FUTURE COMPUTATION

Yufan Xie

2019-2021

YUFAN XIE

UVNLAB.COM

■ Architecture ■ Computation ■ Interactive Media

Born in an art family, educated as an architect, now I'm in a transition to innovator of spatial computing and multi-sensory experience.

With years of experiences in grasshopper consultancy, I'm specialized in complex geometries, data visualization and interactive contents. I'm proficient in interactive media, such as Unreal Engine and processing. As an innovator, I'm constantly learning emerging smart technology to enhance the built environment.

EDUCATION

■ 2014 - 2019 B.Arch
Central Academy of Fine Arts, China, SoA

■ 2019.9 - 2021.5 M.Arch +2
University of Southern California, SoA

WORK

■ 2017.9 - now
Grasshopper Consultant, Self Hire

■ 2017.9 - 2019.7
Research Member of Parametric Group Team CAFA, Beijing

■ 2017.8 - 2017.11
Internship at Tuning-Synesthesia Studio, Beijing

■ 2020.6 - 2020.8
Internship at MADA s.p.a.m, Los Angeles

■ 2020.8 - 2021.5
Usability Lead at USC AGP

AWARDS

■ 2019.6
CAFA Graduate Design 1st Award

■ 2020
Gensler Diversity Scholarship, 2nd Place

■ 2020
Young Talent Architect Awards(YTAA) Shortlisted

EXHIBITIONS

■ 2019.12
Shenzhen Bi-City Binnale of Architecture and Urbanism (UABB)

