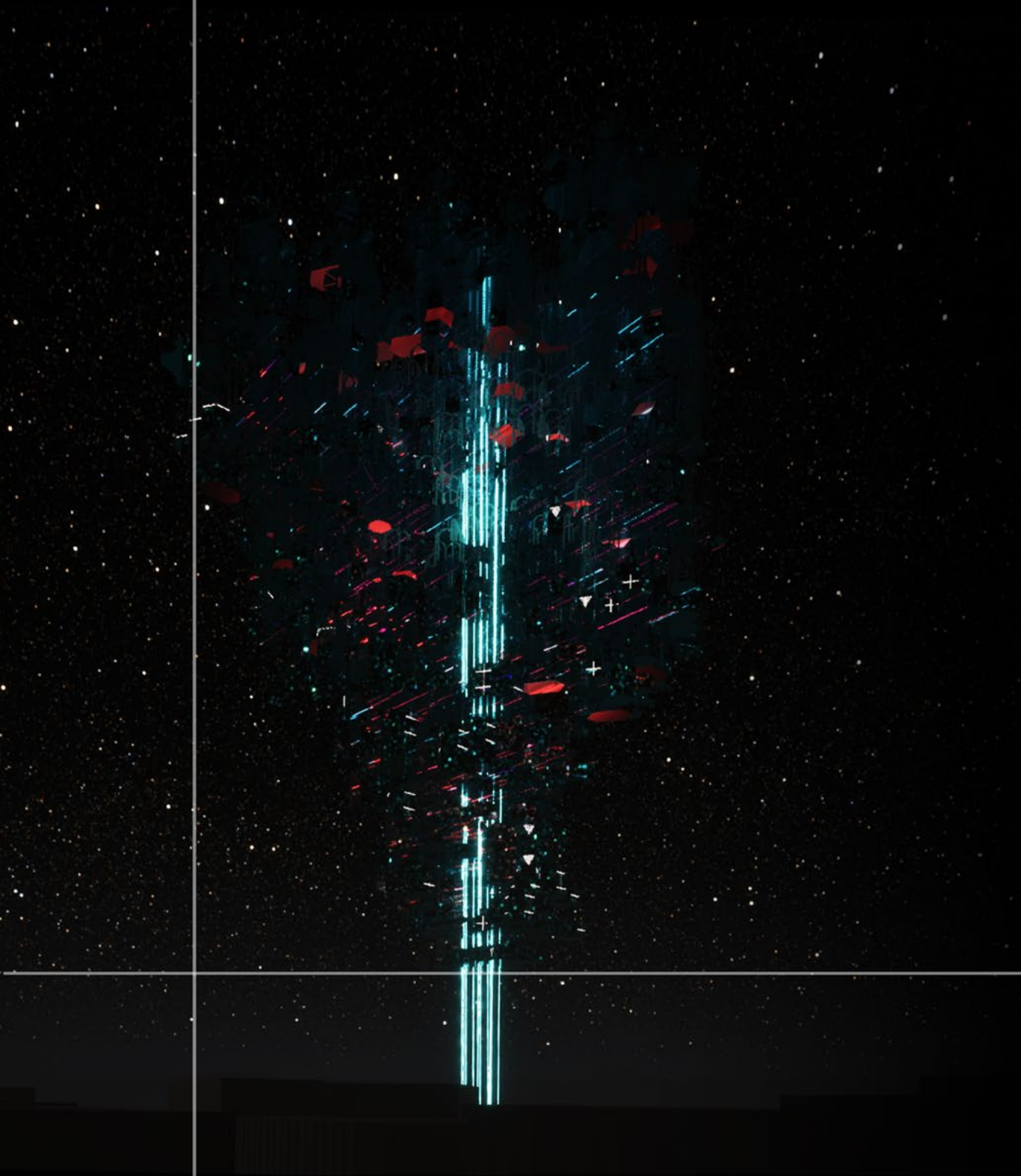


PORT FOLIO

HONGHU CHEN

Eternal Memories

——Virtual Digital Cemetery Based on Intelligent Discrete Design and Cellular Automata

Team Work

Team member: CHEN HONGHU BAO TIANNING SONG XINYI

Team work: In this project, I was responsible for the concept definition, preliminary research and analysis, the use of various algorithms in the GRASSHOPPER, all the work of the CA, the creation of the model using the virtual engine, the rendering of the renderings and the creation of the UI.

With an eye on the current situation of tight and unaffordable cemetery resources in major cities and the emotional need to commemorate the deceased, we implanted the concept of Babel Library, and through the application of intelligent discrete design and meta-automata, we intend to create a digital cemetery that combines virtual and reality, so that the living and the deceased are no longer distant from each other and memories are immortalized.

Burial History Development

In the torrent of history, human life and death has been something that human beings have been unable to control and avoid since ancient times, which gives a sacred meaning to death. From the Gypsy civilization period to modern society, a variety of ideas about death and ways to commemorate the dead have evolved.

The ancient Egyptians believed that after death one could enter the eternal world. But not everyone can get in.

The Mayans had the idea of a soul, He disappeared like a white flower, replacing the idea of a soul with a visible physical phenomenon and giving it a flower-like shape.

On the issue of death, in addition to physical torture, the ancient Greek also concerned about spiritual torture.

There has been a marked change in the attitude of actual Europeans towards death. Grief and remembrance of the dead grew heavier and heavier.

in the face of death, westerners in addition to the body, They also pay more attention to the psychological and spiritual aspects.

With the advent of the Internet and the sudden onset of the pandemic. Cemeteries are rapidly saturated and crowds are not easy to gather, so online funerals are being developed.

Perhaps the future of burial will shift to digital burial, with data storage centers that retain memories and belongings of the deceased.

The Three Deaths

Physiology

The first is when the body ceases to function,death is declared at the physiological level.

Sociology

The second is when the body is consigned to the grave,which means that the person has lost social attributes.

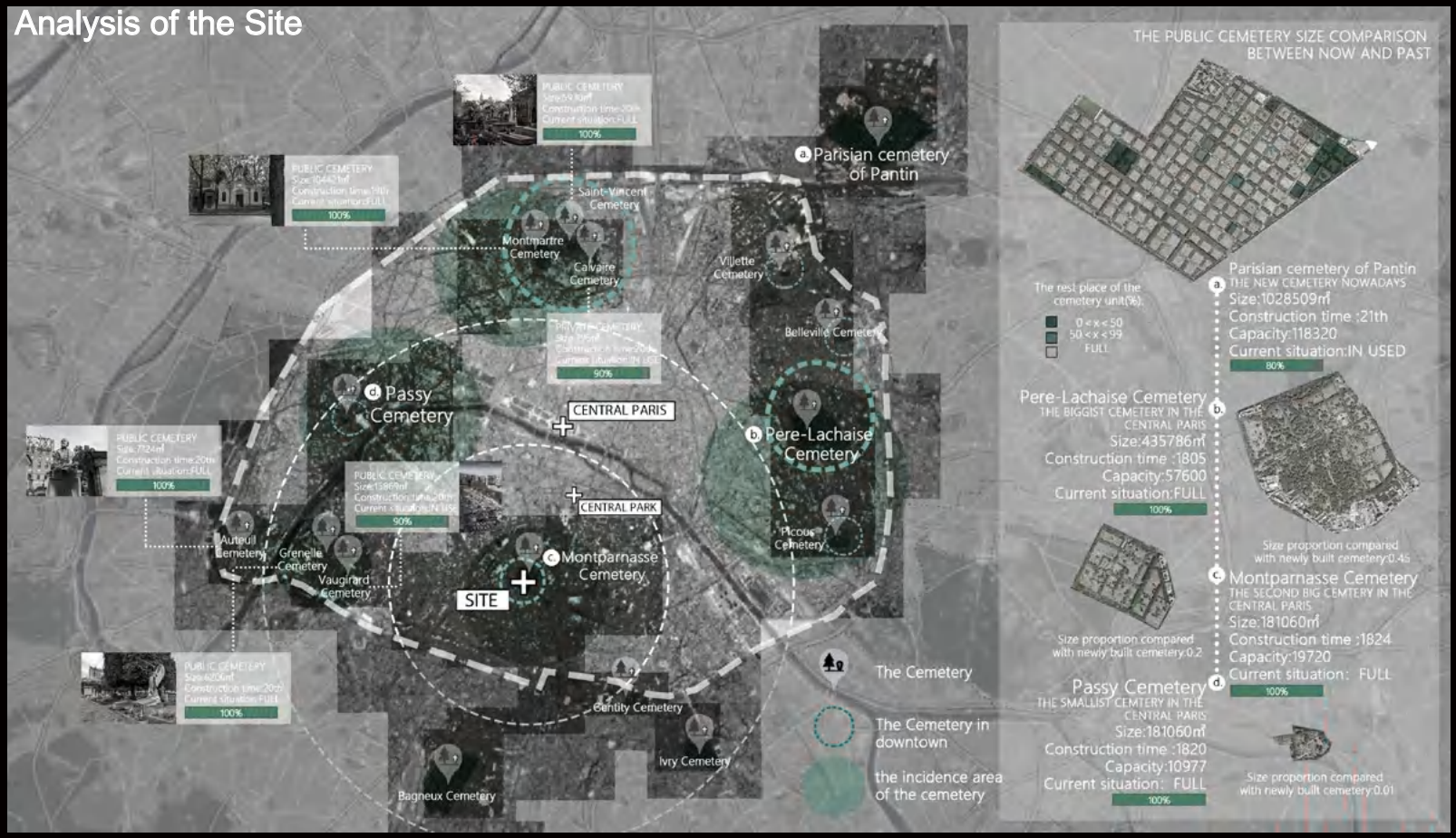
True Death

The third is that moment,onetime in the future, when your name is spoken for the last time.

Present Situation of the Cemetery

As European cities have a profound funeral culture, many celebrity are buried in the cemeteries and make the cemetery more likely to be a CELEBRITY MUSEUM and CITY GARDEN. As a result, the local residents like to take a walk and get relaxed in the cemetery. Also, visitors come to the Paris can feel the native humanities culture in the cemetery.

Analysis of the Site



We chose the Montparnasse Cemetery in Paris, France as the site, where has a very special religious culture and rich humanistic feelings. We are trying to find a way to solve the cemetery land bust problem and make it affordable even become a place which can store a person's life value forever.

European Population Data

According to the survey, the population broke out in the middle Ages after the plague and war. Up to now, we have been in the peak of death, the supply and demand situation for cemeteries is getting tougher.

Progect Concept

Physical death is not the end of a person's life, and the three main data stores in the virtual part of the digital cemetery can preserve the experiences the deceased wanted to leave behind, leverage the digital legacy on social platforms, and create better mourn spaces to perpetuate the presence of the deceased and avoid a third death.

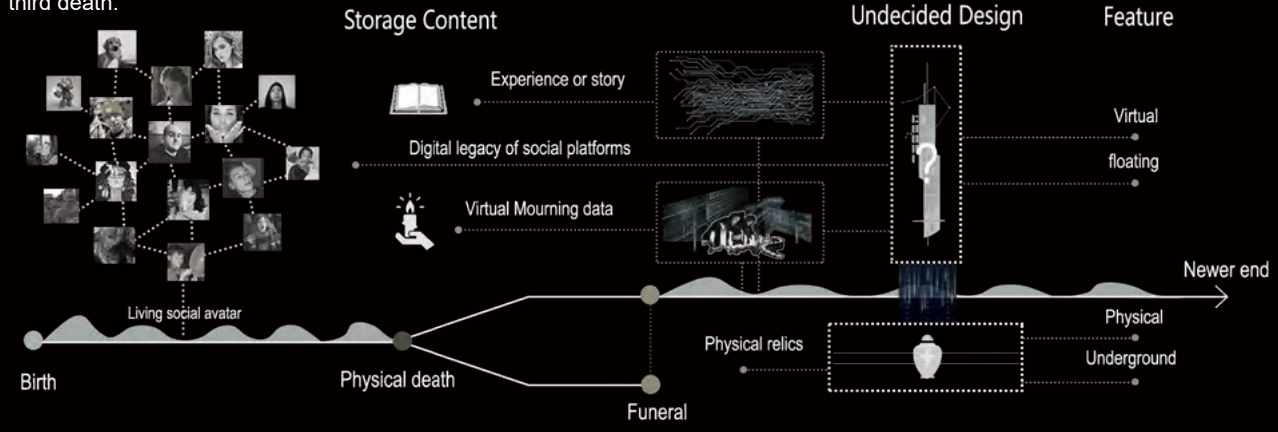


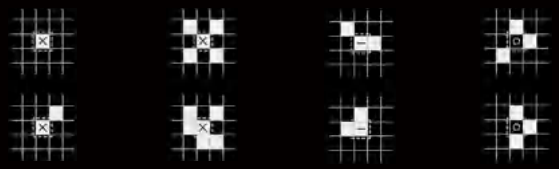
Figure Ground

Montparnasse Cemetery is located in the center of Paris, and its architectural texture is rich in the characteristics of classical French gardens, with a strong cultural atmosphere.

Cellular Automata

The CA mechanism has the ability to simulate the spatio-temporal evolutionary process of complex systems and also provides an organic method for cell expansion. Based on the basic rules of CA, we use the rabbit plug-in to iterate the cells layer by layer, transforming them from 2D to 3D, resulting in an infinitely scalable tower of discrete memory cells.

