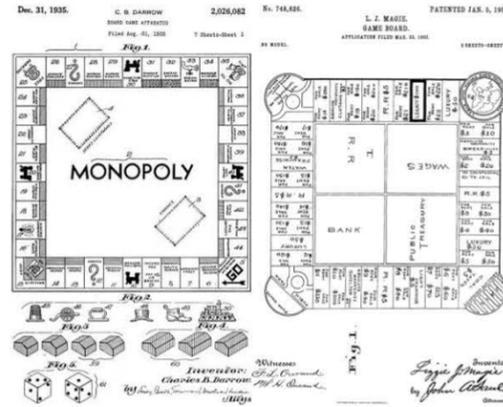


Figure 3. Monopoly (left) and the LandLord Game (right).

Later in the 1972, *Community Land Use Game* (CLUG, originally *Cornell Land Use Game*) was designed by Allan G. Feldt for educating urban planning students with the basic idea of how urban growth happens as a systematic result of multiple interacting factors. CLUG offers a more developed system into urban situations, not only land, building and capital but policy, urban function and even urban infrastructure such as transportation are included in this game. Because of the complexity of this game, five teams of 2-5 players are required for this game and each round for decision making process takes 1-2 hours, which makes this game not possible to be published commercially. However, by building such system where elements interact with each other, a city system can be built or designed under the structure of the game settings. CLUG, though not as famous as the *Monopoly Series*, provides more potentials in either developing into a system that can be used for interactive design or developing into some more recreational games by focusing on only part of the elements involved while maintaining the similar system building philosophy.



Figure 4. Community Land Use Game.

In 2011, *City Tycoon*, *Urban Sprawl* and *City Council* were released. They took similar strategy to translate real urban development into a game play more recreational than CLUG by focusing on part of the problems or interest groups involved in the game. In *City Tycoon*, players play the role of businessman to invest in the city's development. It seems similar to the logic of *Monopoly*, but it is actually a system that pursue certain complexity in this simple game. In this game, resources such as water and electricity, the standard of living by means of the arrangement of buildings with different functions and the happiness of citizens are included in this model as Payoff as mentioned before. *Urban Sprawl* based its game play on building or developing permits, which indicates that policy is included in this urban simulating system. The role of entrepreneur, tycoon and even politician can be played in this game. By setting different Payoffs according to the role of each players, a vibrant metropolis can be achieved this way. *City Council* mainly focuses on the decision or policy making process in urban development. All players take the role of politician, to be specific, council member. Each council member can fulfill their political or economic pursue and also the interest of other groups. The decision of building every single

facility has to be made after a negotiation where council members use their resources to win votes. Similar to *City Tycoon* and *Urban Sprawl*, by each player's trying to get as much Payoff as possible, a city that develops constantly can be achieved.



Figure 5. *City Tycoon* (left), *Urban Sprawl* (middle) and *City Council* (right).

As the examples suggest, the urban simulating board games all contain a well structured urban developing model. Although the models used there may not be practical for real urban planning or similar architecture design, they show certain possibility that if a model of the procedures included can be well extracted from real situations, an interactive platform for people to participate regardless of their academic or practical background can be reached.

6. *Urban Works Agency*

The *Urban Works Agency* is a research lab at the California college of the Arts Architecture Division, which is dedicated to the structured rules which forces the urban environment. They have designed several different game plays such as *RBD Engagement Toolkit*, *Bartertown* and *Win-Win Board Game Faculty*. Those games are based on the classic win-win game theory to translate the complex urban rules and strategy into playable games for public to participate into creating a new blueprint for the city together. By setting different game plays, certain urban

problems or conditions can be discussed and simulated in a way that all architects, urban planners and even public with no such experience can participate.



Figure 6. *Bartertown*.

For example, in *Bartertown*, players play the role of residents of Bartertown to take actions including building urban infrastructure to get Payoffs by taking the right actions. The model here simulates the future modes of public's participation into building a vibrant community.