CATALOGUE

COMPUTATION

THE UNKNOW CITIES

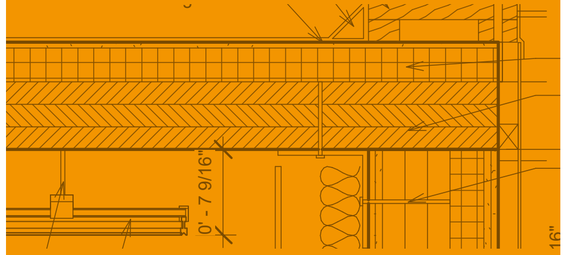
ARCHITECTURE

GAP+

SPATIAL COMPUTING

ACOUSTIC GARDEN

WORK SAMPLE

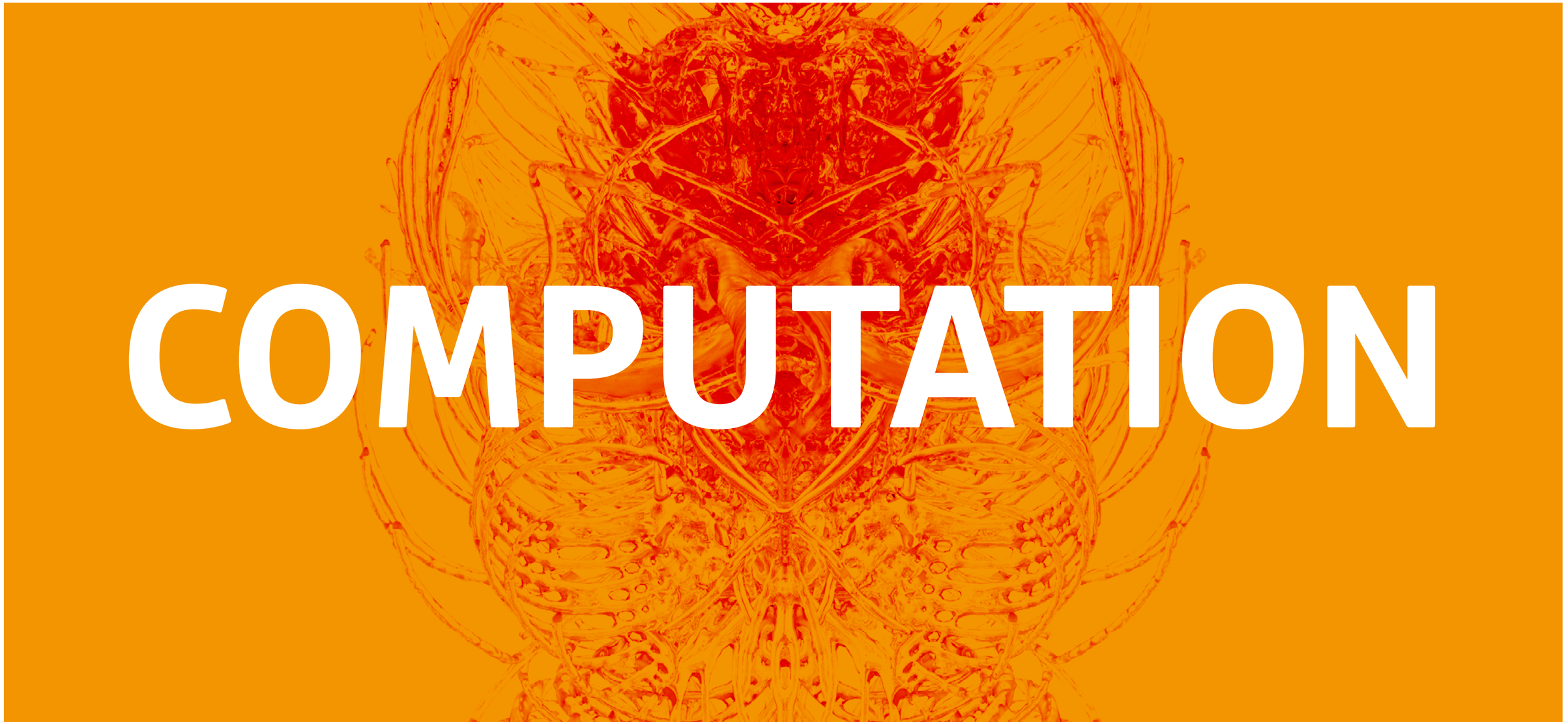


ANT FARM

<<< PROFILE

>>> START

EMBRACING THE FUTURE.


COMPUTATION

THE UNKNOWN CITIES

BI-CITY BIENNALE OF URBANISM\ARCHITECTURE
深港城市\建筑双城双年展

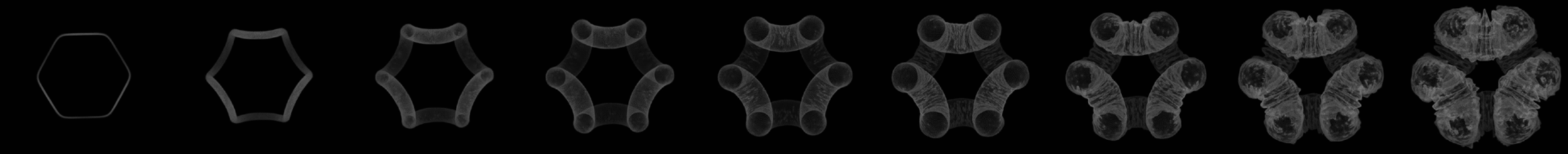
Collaborator:
Yu Chen(Curator)
Yan Wu(Writer)
Yufan Xie(Designer)