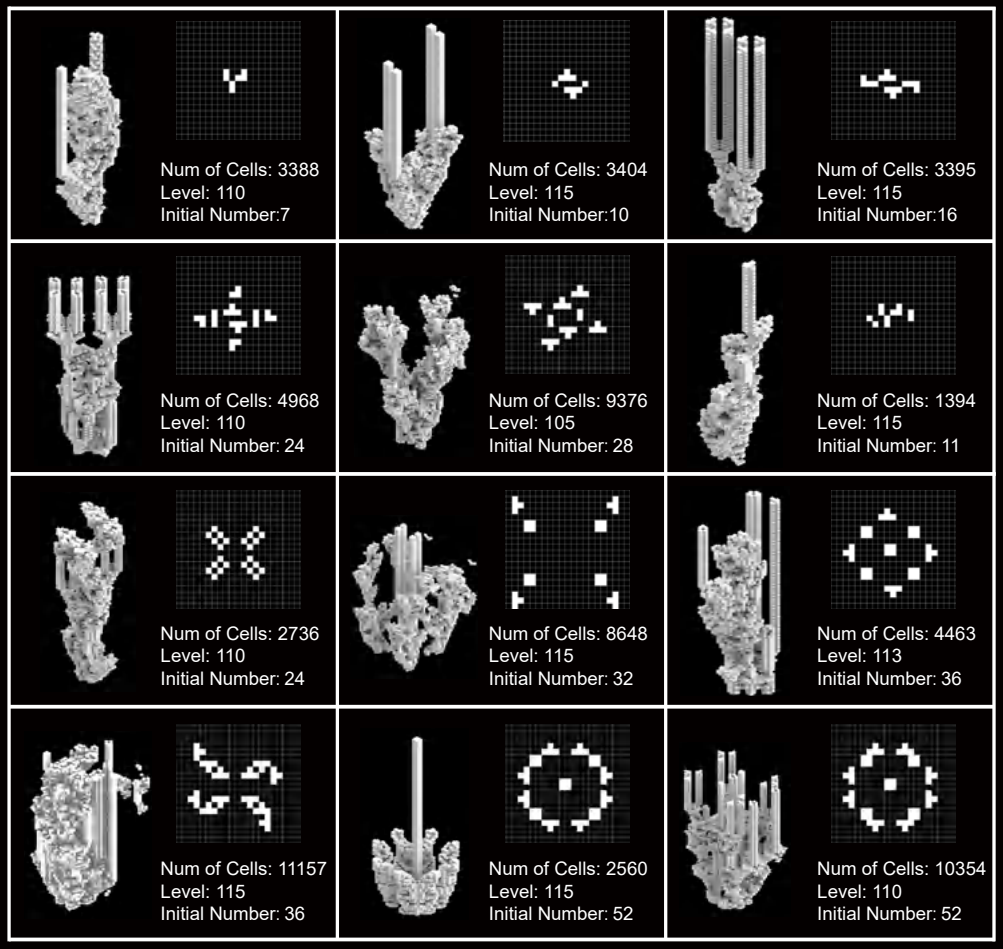
Inventor: Stanistaw Marcin Ulam



LONGLINESS OVERPOPULATION KEEP REPRODUCTION

Alternative Unit Towers

We experimented with individual morphological data storage cell towers. In addition to the initial point position, we set various factors affecting cell growth such as cell mortality, survival rate and growth rate, and after dozens of experiments we obtained the 12 alternative cell tower forms in the table below.



Num of Cells: 3388
Level: 110
Initial Number:7

Num of Cells: 3404
Level: 115
Initial Number:10

Num of Cells: 3395
Level: 115
Initial Number:16

Num of Cells: 4968
Level: 110
Initial Number: 24

Num of Cells: 9376
Level: 105
Initial Number: 28

Num of Cells: 1394
Level: 115
Initial Number: 11

Num of Cells: 2736
Level: 110
Initial Number: 24

Num of Cells: 8648
Level: 115
Initial Number: 32

Num of Cells: 4463
Level: 113
Initial Number: 36

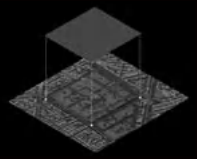
Num of Cells: 11157
Level: 115
Initial Number: 36

Num of Cells: 2560
Level: 115
Initial Number: 52

Num of Cells: 10354
Level: 110
Initial Number: 52

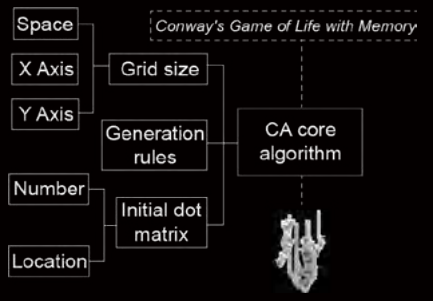
Generation Logic of Virtual Boundary

Grid: X=36, Y=39
Unit : 10m*10m



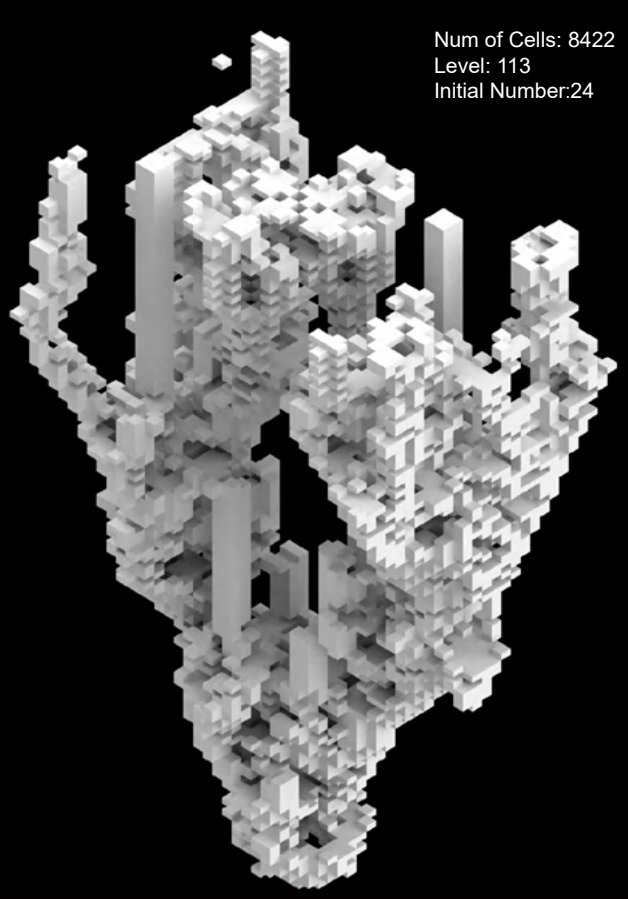
Initial Growth Rules:
1. If surrounding cells< 2, cells will die.
2. If surrounding cells> 3, cells will die.
3. If surrounding cells = 2 or 3, cells will survive.
4. If surrounding cells = 3, cells will reproduce.

Selection Principles:
1. Meet the infinite growth of cells.
2. If layers > 110, cells should > 5000.
3. The recurring cell layers should not > 20.
4. If layers > 5, cells in any layer should < 10.

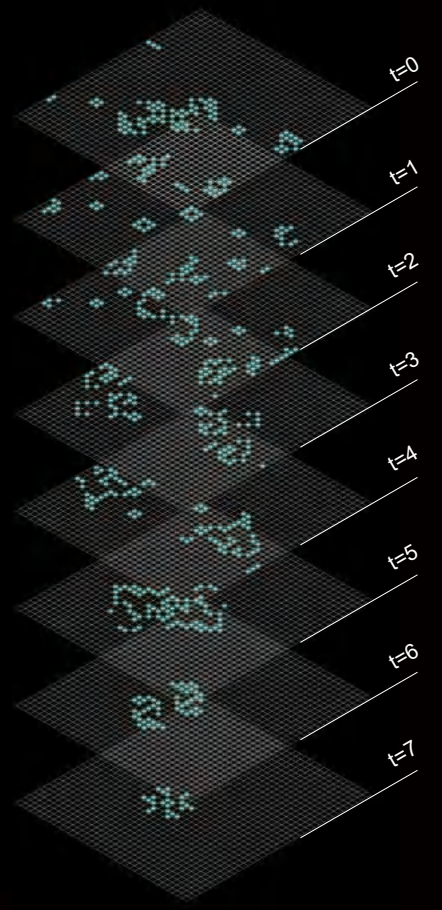


Determination of Unit Towers

Based on the rules, we selected the final unit tower structure shown below to serve as the outer boundary that houses the functional monoliths and combinations, the shell of the suspended virtual part. The structure has an overall inverted triangular shape and its imagery is based on Christian religious elements. It has a tendency to grow upward and can expand indefinitely, providing a structural basis for the infinite growth of cells.



Num of Cells: 8422
Level: 113
Initial Number:24



Cemetery

An exploration of the open and closed nature of hexagonal spaces, with different sides treated as open or closed, the dotted line indicating open without walls and the solid line indicating with walls. When one

FUNCION	UNIT	IMAGERY	AXON
ROOM			
CORRIDOR			
WALL			

FUNCION	UNIT	IMAGERY	AXON
WALL			
SQUARE			
STAIRS			

Theoretical Principles

Borges described the Babel Library as a series of interlocking hexagons, each with four bookcase walls and two walls leading to the next cell. Architecture certainly has an iterative quality, like books in a library, which can be endlessly repeated by hexagons, Inspiring reverence for the God who created them and despair for the lives trapped within.

But this is only possible if the hexagon has two openings each, otherwise the structure will end at its first join. Open the fifth wall as another passageway to allow for the endless continuity of his labyrinth. People may be no more than a bookshelf away from others that they will never be able to reach.

Unit Selection

we experimented with the combination of triangles, squares and hexagons, and finally chosen the hexagon as the base form for our proposal.

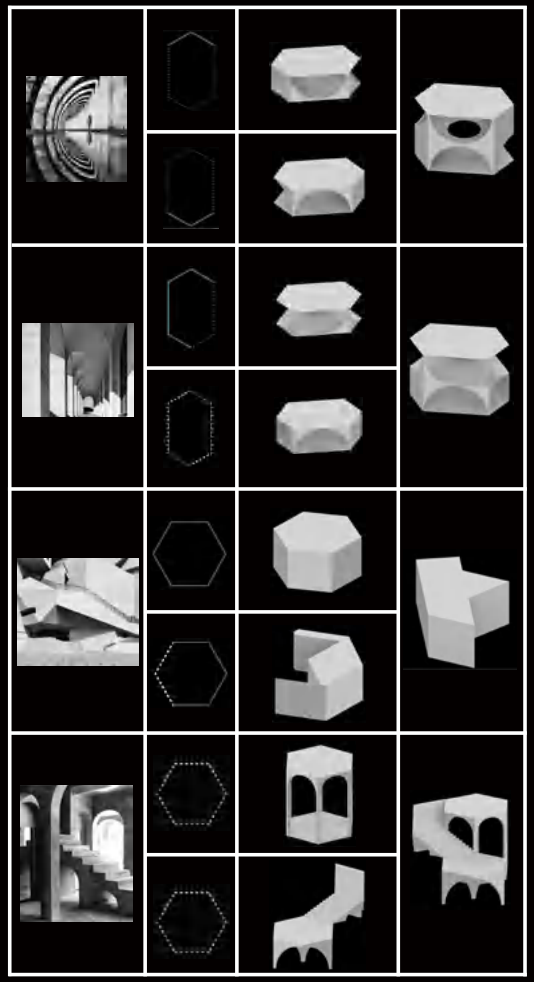
Triangular

Square

Hexagon

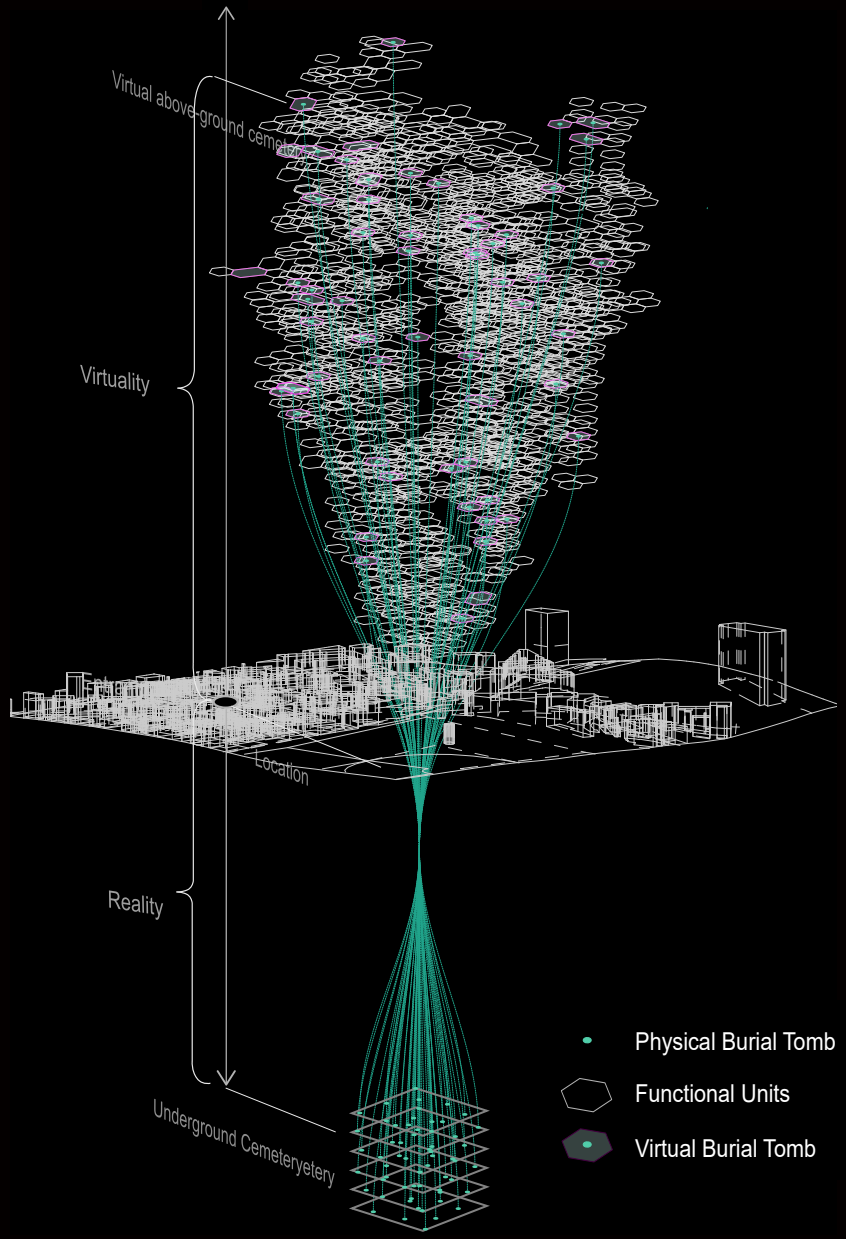
Composite Monomers

We made combinations of the simple monoliths and have selected the following monoliths with diverse functions.