7. *Reddit Place and Twitch Plays Pokemon*

The games mentioned before, explore a way into simplifying complicated reality into a simple game. However, the number of players involved in a game set is small due to the form and media of the games. Now, with the development of technology, especially the spread of Internet and the application of big data processing, there may be a way to involve a relatively large number of players in a game set to make decisions together toward a single goal. *Twitch Plays Pokemon (TPP)* is a social experiment on the Internet live streaming website Twitch based on *Pokemon*, a game where the hero or heroin collects a certain type of monster or pet, pokemon and raise them

to battle against others. Viewers of the website can type in any instruction they want to let the hero of the game to take actions. With the participation of a vast number of players (1,165,140 players in total) around the world, this experiment ran across countless interesting situations which were caused by the crowd. However, seemingly impossible, the hero in this experiment made his way to the final stage after 16 continuous days of unexpected events.



Figure 7. Twitch Plays Pokemon.

Similarly, *Reddit Place*, a collaborative project launched by the social networking site Reddit, involved countless players in creating an artwork on a 1000*1000 pixels square canvas. Players can change the color of a single pixel from a 16-color palette once in 5 to 20 minutes. The social network worked as a place for different group of players to set their group goals and arrange their plans and movements. After 72 hours, a canvas that contained marks of human civilization was made through negotiation, cooperation and battle was made this way. *TPP* and *Reddit Place* explored the possibility to engage social networks and users of those networks into the process of decision making in an interactive way.



Figure 8. Reddit Place.

8. Conclusion

The philosophy and strategy here may not be able to be translated into practice in architecture and urban area. But it shows that by carefully abstraction, even a system that may contain countless elements and involve countless agents can be transferred into a system that is easy to understand and even easy to participate. Through abstraction in the form of interacting game, people with or without certain background can participate in the decision-making process effectively. By this way, the traditional process of architecture design and urban planning is possible to be transferred to a way that is more interactive in information exchanging. And maybe by the help of this interactive platform, new architecture or urban forms or qualities can be achieved.

IV. Body, Space and the In Between

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Spring 2020

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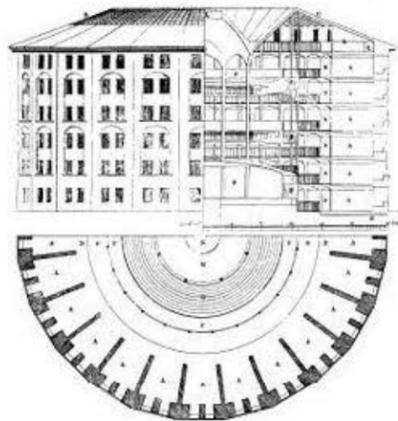
22 May 2020

Form and power: translation from political paradigm into architectural languages

---what forms the local government building of China

1. Introduction

"Architecture is only taken as an element of support to ensure a certain allocation of people in space, a canalization of their circulation, as well as the coding of their reciprocal relations."



Jeremy Bentham's Panopticon
<https://en.wikipedia.org/wiki/Panopticon>

In Foucault's discussion over Jeremy Bentham's panopticon, where a spatial form of constant surveillance is built, the efficient layout of the architecture is supporting the exercise of power. This

relationship between architecture and power system may not be applied to all buildings, because the types of buildings vary and the factors or forces that form the final construction of buildings vary. But particularly in some institutional buildings such as hospitals, schools, where a disciplinary function structure is applied, the relationship between architectural layout and the institutional power system is more obvious. Here, the invisible power relations behind the institutions are translated into spatial entities, the floors, the roofs, the walls, the windows, the doors.

For architects, the translation process sometimes seems empirical or to say mandatory. The translation process happens without our even thinking of it. It is like formulas in physics and mathematics, like recipes in cooking. Similarly, to better use the formulas and recipes in architecture or even try to modify or change them requires a deeper comprehension of them. But sometimes, the comprehension of the translation process remains only in the scope of aesthetics or human experience which sometimes becomes illusory, without seeking deeper into the essence which lies beneath the pages of guideline books.