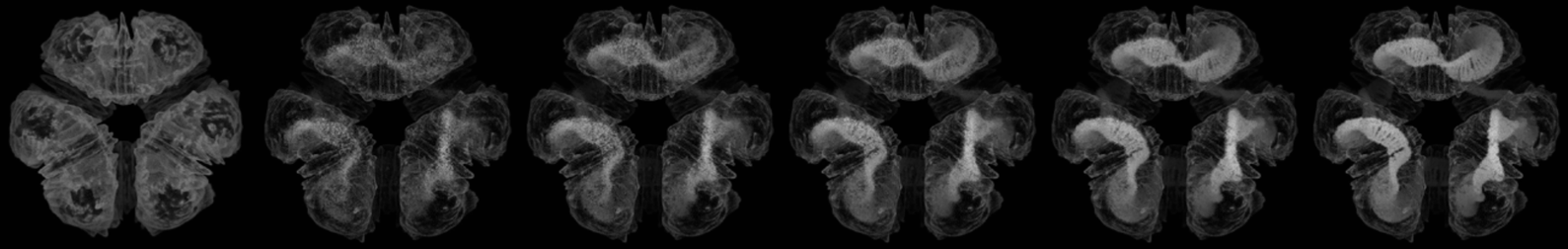
CITIES IN CLIMATE CHANGE

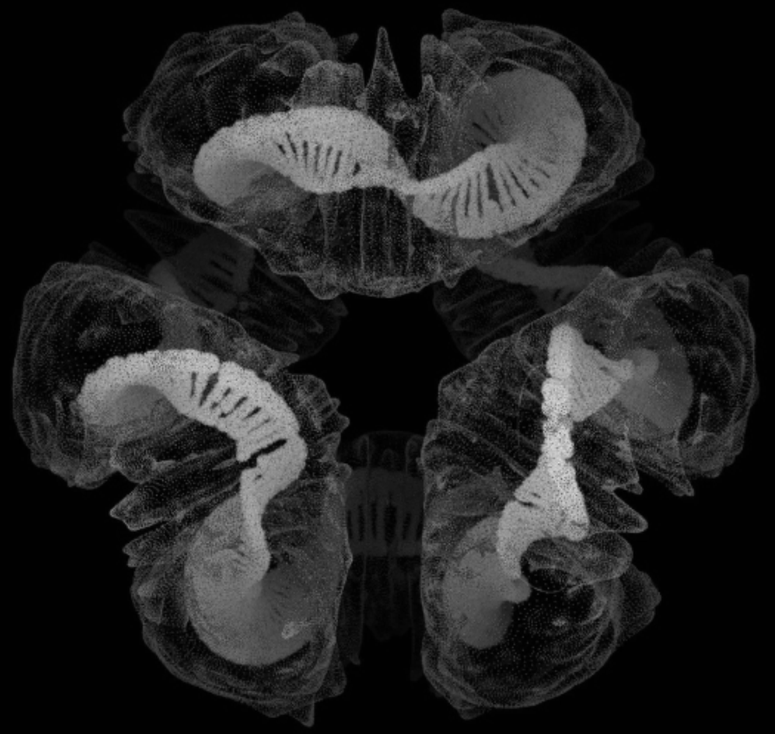
“We will die here, and, get rebirth there.
Dying is not painful, and seasonal trauma will be healed.
Rebirth is full of hope as the eye of crystal can see the light deep in the universe.”
-by Yan WU, from Nine Cities, Millions of Futures. ho return the Earth to a natural planet by reclaiming the nature from cities’ occupancy. After many attractive but upset seasons, people have discovered such methods, and at the same time, developed an approach to create a brand-new city in every unknown place of the planet within a moment.

Underwater City
of Symbiosis

3d printing
158*162*111 mm
Stratasys J850







GENERATIVE SYSTEM

Typical complex systems - such as Differential Growth, can be utilized in various way, to generate complex and impressive results.

OCEAN

Underwater City>>>

In the future, human find a way to build symbiotic structure in the deep sea. These bio-materials from planktons becomes a shield and filter between human and sea water.

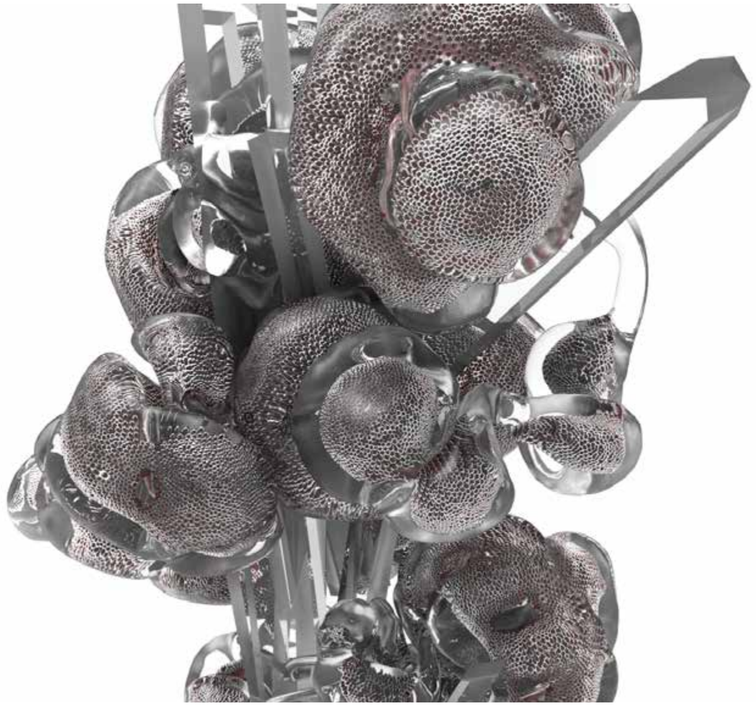
COMPUTATIONAL TOOLS ARE SO POWERFUL FOR ARCHITECTURE, THAT THEY BECOME PERFECT MEANS TO CONCEPT AND IMAGINATION