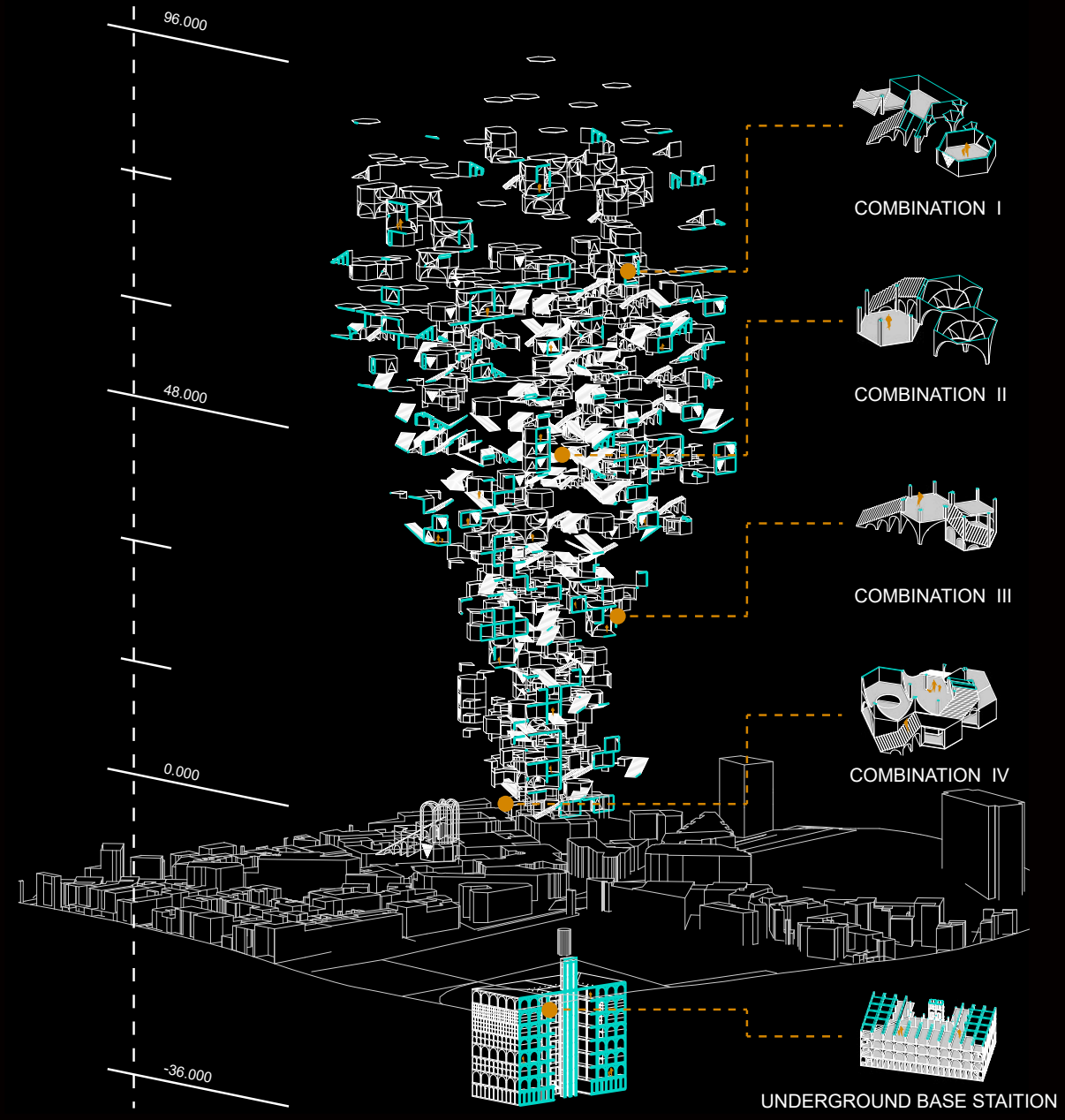
Structural Components

The project is made up of two main components: a physical underground and a virtual above-ground space.The physical part of the ground floor is mainly responsible for the physical functional spaces such as the transfer to the virtual space and the equipment rooms, While the above-ground virtual space is mainly responsible for the tributes, memories and visits during the tomb sweeping process. People entering the underground space can be transported to the suspended virtual space through the technical medium.



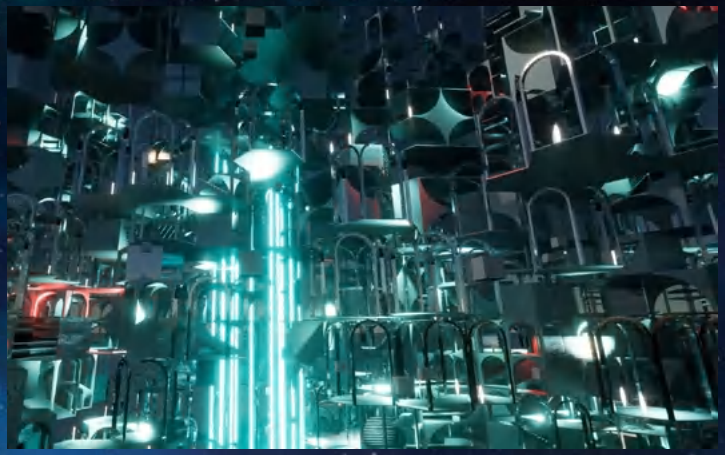
Profile

The sections show mainly the structure of the solid part of the ground floor and the virtual part of the ground floor. Virtual space above ground has no limit to the number of levels, which can grow indefinitely according to demand. The ground floor is divided into eight levels, with the first level being used for reception and conveyors, and the second to seventh levels for the belongings of the deceased, which families can choose to enter to pay their respects. The eighth basement level is mainly used for equipment rooms.



Effect Demonstration

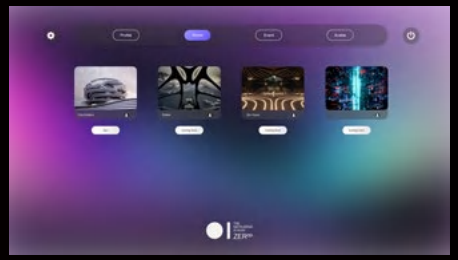
The upper virtual space is only visible to those who enter the confines of the cemetery and its appearance displays different effects at different times of the day. During the day it is predominantly white stone and at night it is predominantly metallic, creating a different atmosphere through the different textures, solemn and dignified during the day and shining like stars at night, bringing comfort to the families of the deceased. The central pillar of light reaches up to the sky, signifying the soul of the deceased entering heaven and bringing comfort to the family of the deceased.



Experience Route

Information Login

LOBBY



Select the Scene

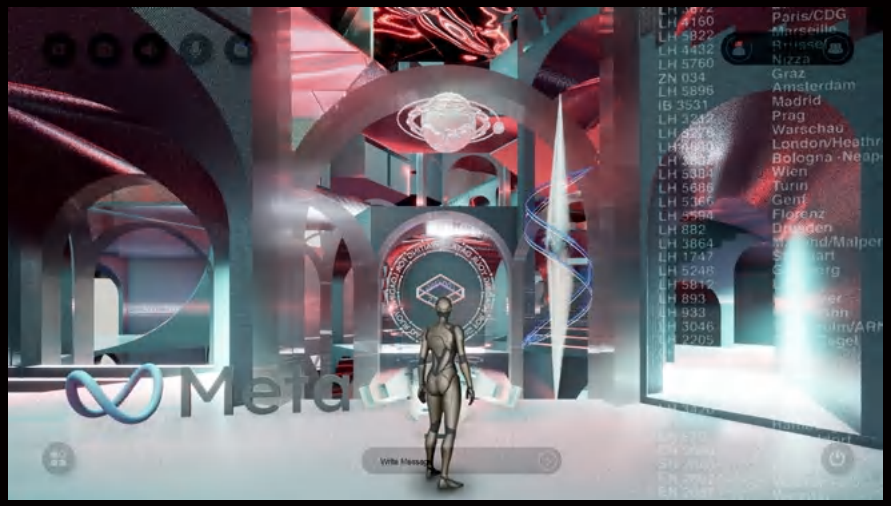
Mourning space, when used it will darken and the circular sphere will project a virtual image message of the deceased.

ROOFTOP

Vertical traffic spaces, which isbetween the units of the chambers and creating a variation of paths and perspectives.

COURTYARD

The public square area serves as a link between horizontal and vertical traffic spaces.



TRANSMISSION

ROOMS

CORRIDOR

Teleportation center, where people can travel through different spaces through teleportation points.

Viewing pavilion, mourning niche, private cemetery space for people in the virtual cemetery.

Memory corridor, a longitudinal corridor, with digital assets playing on both sides in a loop.

Urban Voyeurism

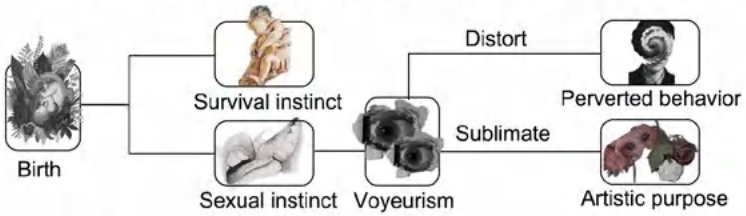
—— *The Urban Public Art Space Design Based on The Theory of Voyeurism*

Individual Work Completion Date: Dec. 2022

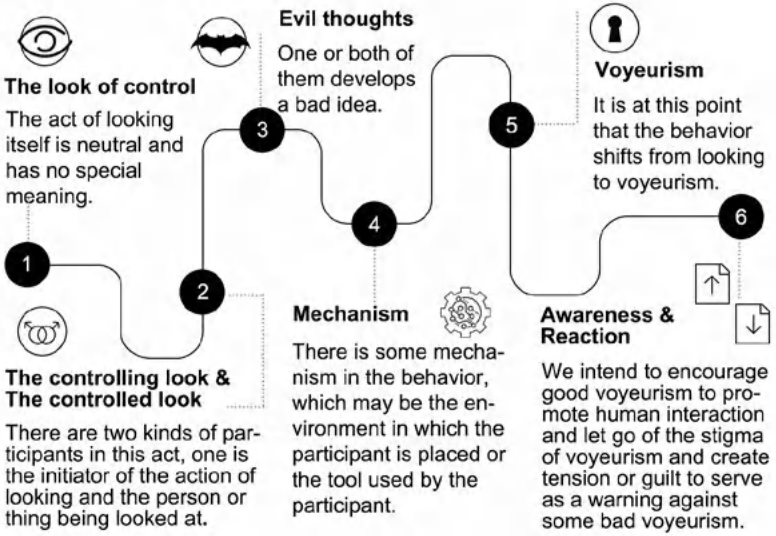
Nowadays, our society has become a landscape and consumer society in which people's desire for voyeurism is infinitely rationalized and amplified. In this project, I explored the inner causes of the phenomenon, critically reflect on it, and designed the mechanism of positive and negative voyeurism in public space with the intention of provoking people to think about voyeurism.

Related Concept

The term voyeuristic desire first appeared in Freud's work Three Essays on Sexuality, he believed that the "voyeuristic desire" is a human being that originates from the sexual instinct, one of the two basic human instincts. The voyeuristic desire may allow some of the Libido to point to higher artistic purposes sublimated into art while it also may be distorted into perverted behavior.