Light and Shadow of the Forbidden City
"The Last Emperor.", 1987

The birth of the dominating pitched roof of Chinese traditional imperial palace architecture like the Hall of Supreme Harmony in the Forbidden City, and the shadow created by such dominating roof, explains the phenomenon well. In many architecture books, the shadow created by the roof comes as a special interest in traditional Chinese aesthetics. But when I had the chance to have a chance to practice in the Forbidden City, I was told that there was also an explanation in the scope of Chinese traditional politics, where the Emperor possessed a position supreme to all the officials of the central government. When they have morning meetings together, the officials kneeled on the ground outside the palace while the emperor sitting inside the palace with the upper body of him hidden in the dark shadow. It creates a situation of unidirectional surveillance, from the emperor to the officials, as well as puts the emperor in a state of mystery, where dominating fear of the officials is embedded. Similarly, there is more behind the ultimately simple guidelines, it is about how the institutional function is supported by the power system and how we, humans, live with the system of power. By examining the translation process here, the forms of certain types of buildings can be interpreted with a more sociological perspective. Particularly, the human body that lies between the invisible power system and the materialized spatial entities is observed in examining the relations here.

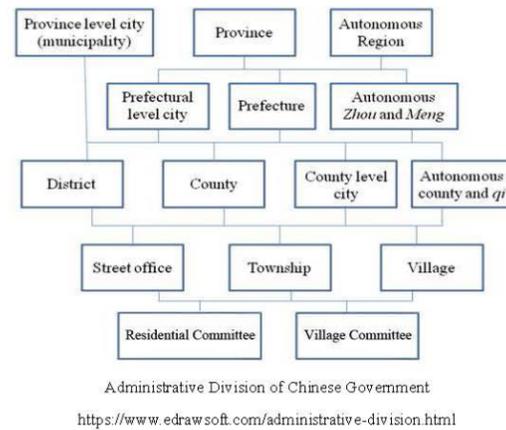


The Case Government Building
by Hongqing Zhang

To observe the translation process here, I will use the formation of a local government building in China as an example. The main reason for me to choose the building is that the political power system there and the architectural layout of the building are familiar and accessible to me because I have one month of social practice there after graduating from high school. The particularity of the Chinese government system compared to a western and capitalistic one will not be discussed in this passage. Besides, to examine what forms the local government building is more feasible in terms of its relatively simple power structure compared to the central government, and its relatively pure relations between power and architectural layout because it lacks architects' creation compared to buildings of the central government which are designed to fulfill more complex requirements.

2. Brief Introduction of the political power system of Chinese local government

To help understand what forms the local government building of China, here is a brief introduction of the political structure behind the Chinese local government and its building. The political system of the Chinese government of all levels have the same structure but differs in some areas. The government for this passage studies the case of a district government. The District is the 3rd level of the administrative divisions of China, which is called the County Level. Through all people's government of all levels in China, the CPC (the Communist Party of China) of all levels lead the government, in this case, the District Committee of CPC, in short, the District Committee. The two parts: Committee and the People's Government along with various departments of it make up the executive branch of the administrative system of the Chinese government.



The leaders of the Committee and the People's Government are elected by the People's Congress (PC) of all levels, which represent the will of people, being the legislative branch of the administrative system. The People's Congress meets in full session for roughly 2 weeks annually and the Standing Committee of People's Congress takes the hold when the People's Congress is not active. Also, the People's Political Consultative Conference (PPCC) is the consultative branch of the district government. In addition to the 3 branches, there are supervision branch and judiciary branch of a district government. But the 2 branches often have their buildings which are often located near the local government building, so that in this passage, they will not be included in the discussion.

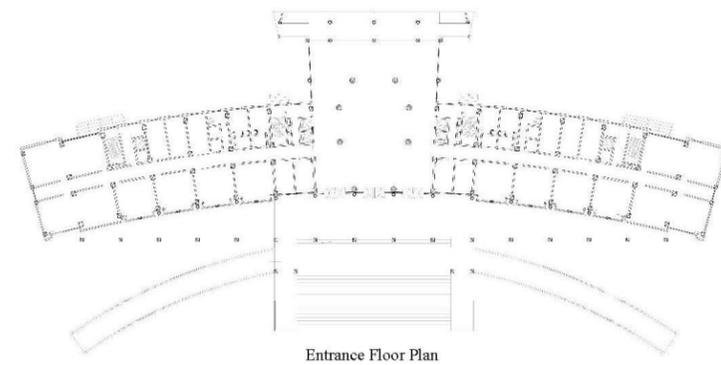
The officials of the district government especially the leading figures often have different positions in different branches. For instance, the Mayor (leading position) of the District Government is the Vice Secretary (2nd leading position) of the Committee. For this reason, the relationship between the branches seems complex. But there is a thread in interpreting the Chinese political system, that the Party leads all, which means the Committee holds the leading position of all branches here. But because of the close