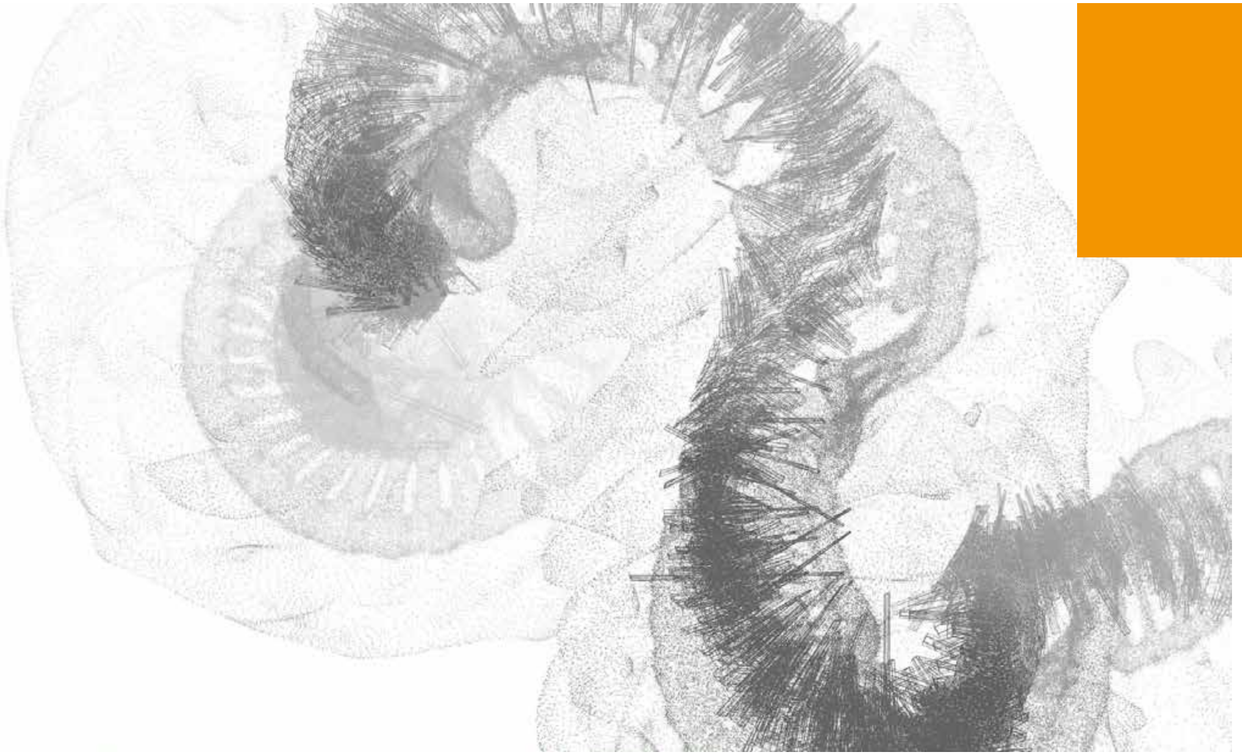
POPULATION

Hyperplastic City>>>

We imagine the city as an accumulative system of self-folding. Small structures are organized along huge spikes. Folding structure to increase surface to accomodate more residents.

Iteration 1 | 10 | 50 | 100 | 150 | 200 | 300

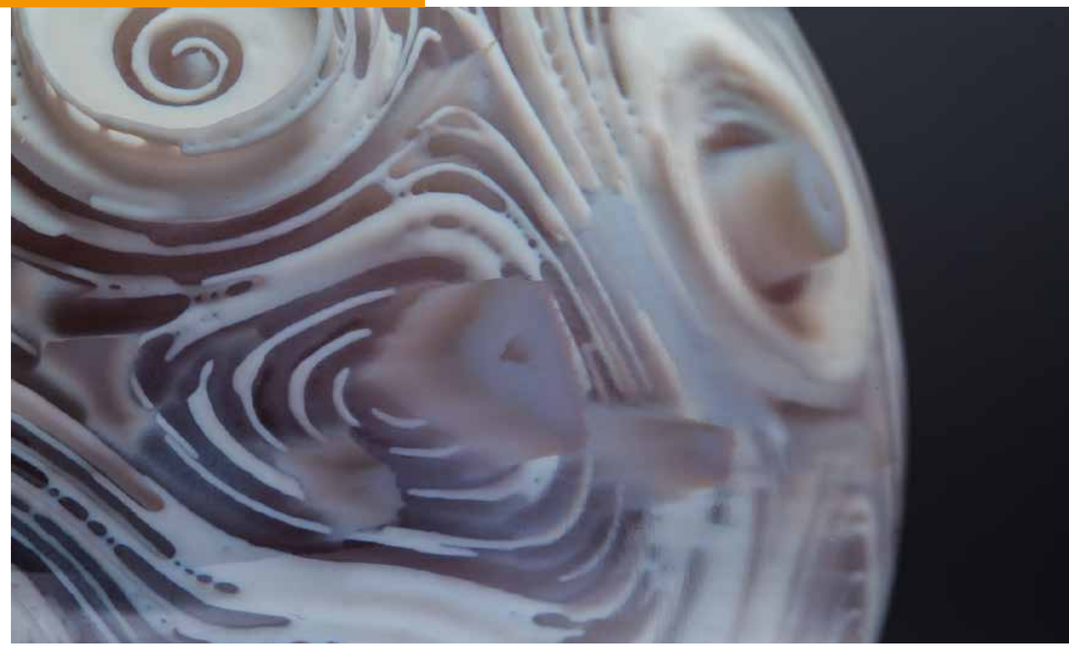




Floating City, 3d printing, color-resin,Stratasys J850

The floating city is a city form of mobility. After hover vehicle being popularized and correspondingly new structure are built on earth. These spikes of junctions form orbits for public transits.
The ground level are gradually returned to pedestrian and nature.