Redefining of Voyeurism



Film Interception

We classify the mechanisms of voyeurism into three categories based on the degree of isolation of the voyeur's location, the concealment of the voyeur's location, and the visibility of the voyeur, and search for relevant film and television materials to analyze their spatial relationships to further explore the mechanisms underlying voyeurism.

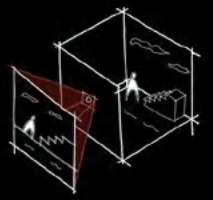
Type 1

The peeper and the peepee are located in two isolated spaces and rely on some kind of medium to achieve peeping, such as surveillance or double-sided mirrors.

Controlling Look ●●●●○
Look of Control ●●●●●
Controlled Look ●●●●○

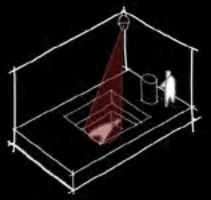
Fanfan (1993)

The truman show (1998)



Unfriended (2018)

Dark Web (2018)

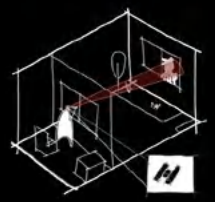


Type 2

The peeper and the peepee are shielded by a medium, with one side in a more private and undetectable location and the other more open, thus enabling peeping.

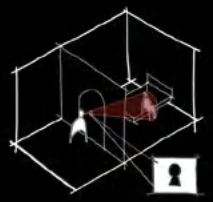
Controlling Look ●●●○○
Look of Control ●●●●○
Controlled Look ●●○○○

Rear Window (1954)

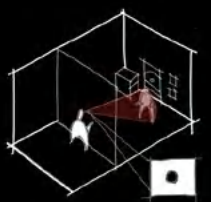


Body Double (1984)

Crimson Peak (2015)



Psycho (1960)

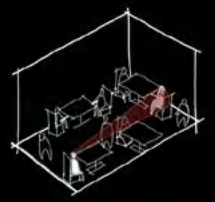


Type 3

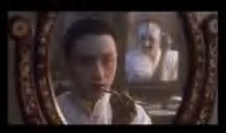
There is no specific occlusion between the peeping parties, but rather the peeping is achieved through various environmental elements, such as reflection or height difference.

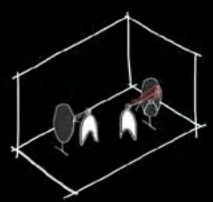
Controlling Look ●●●○○
Look of Control ●●○○○
Controlled Look ●●●○○

Vertigo (1958)

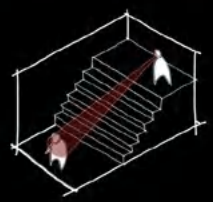


Farewell My Concubine (1993)

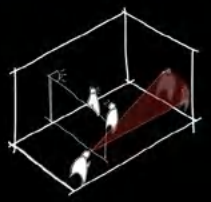




Joker (2019)



The Wild Goose Lake (2019)

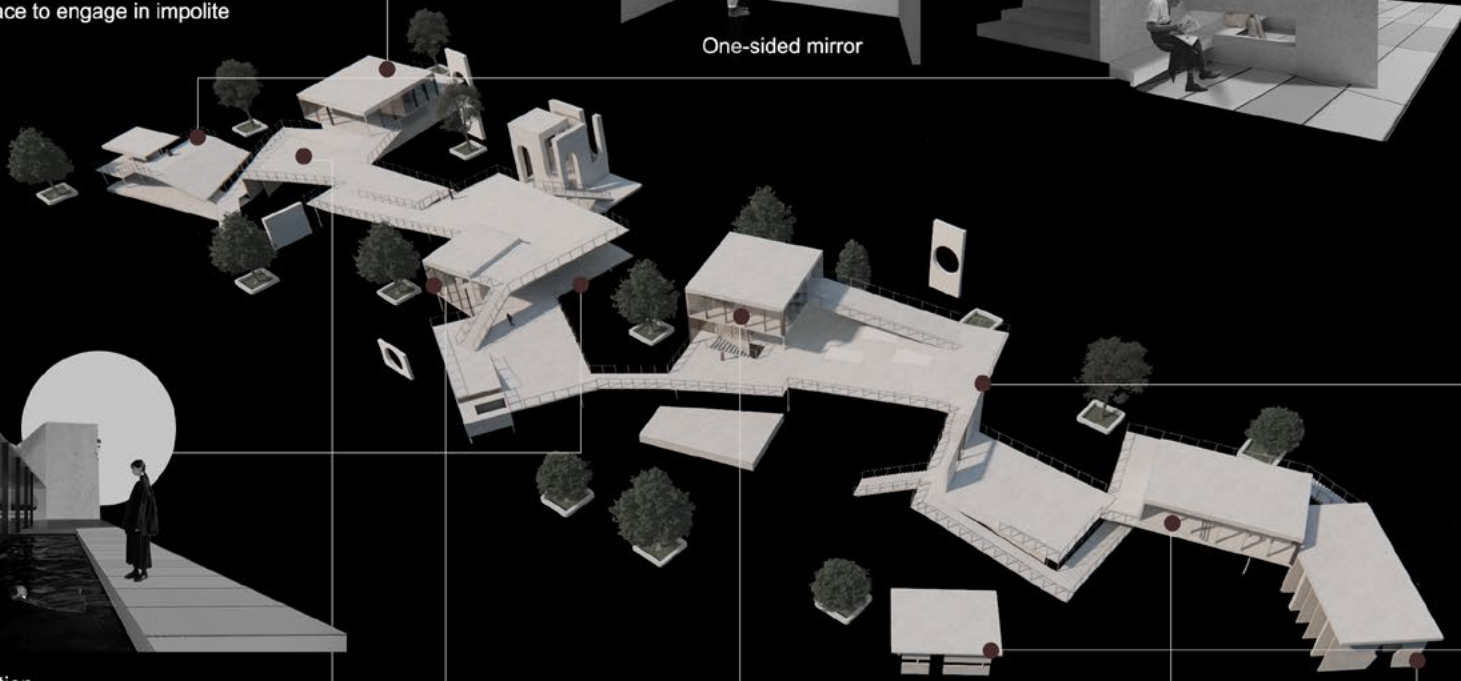


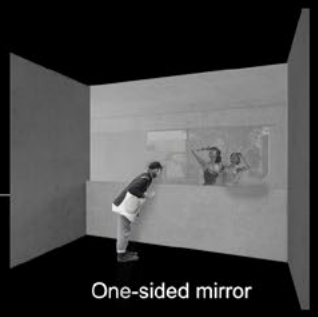

Mood Board

Bird's–eye View

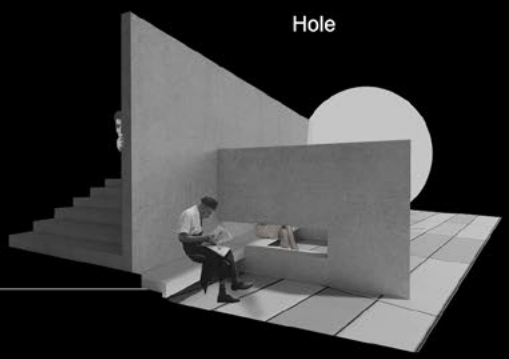
Space Experience

People can experience all kinds of spaces related to voyeurism, both positive and negative, in this public space. Walking in it, people may be both the voyeur and the voyeurized.
In spaces such as public stage, people are encouraged to show themselves while creating a good sense of viewing, while in some spaces, people run the risk of being discovered if they rely on the mechanisms in the space to engage in impolite voyeurism.

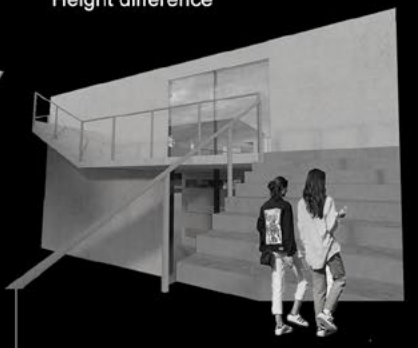




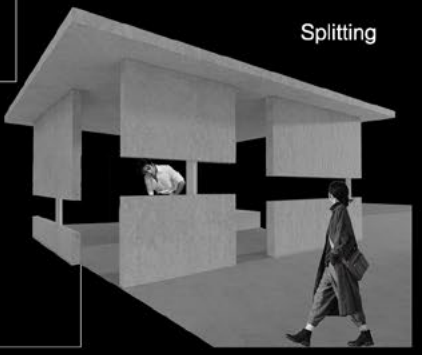
One-sided mirror



Hole

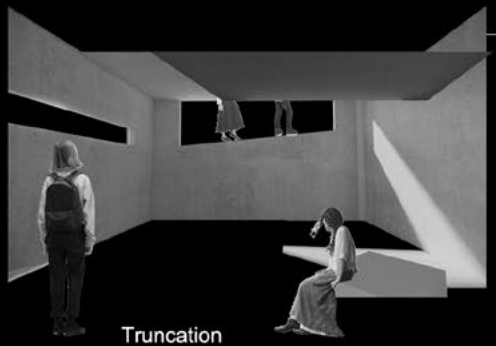


Height difference



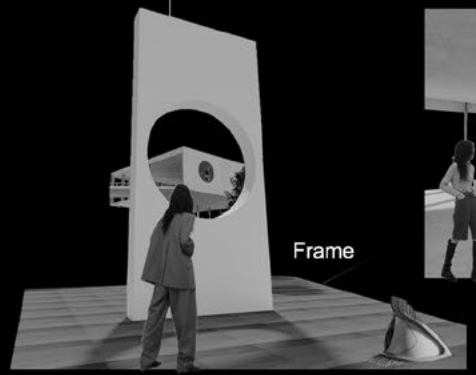
Splitting

Reflection

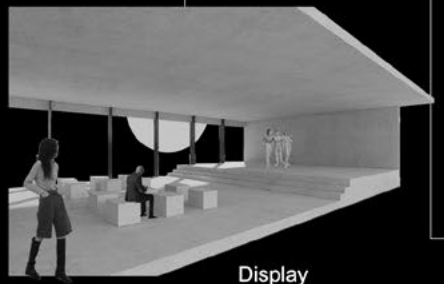


Truncation

Corridor



Frame



Display

Lock hole

Mountain & Gorge

The Fourth Phase of Baiyang Resettlement Housing Project in Yichang High-tech Zone

Professional work *Supervisor: HUANG LI*

Team work: In this project, I was responsible for preliminary background research, assisting in building models, drawing renderings and master plan.

This project is the fourth phase of Baiyang resettlement housing project, located in Zhijiang, Yichang City, Hubei Province, China. The project aims to create a humanized ecological residential area by taking advantage of the environment and traffic, following the mountainous terrain, adopting a terrace layout, and combining the current topography to avoid valleys and high-voltage corridor sites.

Basic Planning

Planning Structure

- Core Area
- Residential Group
- Landscape Axis
- Humanistic Vitality Axis

Traffic Flow Line

- City Road
- Driveway
- Underground Entrance/Exit
- Main Entrance
- Secondary Entrance

Static Traffic

- Underground Area
- Ground Parking
- Underground Entrance/Exit
- Non-motorized Parking

Bird View

Perspective

Cultural Activity Center

Community Kindergarten

Core Area Plan

(Y!)IMBY

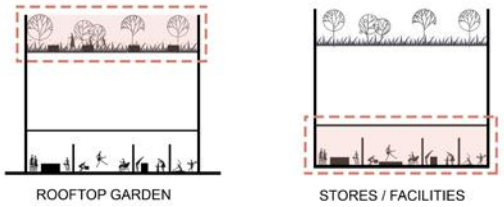
——*Adaptive Pre/Re Use Affordable Housing*

Individual work Supervisor: Julia Sulzer
Completion Date : Jan. 2024

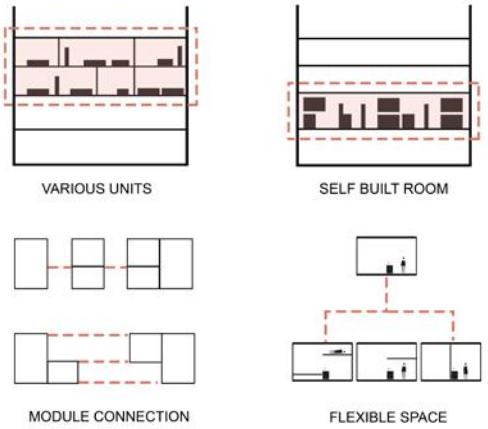
Facing Koreatown's housing affordability crisis and limited housing options, our initiative seeks to create sustainable, inclusive living spaces. We're transforming underutilized areas into affordable housing that blends with community services, fostering an (Y!)IMBY approach to urban development. This project offers a mix of housing types for diverse needs and dedicates ground and top floors to community activities, promoting interaction and cohesion within Koreatown.