relationship between the People's Government and the Committee, they 2 both compose the core of local government, leading all departments including the People's Congress. In terms of administrative levels of a district government, 5 levels are included. They are Division-Head level (Secretary of the Committee, Mayor of the People's Government and the Director of the district PC and PPCC), Deputy-Division-Head level (Vice-Secretary of the Committee, Vice-Mayor and Vice-Chairman), Section-Head level (Director of all Department of District Government), Deputy-Section-Head level and basic officials. Now with a brief understanding of the political system behind the case government building, the discussion of how political structure drives the spatial form of the government building can make sense. In the discussion of the relationship or the translation process here, the passage will focus on 2 political relationships: equity in the same administrative level and distinction across levels and see what the 2 relationships in whole form the constructed building of the district government.

3. Equity and its architectural fulfillment: symmetrical layout and political sensitivity

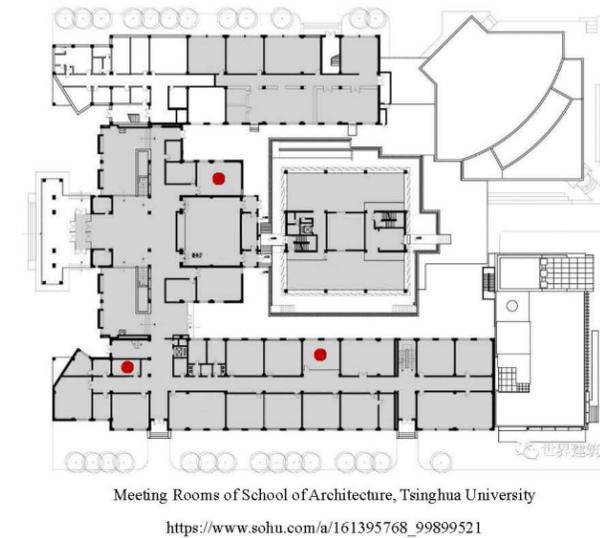
Chinese local government is an environment with relatively rigid stratification. The difference in administrative levels of the officials not only affects the amount of salary but also influences the invisible income and social status, which accumulate to the life quality of the whole family. For this reason, almost all the officials in the system desire for a higher position or a position with higher importance even at the same administrative level. The environment stimulates incredibly high political sensitivity among officials of the same government building, establishing a dynamic information system. Any inequity between officials of the same status there would be considered a signal for future adjustment, which may become an invisible storm in the environment. To answer to the dynamic

information system, the building of the government is designed with care.



The overall layout of the building adopts a symmetrical form, spreading the volume in the west-east direction. The symmetrical form not only forms a solemnity and ceremonial image of the People's Government but also makes it easier for the functional layout to be fair throughout a floor. The planar shape of the building is similar to a rectangular form but with its longer edges being curves, which allows a uniformed module of 2700 in width and 6300 in-depth. With this arrangement, the room size of officials at the same level can stay exactly with equal access to the sunlight, which is the most precious resource in northern China. Besides, there exist 2 same meeting rooms at the end of each floor, allowing 2 meetings held simultaneously with the same conditions. This kind of arrangement of the symmetrical meeting rooms can be seen in almost every typical government building in China. The political intension behind this arrangement is embedded in the environment of political sensitivity. Meetings account for a large proportion of the work time of the Chinese officials. Usually decisions are made through meetings including all kinds of groups. For groups of the same or similar level of importance, it is improper to have them in conference rooms of different conditions. Otherwise, the pressure caused by the quick

spread of rumor or to say information that certain groups are treated especially would accumulate to break the stability of the fragile political balance, and may finally cause the officials of lower levels to be overwhelmed with such pressure.



This may sound a little bit abstract, but I will take another example of the meeting rooms of my undergraduate school of architecture as an example. As the organization of the Chinese local government, there is an institutional structure composed of administrative departments, student organizations, and research groups behind the school of architecture, although not as rigid as the structure of government. But for the conference rooms of the school building are different: each conference room is identical, not only in size, location but also the furniture arrangement and openness of the space. That makes it awkward for the organizer of some important events when there is a time conflict with other events of the same importance because both groups would like to have the events held in one particular room with the most comfortable furniture and most private space. The

environment of the school is different from the local government, but such thing causes certain problems especially to the actual organizer of such events that if he or she cannot get the best room, he or she has to take the responsibility of the unhappy issues because of the room selection.