TRANSPORTATION



ARCHITECT, WORLD BUILDER

In the past few decades, we have almost turned our imagination into reality.
How do we develop new imagination for the next generation?
How do we innovate "unfarmilar world"?
How do they take imapact on our current world?

Underwater City

City of Pipeline

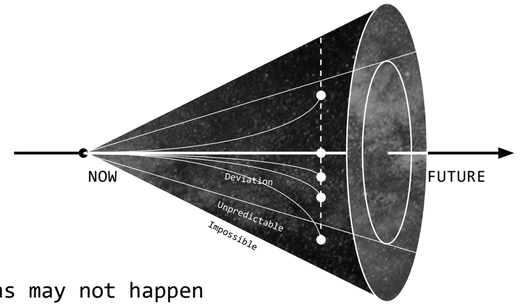
Floating City

WATER

City of Pipeline, 3d printing, color-resin,Stratasys J850

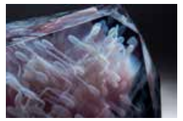
We imagine the city as a densed tree-like pipeline for water cycling and storage. It is a self-sustainable greenhouse in desert planet - which is a possible future of earth under climate change.

A WARNING?
OR GUIDANCE?



Some conditions may not happen in distant future, but we shall be prepared, or avoid human-caused disasters.

Our goal is proposing possible futures of human society, and providing template for the condition.



CURATION AS AN EFFECTIVE PRACTICE

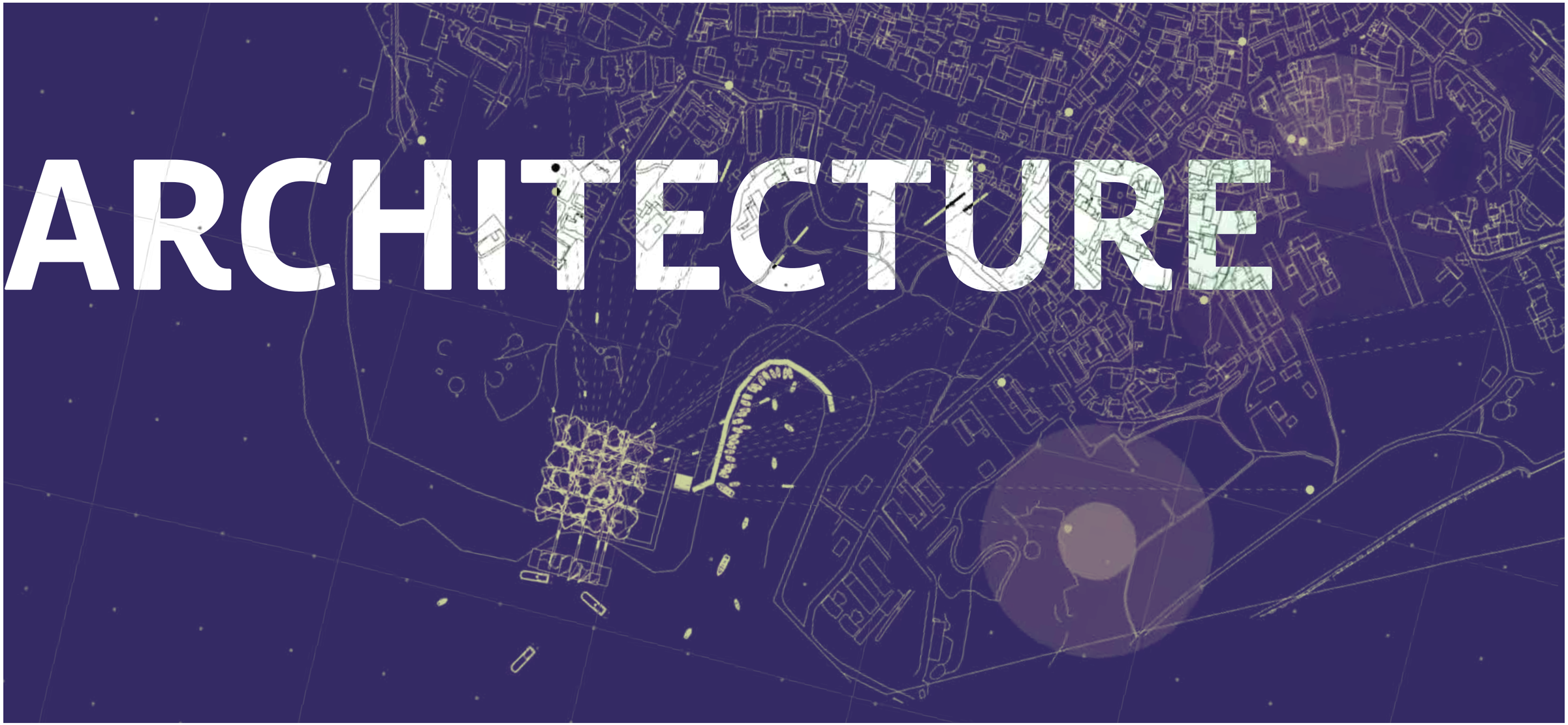
Curatorial narrative will be a core platform for concept delivery, and involve audiences, investors, and decision makers into discussion.