Conceptual Drawing

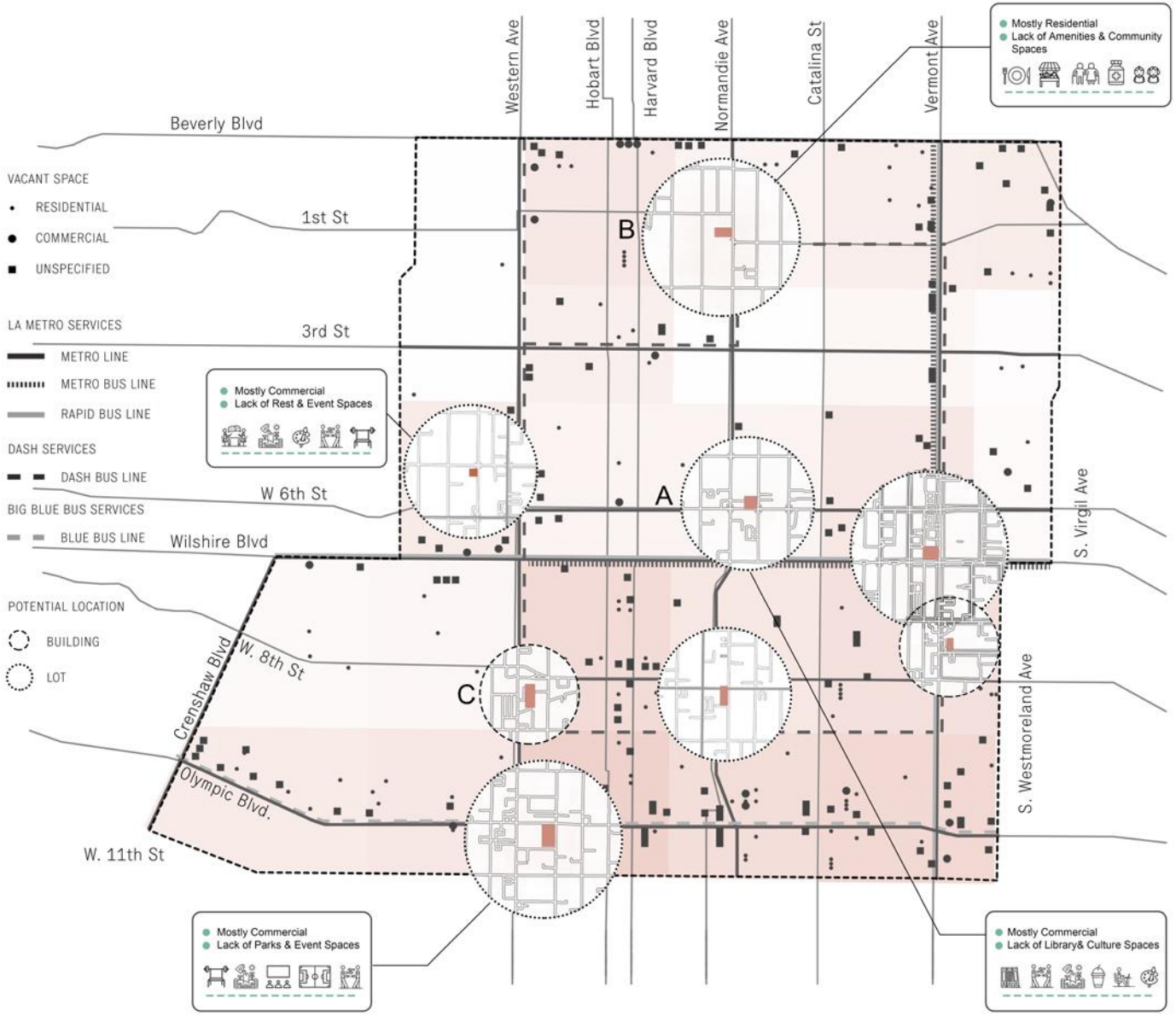
To The Public



To The Resident

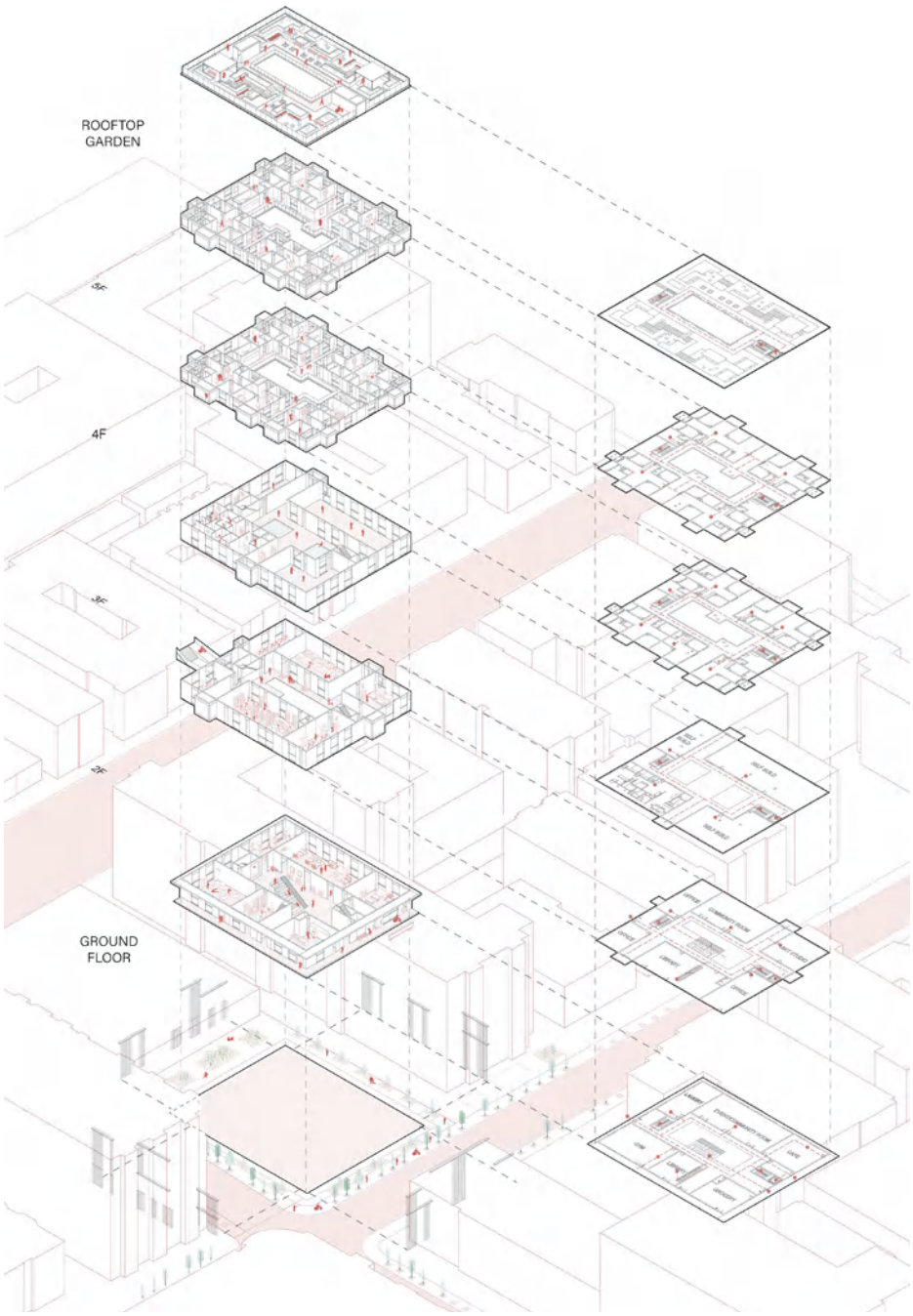


Urban Scale

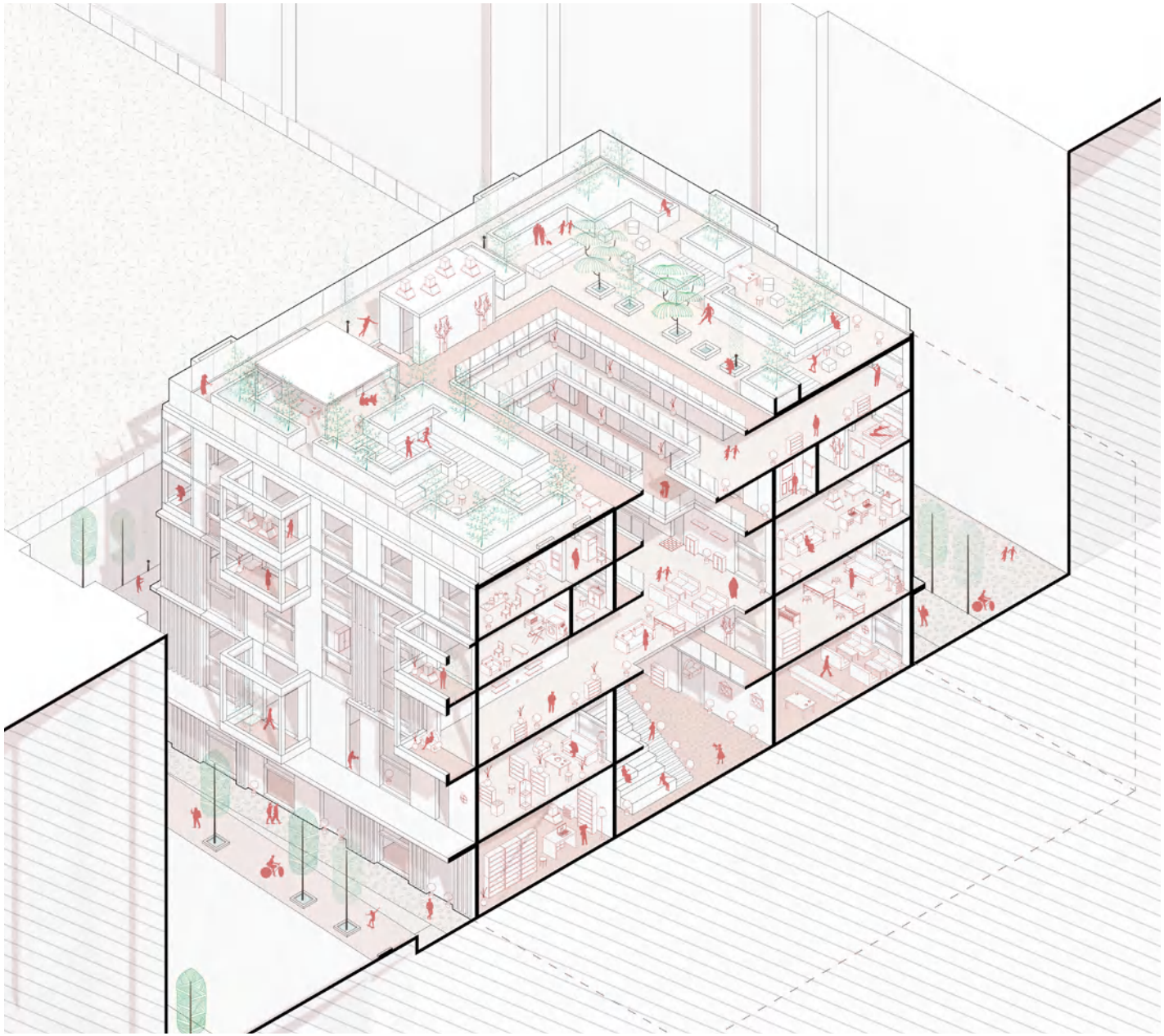


Public Benefits

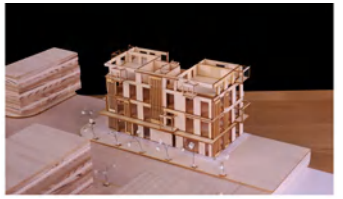
Exploded AXO

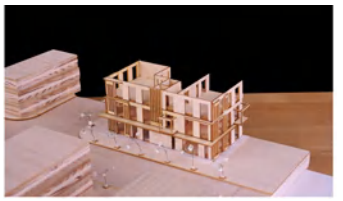


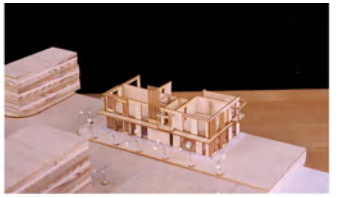
Perspective



Axonometric Section







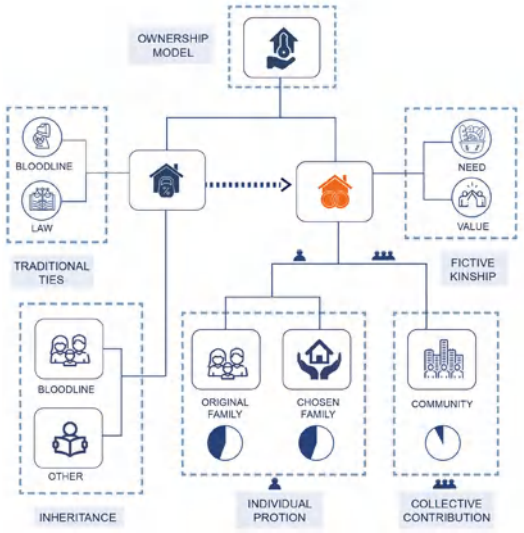
Beyond Traditional Ties

——*Affordable, Flexible and Inclusive Dwelling Arrangements for a Multitude of Familial Steups*

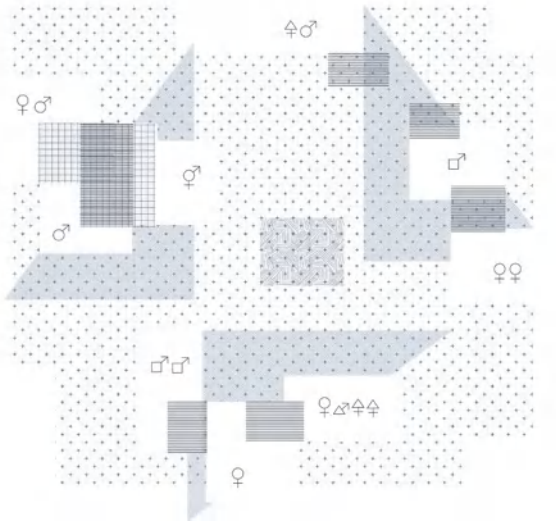
Individual work Supervisor: Sascha Delz
Completion Date : May. 2024

This project focuses on how social setups beyond the nuclear family can foster innovative forms of ownership and living frameworks, to move beyond conventional family housing. Drawing from traditions of communal living examples such as the Chinese Tulou, Sumatra's long houses, or the Shabonos of South America, it proposes a design strategy that can deliver a greater variety of dwellings for both traditional and chosen families. Within the dense and multicultural neighborhood of LA's Koreatown, it therefore redefines the omnipresent normative typology of the stucco box to offer more diverse spatial setups and stimulate the potential of prevalently underutilized collective spaces and courtyards. Rather than demolition or simple renovation, the project seeks to revitalize these buildings into flexible co-living spaces, offering room for diverse familial setups, creating useful shared spaces outside of their dwelling units and thus supporting living arrangements within and beyond traditional ties.