From another perspective, the symmetrical layout can also be explained with a symbolic reason, that symmetrical layout that is not declined to either right or left avoids dangerous comments saying that the government may be one of the left wings or right wings, which is dangerous in Chinese political environment. The layout of the government building even a simple one is a result of a complex negotiation between agents and forces.

4. Distinction and its architectural fulfillment: subtle difference, domination, and privacy

After the discussion on equity among the same administrative level, the environment of ultimate political sensitivity is translated into architectural languages. But what dominates the architectural design of the People's Government building here is the relationship across the levels, from the layout of rooms of different sizes and to other details make up the whole image of the building. As mentioned before, the political environment of the Chinese local government follows a rigid stratification. As in the scope of architecture, the size of the rooms for officials of different administrative levels is regulated strictly. For the Secretary of the Committee, he or she has the room with the largest size (5400 * 6300) and besides, a small lounge (2700 * 6300) and also a personal restroom. For normal officials with a basic level in the administrative level system, 2 officials share a single room (2700 * 6300). Moreover, the room for Secretary, Mayors, and the Directors of each department is at the very end of each floor,

where minimal circulations of others are involved to keep its privacy.

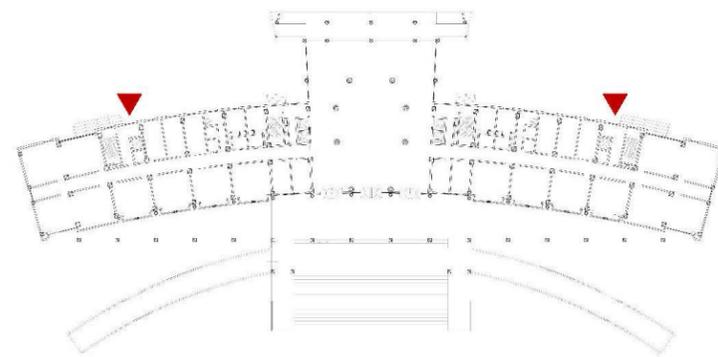
This distinction across officials and levels can be viewed also in the seat arrangement of the auditorium where the most important conferences or events. The number of seats of the first row of the auditorium as well as the seats of the rostrum must be odd where the central one left for the officials of the highest administrative level or the most distinguished guest. The intension of the arrangement is quite simple, but the failure of such simple arrangement can cause problems for the organizers of the events who are usually officials of relatively low levels. This similar philosophy is also common for the rostrums of stadiums or arenas.



Main Entrance
by Hongqing Zhang

The importance of privacy of the Secretary, Mayors, and Directors is not only demonstrated in the room arrangement as mentioned before but also in how they enter the building. The major gate of the building can be accessed through a ceremonial set of steps with huge symmetrical automobile ramps on both sides. Most of the officials in this building as well as guests either walk through the steps or ramps or drive along the ramps to get to the main gate located on the second floor of the building. Then, a magnificent front lobby of about 10 meters in height, welcomes all guests and officials. Next, a lobby

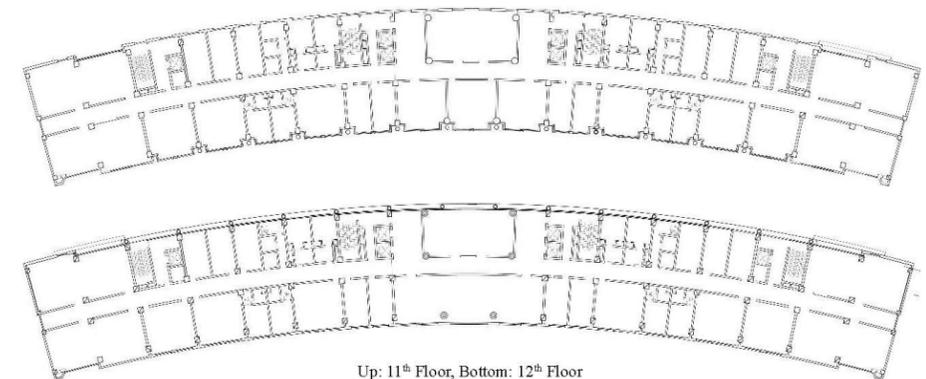
containing an atrium of over 18 meters, from the second floor to the seventh floor guides them to the elevators or stairs with a fancy chandelier and shining marble columns. The ceremonial design of the main entrance and the lobby here is intended to show the image of a rich and opening government according to the designer.