In the collaboration between architect, writer and curator, we succeeded in getting our voice out to the public, and policy makers.

Decision and changes can be made through collaboration, beyond single architecture industry.

>>>>Watch "The Unknown Cities" on Vimeo

ARCHITECTURE



GAP+

2019
User-centered Acoustic Museum

- 2019 CAFA Graduate Design, 1st Award
- 2020 Gensler Diversity Scholarship, 2nd Place
- 2020 Young Talent Architect Award, Shortlisted

MAX/MSP
Grasshopper
Leap Motion

This project explores the dynamic mixing mechanism of acoustic space through two derivatives - GAP+ and GAP-.

By translating experience of acoustic space in gaps, it re-defined how digital architecture and media intervenes our daily life in various ways. New perspectives of acoustic space and digital museum are proposed in a real-time and remote manner, in response to urban renovation in digital era.

KULANGSU - A PLACE COLONIZED BY "ELSEWHERES"

13 th Century

TRIBAL AGE

1842

COLONIAL AGE

1945

POST-COLONIAL AGE

NOW

??????

While history and individual experience of city are being marginalized in digital era, the huge sounds by consumption colonized everywhere. In the post-industrial age, it becomes critical to bring the power back to individual, to re-interpret the city and develop human-driven narratives. Kulangsu is a typical example in this condition.

Kulangsu - "the Island of Piano" in southeast China, was announced as “World Cultural Heritage” in 2017, but its lost identity were never back again. Colonizers replaced local culture with piano and european buildings in 20th century.

Now, since local residents are leaving Kulangsu, fast iterating internet brands have dominated the island. Tourists come to Kulangsu, and shop culture from other places - it finally becomes an island colonized by “elsewheres”.

WHAT IS REAL KULANGSU?
WHO OWNS KULANGSU?
WHAT IS OUR ROLE?

Crowded beach and european buildings on Kulangsu

GAP

ACOUSTIC ELEMENT

GAP, A MIXER

The GAPs - where only one person could pass,
connected spaces - a room, a street, or the sea.
In twisted GAPs, visual sense is reduced
Walking through GAPs, sounds fade in, and out,
and we transit different places.
GAP, is the basic element of sound mixing on
Kulangsu. It is a narrative driven by individual.

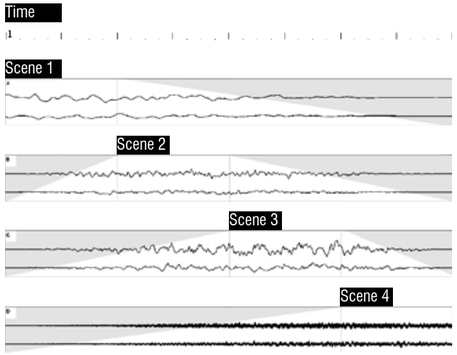
WHAT DOES A SPACE OF GAPS SOUND LIKE?

SCENE

Scene is a non-linear framework in electronic music.

It refers to a group of looping sounds
which share the same texture and spatial experience.
By switching scenes, sounds fade in and out,
presenting a real-time narrative.

THE FUTURE OF MUSEUM



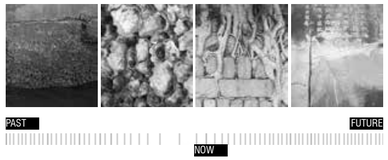
SCENE-LIVE SET

Real-time and non-linear narrative driven by time.

SCENE-KULANGSU

Real-time and non-linear narrative driven by human.