Ownership

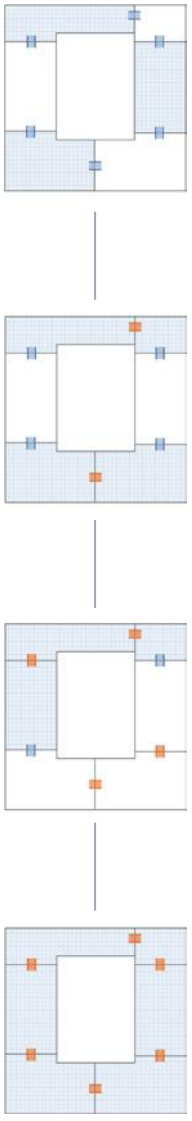


Dwelling

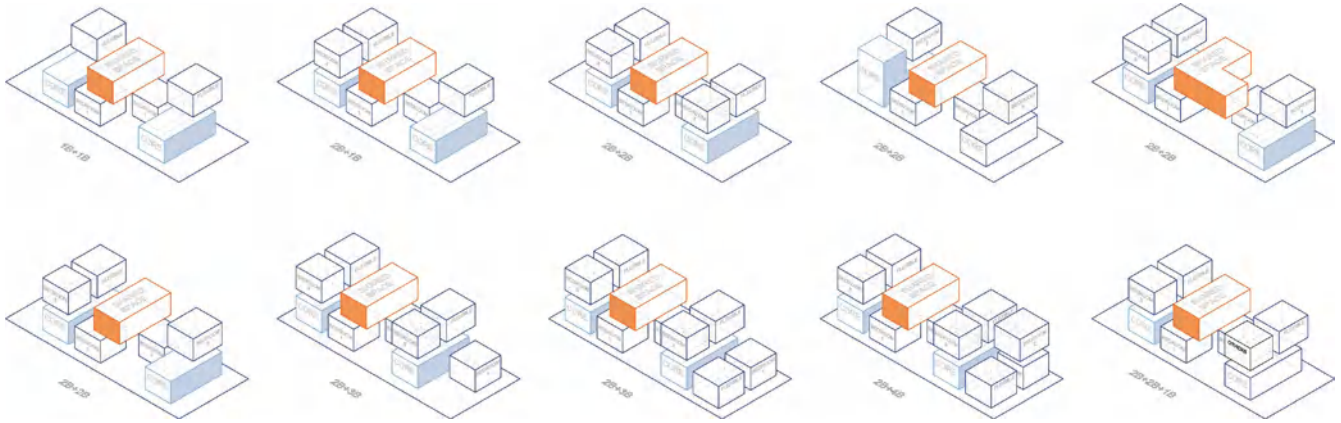


Stucco Box

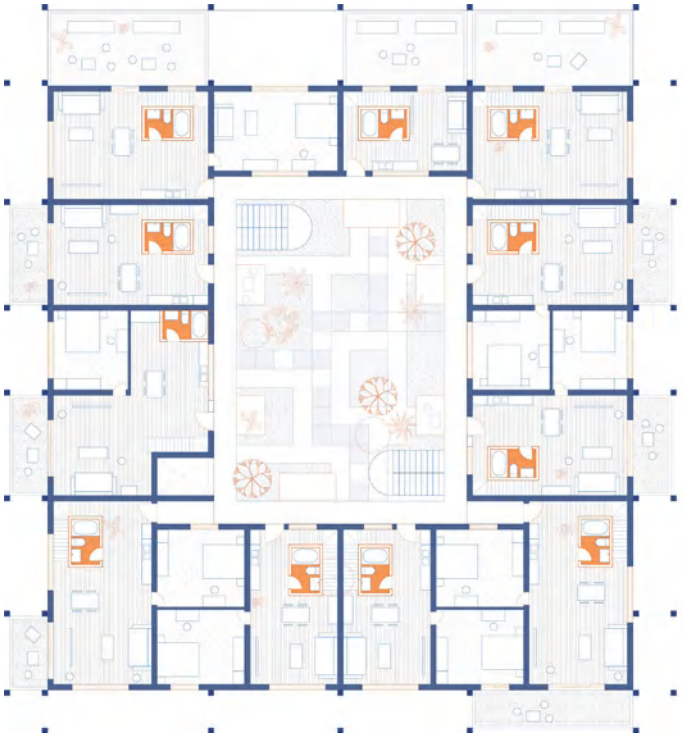
Connection



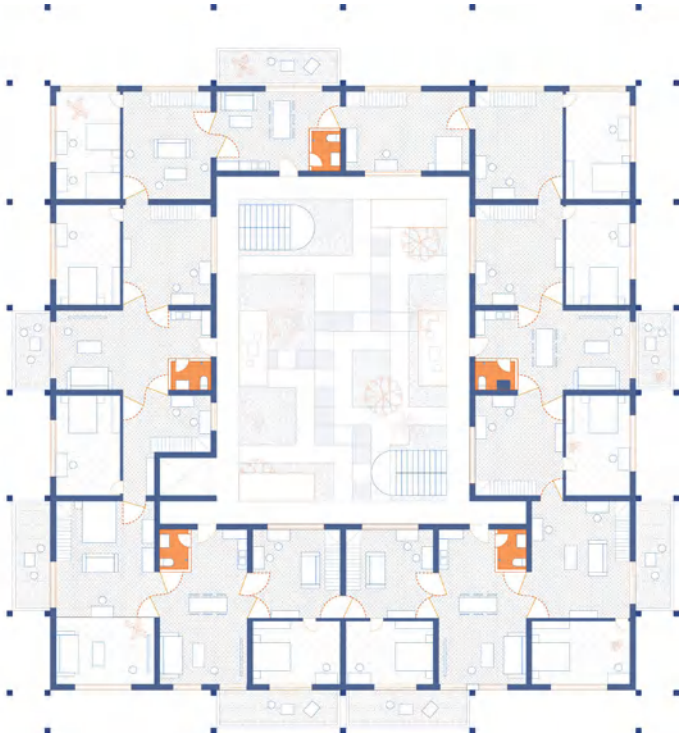
Typology



Floor Plan

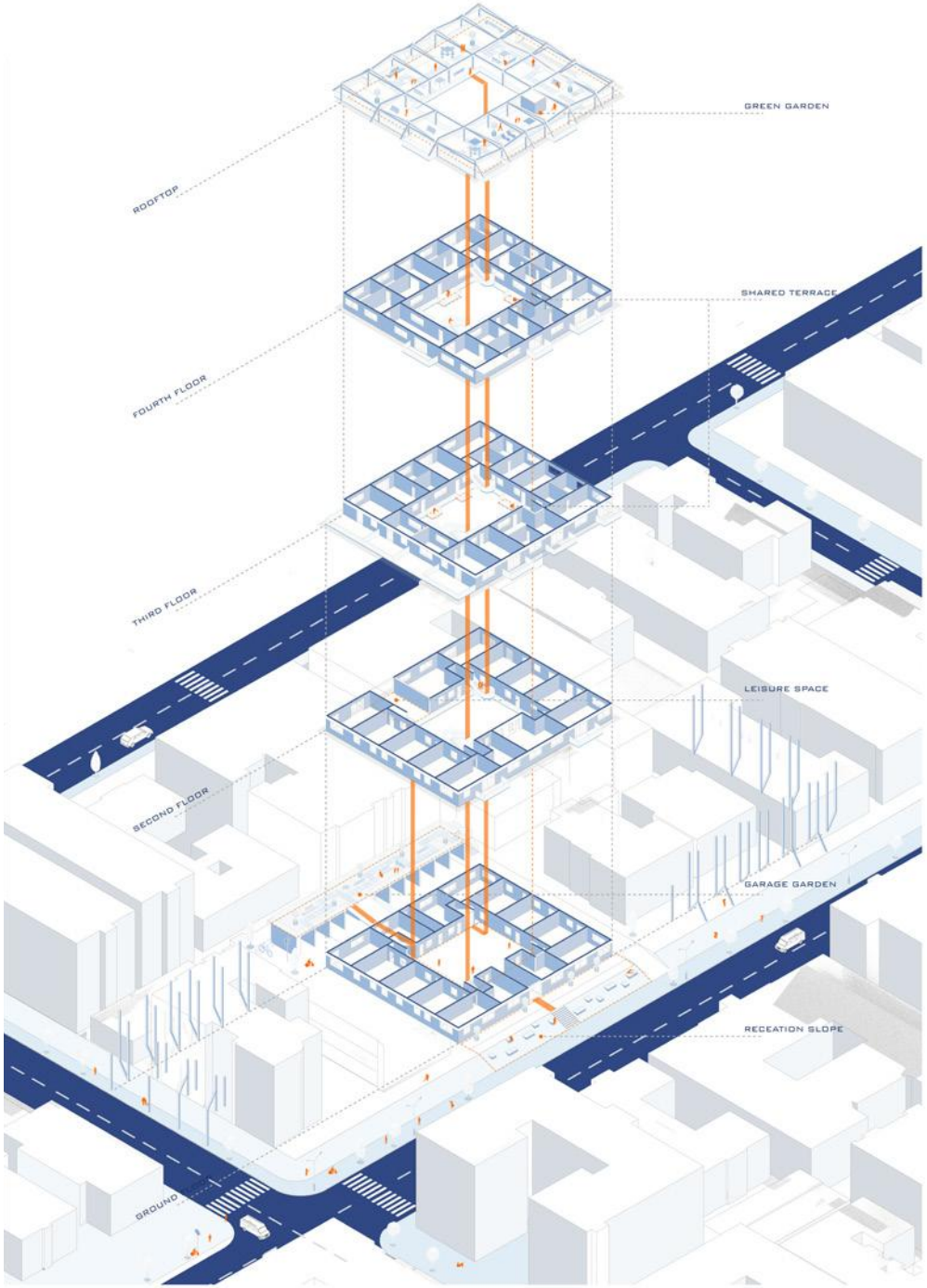


3F



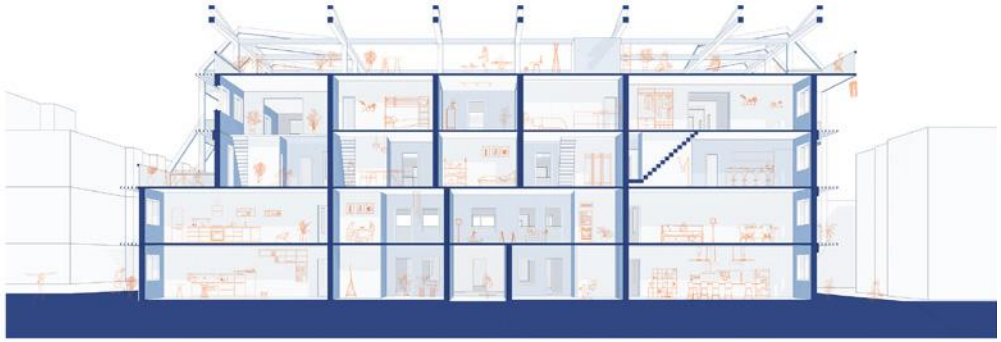
4F

Exploded AXO



Perspective

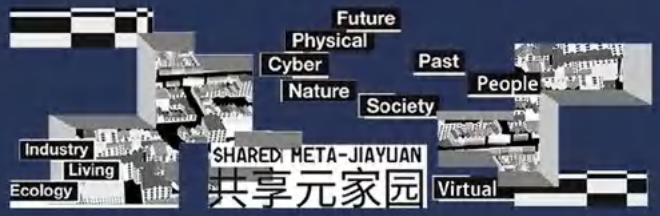
AXO Section



Meta Community

—— *Urban Renewal Design of Jinan's Old Commercial Port Based on Shared Meta-JiaYuan*

Individual Work Completion Date: May. 2022

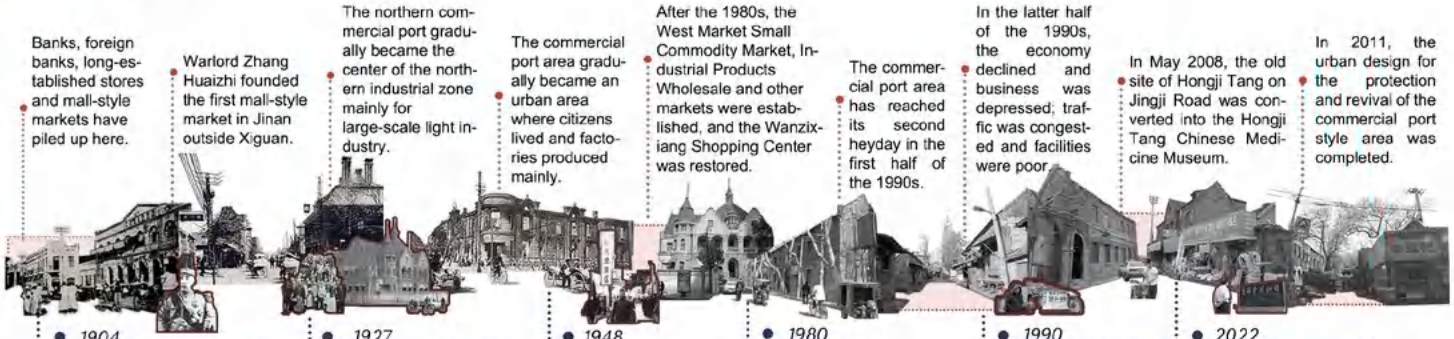


This project selects the site of the Shangbu District in Jinan City, Shandong Province, takes its deep history as the cultural background, conducts research to summarize the dilemma, and improves the harmonious sharing of physical space through strategies such as renewing the neighborhood, creating scenes, and improving transportation.