VIP entrance of the building
by Hongqing Zhang

However, for officials of the high levels such as the Secretary, Mayors and some Directors, this kind of ceremonial entrance where every guest entering the building becomes the focus of the space, viewed by people of all floors from 2 to 7 and by security personnel, invades their privacy especially when arriving late due to some business issues. Besides, officials of lower levels may be awkward when meet their leaders in elevators, especially when they are late or distracted with personal issues. To protect the privacy of both and to distinguish officials of different levels, the VIPs of the building have their entrances at the back of the building, attached with a private elevator near their offices. The private entrance is near the guest or VIP parking lot. There is no intersection between their circulations and the circulations of other officials. This is critical protection and insurance for their privacy. And the

diversion of circulations frees other officials from the intense political environment a little bit by avoiding unnecessary encounters with officials in charge as well. I have seen and experienced some buildings which aim at equity even across levels as in a lower position of the systematic structure. The intension is with humanistic care but it invaded my privacy and put me in a working environment of high pressure with the leading person in charge of the studio sitting right behind me, who can see my screen at just a glimpse of where I am. The intended and innovated mistranslation from power structure to architectural language leads to high prices paid mainly by the people who occupy the space rather than the architects who never own the space.



Up: 11th Floor, Bottom: 12th Floor

The translation from distinction across power levels to this simple government building is fulfilled also through distinction among some specific floors of the structure. In this building of 15 floors, some floors are with special design to create distinction and difference among the floors. The 15 floors have similar overall shape but differ in detail. Especially, the 11th floor is the highest floor with its northern windows span from floor to ceiling, which is seen as the best floor. The 12th floor has the same area as the 11th floor, but the northern windows are just normal. The 13th and 14th floors have windows same as the 12th floor but the area of the floor is a little bit smaller than the 11th and the 12th floor. The overall form of

the 15th floor is the same as the 13th and 14th floor, but with the central space being a small space for leisure with ping pong tables and pool tables, which produce terrible noise because of the smooth marble surfaces. With this distinction of different floors of the building, the departments and organizations are assigned to different floors according to their importance and status in the political system. For example, the central executive branch of the government including the Secretary and Mayor selected the 11th floor for their offices and the People's Congress took the 12th floor as their offices. Those spatial strategies combined to create a hierarchical spatial experience that accommodates officials of different levels.

5. Conclusion

With the rigid hierarchical structure behind every intension of the design, the government building is a dictionary with architectural vocabularies translated from the political structure of the Chinese government. However, to study the relationship between architecture and power does not mean that I am a supporter of such class or hierarchy structure created by power and does not mean that architecture should follow the system of power or emphasize the system, but rather to observe the relationship and forces between the invisible sociological agents and materialized spatial entities. But also, the fairytales all over the media that architects change the political or sociological structure of certain environments by the intervene of an architectural structure are just lies with the packages of manifestos. For me, the fairytales of such wonderlands where architecture dominates other agents can only exist in school, in books, in all kinds of portfolios. But to build such a structure of imagination would cause many conflicts that architects can no longer hold, not only with the sociological structure but also with every person involved with the building. Without a total and

comprehensive understanding of the institutional and sociological system behind such buildings, the designs would always be just some beautiful vases that accommodate any flower. Even in terms of trying to modify the sociological structure through architecture, the modification or even reform cannot be achieved properly without the understanding of the relationship between architecture and original power structure.

From another perspective, I have to say that the most attractive part of the translation process for me is the rigor and the systematic philosophy behind the seemingly boring architectural structure. In architecture schools, there are countless studios and projects aiming at a specific group of people or a specific social system. But the precious particularity of the topics or proposals suddenly stops when the moving manifesto is just about to going into languages of architecture. It may be enough for a portfolio, but not enough for a building even one that can never be constructed. I was thinking if we can take the same attitude as the architects designing for the seemingly boring government buildings in the translation process between our social insight or social ideology and architecture, maybe the design can be read as a special one even without its context read.

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