KULANGSU OF THE PAST



Linear history of print age

MUSEUM FOR THE PAST

Exhibited
Piano that nobody plays

KULANGSU OF HAPPENING

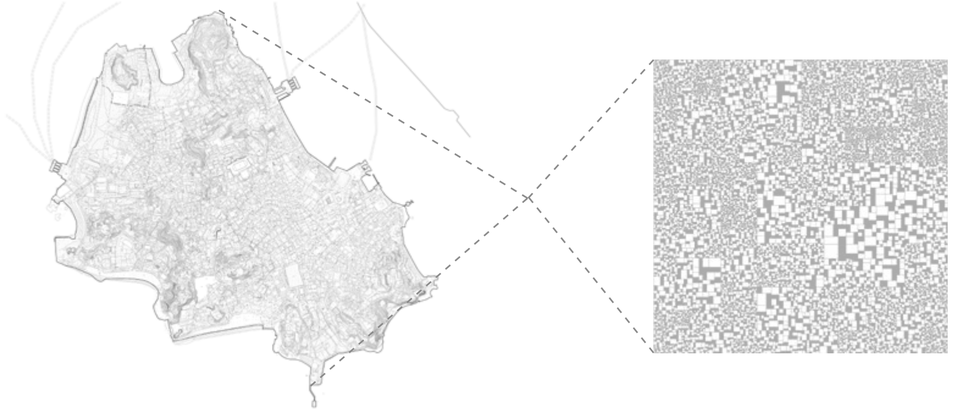
Daily life as a show.
Non-linear narrative driven by residents.

MUSEUM FOR THE "HAPPENING"

Performed
Kulangsu that everybody plays!

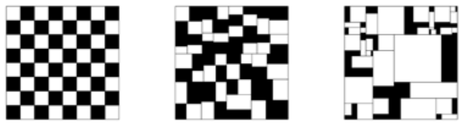
GAP+

REAL-TIME MUSEUM AT THE DOCK

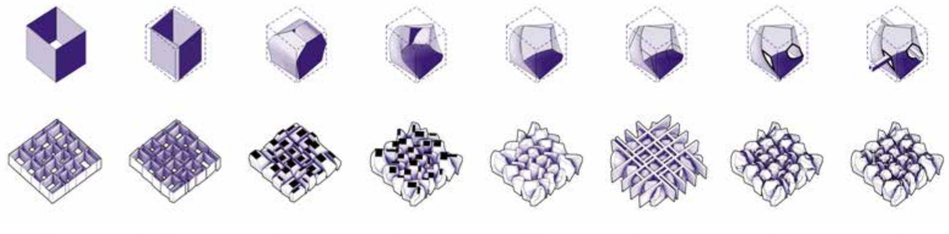


HIERARCHY

K-D Tree structure is used to generate a base grid of GAPs. The museum is a microcosm of Kulangsu.



Deviate:0.01 Deviate:0.2 Deviate:0.5



KD Original Grid
DisPlace Form the GAP
Shape Vision Details
Rotate Negative
Tilt Roof Space
Overlap with Original
Cut by Original
Cut by Original

IN GAP

Attracted
Crossing the GAP

Bottom Mix: Low

ENTER

Through holes on GAP
user step inside

Middle Mix: Midium

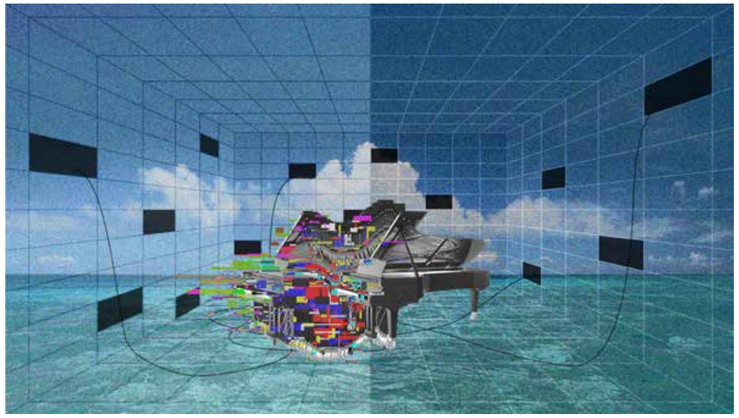
RISE

Rising, up to rooftop
The space opens gradually
Sound and activity are mixed

Top-Plan Mix: High

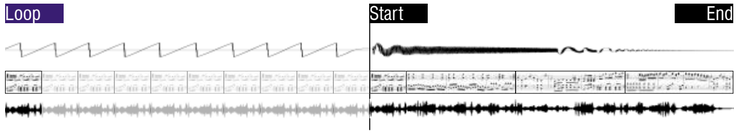
JOIN

Unit Space is awaiting

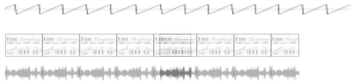


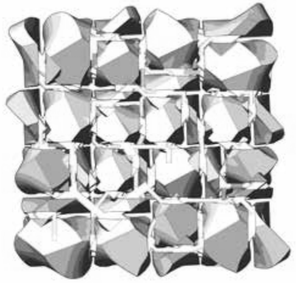
TRIGGER

Residents trigger the performance.