At the same time, digital virtual technology is used to make up for the lack of real sharing, to gather new ideas, to enhance the stickiness of the community, and to collaborate to create a multifaceted shared home with deep history and dynamic innovation.

Site Location

History



- Banks, foreign banks, long-established stores and mall-style markets have piled up here.
- Warlord Zhang Huaizhi founded the first mall-style market in Jinan outside Xiguan.
- The northern commercial port gradually became the center of the northern industrial zone mainly for large-scale light industry.
- The commercial port area gradually became an urban area where citizens lived and factories produced mainly.
- After the 1980s, the West Market Small Commodity Market, Industrial Products Wholesale and other markets were established, and the Wanxiang Shopping Center was restored.
- The commercial port area has reached its second heyday in the first half of the 1990s.
- In the latter half of the 1990s, the economy declined and business was depressed; traffic was congested and facilities were poor.
- In May 2008, the old site of Hongji Tang on Jingji Road was converted into the Hongji Tang Chinese Medicine Museum.
- In 2011, the urban design for the protection and revival of the commercial port style area was completed.

1904 — Self-opening Commercial Port
Jiaoji Railway was completed and opened to traffic, Yuan Shikai and others proposed to open additional commercial ports to expand profit sources.

1927 — All the Rage for A While
The commercial port area continued to expand, and Jinan's industrial and commercial status in the country rocketed.

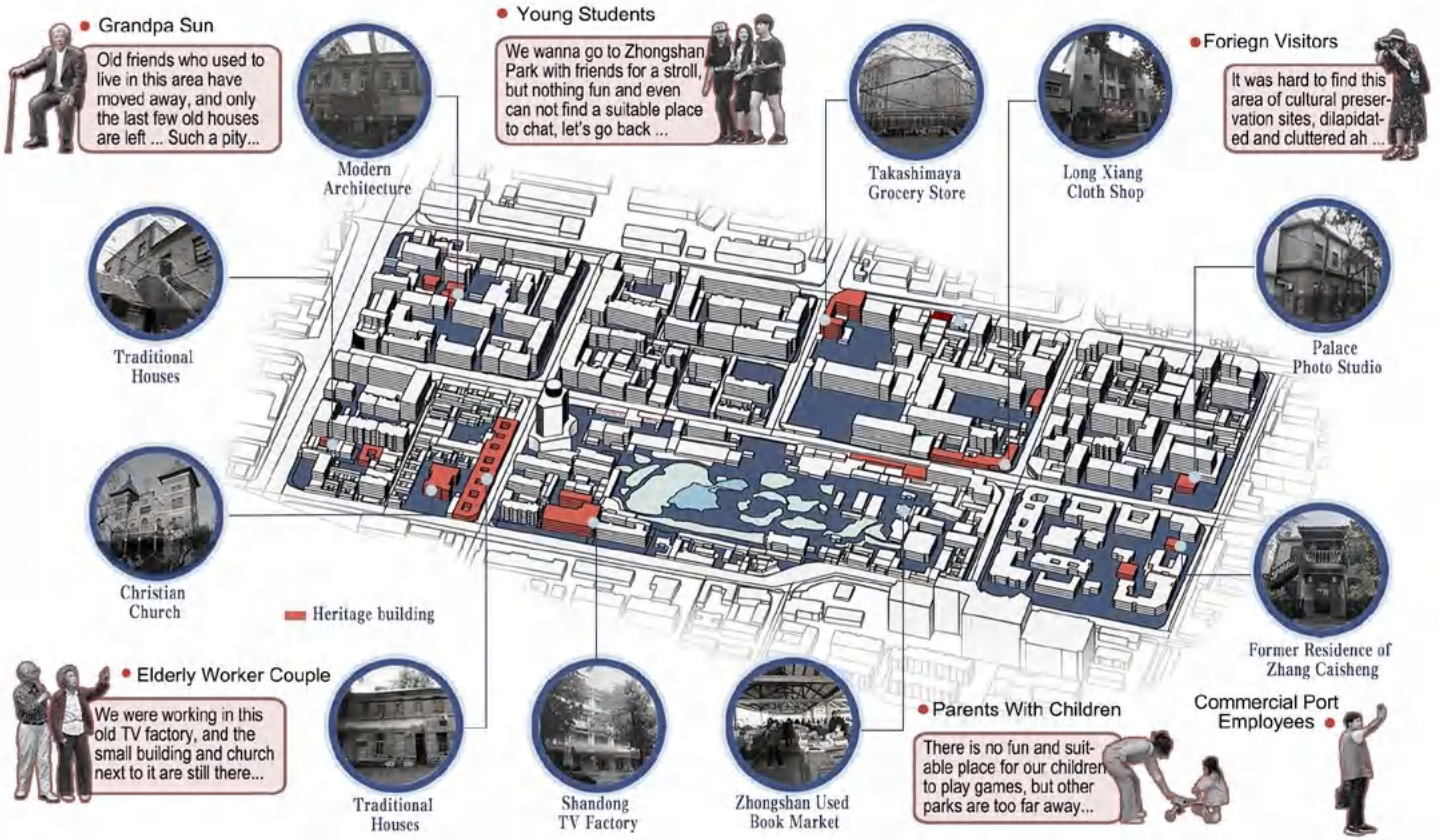
1948 — Gradual Decline
Reform and opening up, under the planned economic system, the status of the commercial port area declined.

1980 — Reopening
Commercial port area to create a market business development model The market once again showed a tendency to prosper.

1990 — Revealing Decline
After 90 years of glory, the commercial district is finally showing its age.

2022 — Commercial Port Revival
The 13th Congress of the Communist Party of China in Jinan was held, which determined the reconstruction of the Shangbu District and the orderly promotion of the renewal of the old city.

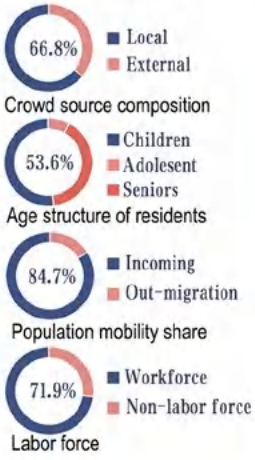
Current Perception



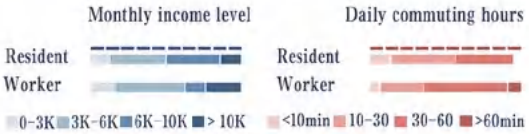
Community Characteristics

Crowd Portrait

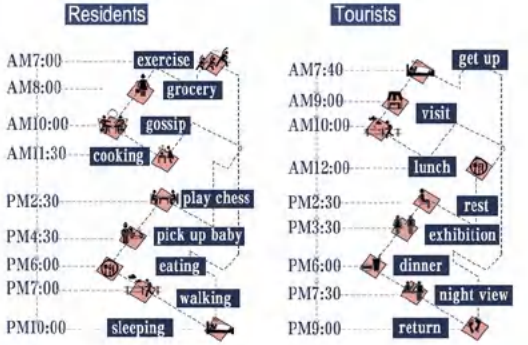
Population Data



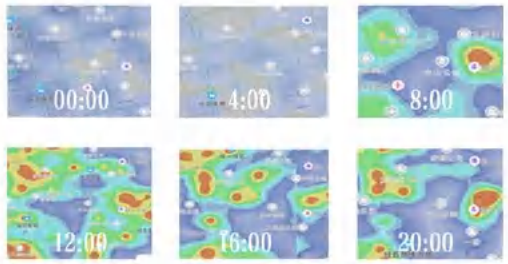
Occupation & Residence Comparison



Typical Track



Heat Map

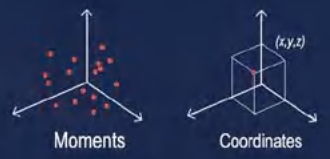


Problem Summary & Strategy Direction

Concept Introduction

There are many moments and freeze-frames in people's lives, and these moments have various elements, which may occur in any person, any place, any time.

Therefore, we can build an abstract Cartesian 3D coordinate system, and these moments are randomly scattered points in the coordinate system, while the X-axis represents Characters, Y-axis represents places, and Z-axis represents time.



Problem Sorting Out

- They represents the existing vitality points
- These are the points that could have had normal vitality but did not, representing the difference between the ideal state and reality.

Problem A:

The X axis of the point is missing , which means the percentage of teenagers and other young people in this site population is extremely low.

Cause Analysis:

- Lack of attractive nodes.
  The content of activities is single.
- Large difference in the number of day and night activities.
- Poor interaction between Zhongshan Park and its surroundings.

Problem B:

The points on the Y-axis are very fragmented, which means many spaces are with poor environmental quality.

- Lack of slow traffic system.
- Excessive traffic pressure at some intersections.
- Many buildings are dilapidated and aging Too many roads at the end of residential
- areas.

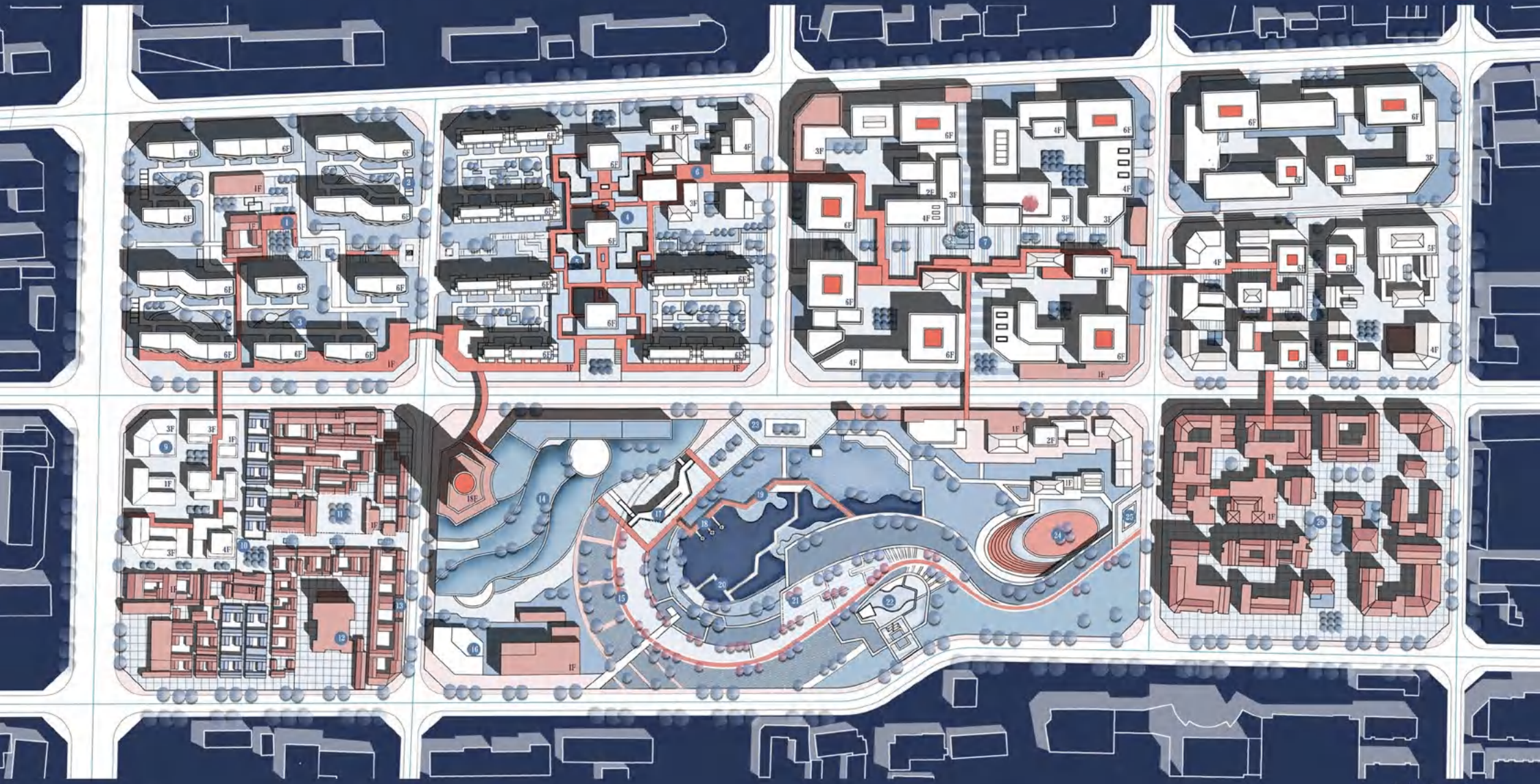
Problem C:

Low recognition of the historical lineage of the site, many young locals lack a sense of identification with the culture, and visitors also know little about it.

- Weak cultural presence of the commercial port
- Cultural tourism does not effectively use existing resources
- Restrictions on building intensity indicators and alterations create conflicts.

There are many more questions .....

■ Program Layout and Landscape Nodes



Masterplan

Main Projects

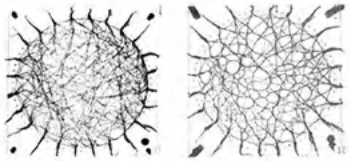
1 Residential activity center
2 Surface parking spaces
3 Non-motorized parking spaces
4 Roof garden
5 Patio Courtyard
6 Gallery Deck
7 Creators' Park
8 Slow Walking Space
9 Cultural Tourism B&B
10 Fuyinli Square
11 Yishengli Square
12 Christ Church
13 Cultural VR Experience Park
14 Park Micro Terrain
15 Wooded Walkway
16 Culture Pavilion
17 Viewing Platform
18 Waterfront Terrace
19 Green Corridor
20 Water Walkway
21 Children's Paradise
22 Leisure Plaza
23 North Entrance Park
24 Sinking Music Square
25 East Entrance Square
26 Old Commercial Port

Table of Land Use Balance	
Land Use Classification	Area (ha)
Total Planned Land	29.34
Residential Land R	5.35
Public Administration & Service Facilities A	2.04
Commercial Service Facilities B	12.07
Roads and Transportation Facilities S	4.65
Green Space G	5.23

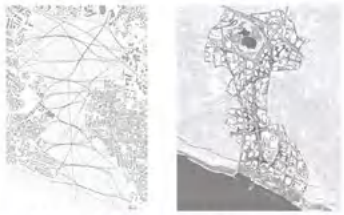
Preserved buildings

Table of Technical and Economic Indicators	
Total Land Area (ha)	29.34
Total Floor Area (㎡)	277500
Volume Ratio	0.95
Building Density (%)	27%
Green Space Rate (%)	28%

Wool Algorithm



The intent of this experiment is to reduce the total length of the direct path to each destination while keeping the winding factor in a relatively low range and generating new planar combinatorial forms.



In 2006, Zaha used Maya's hair dynamics simulation to create the shortest path network, which was applied in the Kartal-Pendik planning master plan located in Istanbul.

Basic Planning

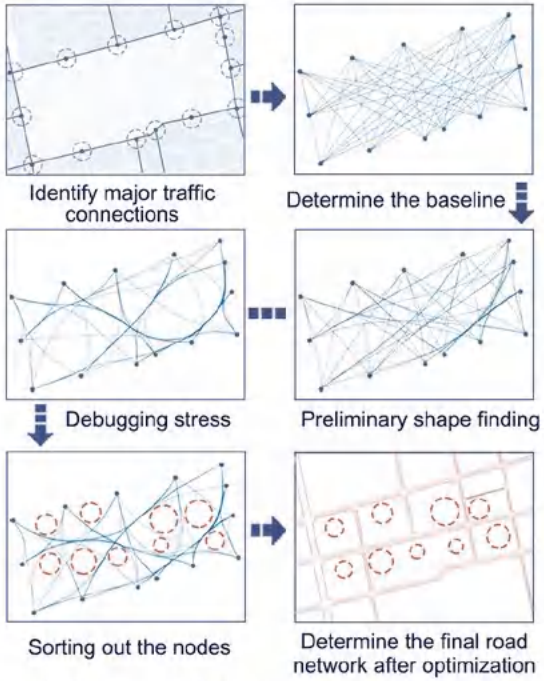
Land Use

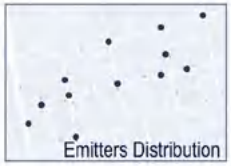
Planning Scope
Commercial
Residencial
Cultural & Creative
Shopping
Administrative
Recreation
B&B

Spatial Structure

Planning Scope
Primary Node
Secondary Node
Primary Axis
Secondary Axis

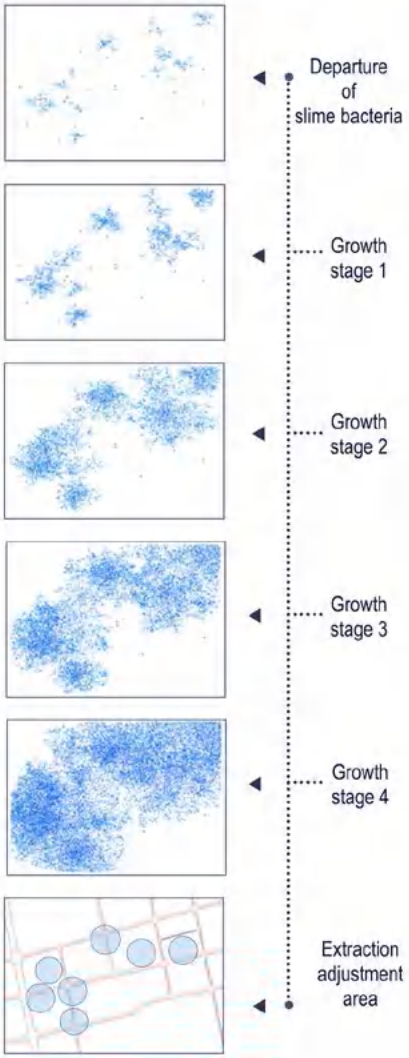
Road Network Optimization



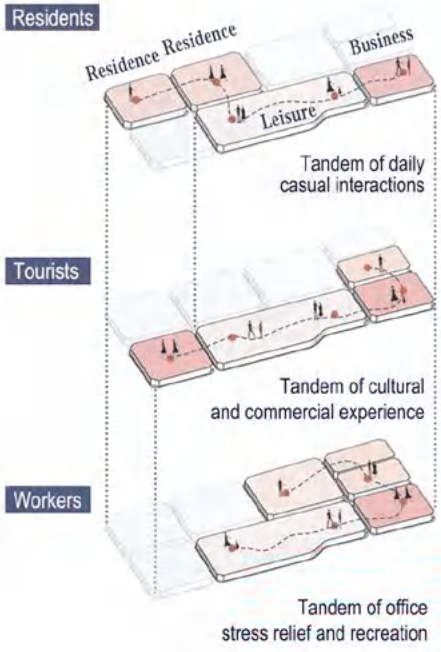


• The Emitters radiation points are determined according to the intensity of the current traffic pressure.

• The Foods points are determined according to the magnitude of the attractiveness of the current major nodes.



Flow & Element

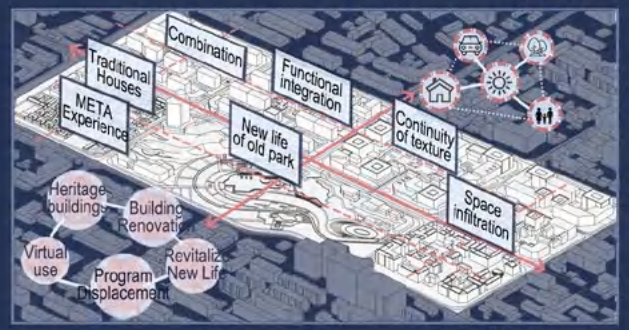


Grid Construction Strategy

Sorting Out The Main Program Areas

Moments

Axis



Scenario

Metaspace Scenario

Recreation Slope

Cloud
- Security detection
- GPS

Equipment
- Watch

Water Theater

Cloud
- Water screen

Equipment
- 3D glass
- Naked eye

Sunken Plaza

Cloud
- Motion capture

Equipment
- Sports mirror
- VR headset

Intelligent Cloud

Cloud
- Track lighting

Equipment
- NFC chip
- Mobile device

META Office

Cloud
- AR e-commerce

Equipment
- Mobile device
- PC

Times Park

Cloud
- Data exchange

Equipment
- Remote interaction
- Connected devices

Daily Activity Voting System

Crowd
- Local people
- Tourists

Subscribe
- Zhongshan park

Event Push
- Open-air show
- Theatre performance
- Band live
- Square dance
- Second-hand market
- Random events

Vote

Results

Event
- Square dance
- Open-air show

Urban Natural Unit Claiming System

Crowd
- Residents

Certification

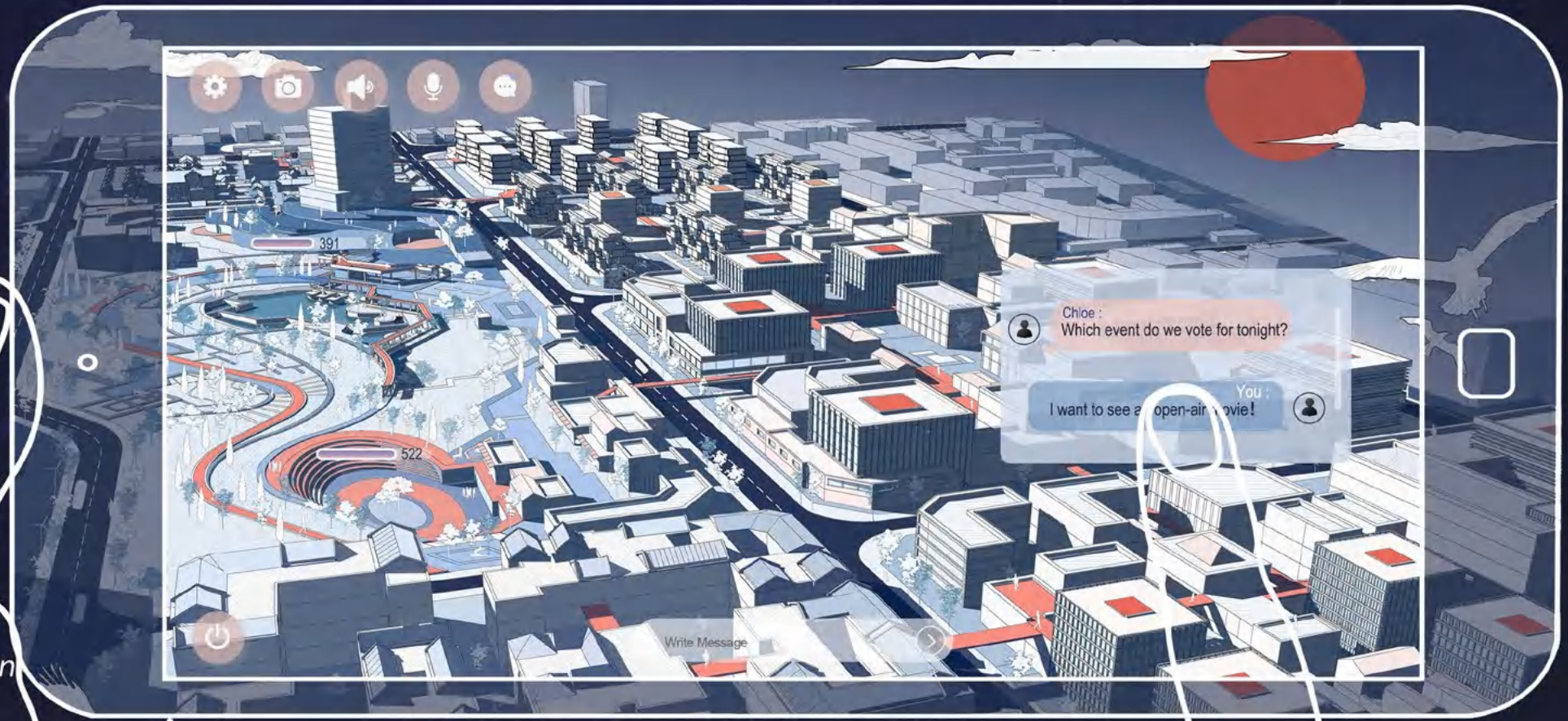
Search for Square

Adopt Public Plots

Care & Maintenance
- Trimming trees
- Feeding fish
- Raising flowers
- Clearing lawns

Select the best weekly
- Community announcement
- APP display

Today's urban neighborhoods are indifferent and selfish, and people and cities are mutually exclusive. In addition to material satisfaction, we should also focus on spiritual connection and stickiness.Hence, we need to add some participation mechanisms that combine virtual and real in the city to evoke human and human interaction and people's emotions to the city, and increase the stickiness.



Shared Meta JiaYuan System 1.0