BACK TO LOOP





Top - Open Roof

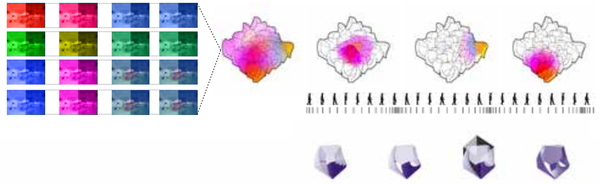
SOUND SYNTHESIS

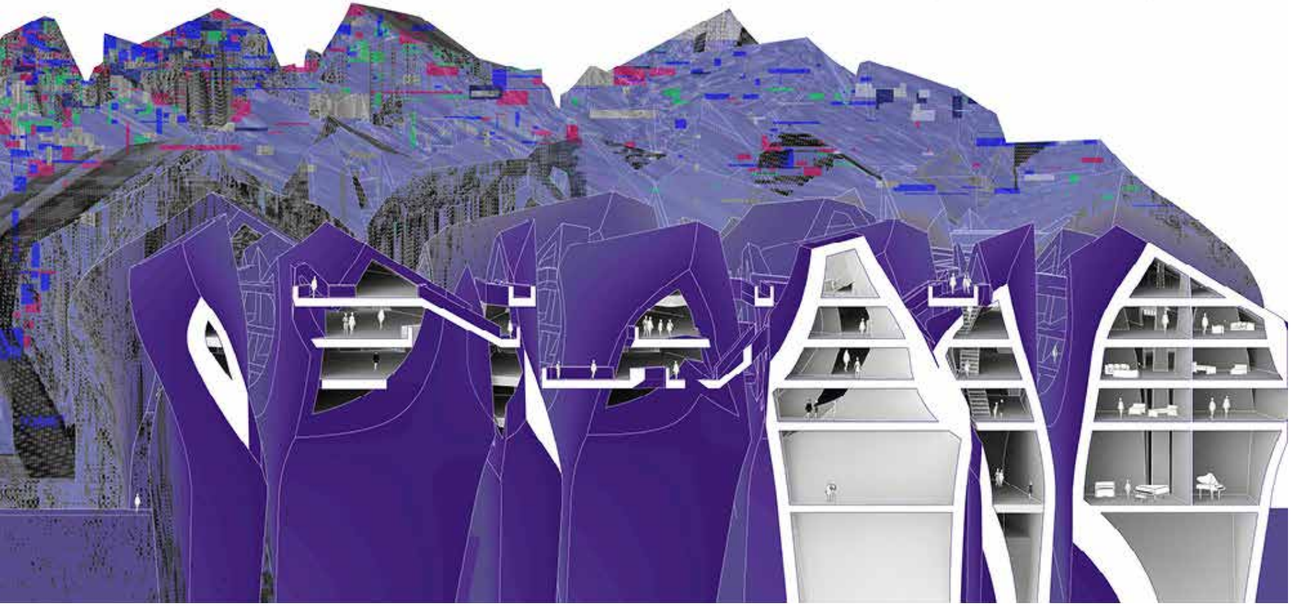
The zone-based mixing mechanism reflects a possible acoustic space in material world, that architectural elements become the medium of sound reflection and filtering.

Curved walls and openings defines how spaces entwines. Sounds, and people, share the same physical boundaries.

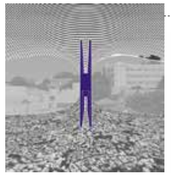
A COMMUNITY-DRIVEN ACOUSTIC MUSEUM

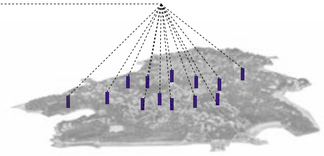
GAP+ will be an experiential space before visitors entering Kulangsu. Simply by walking through, we experience the soundscape of Kulangsu.





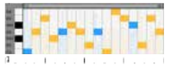
SOUND UNIT ····· **SAMPLER**



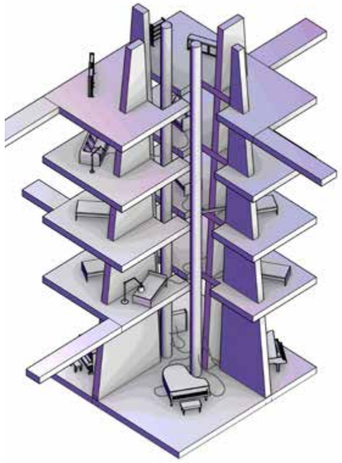


Sample from GAPs

PLAYER UNIT ····· **SEQUENCER**



Tempo



Shared Community

Residential

Private Area Museum

KULANGSU SOUND FROM KULANGSU STREET

With sensor network, sounds can be collected from Kulangsu, and reshaped by visitors in the museum.

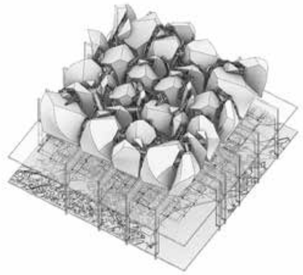
GAP-

REMOTE MUSEUM AT EXHIBITION

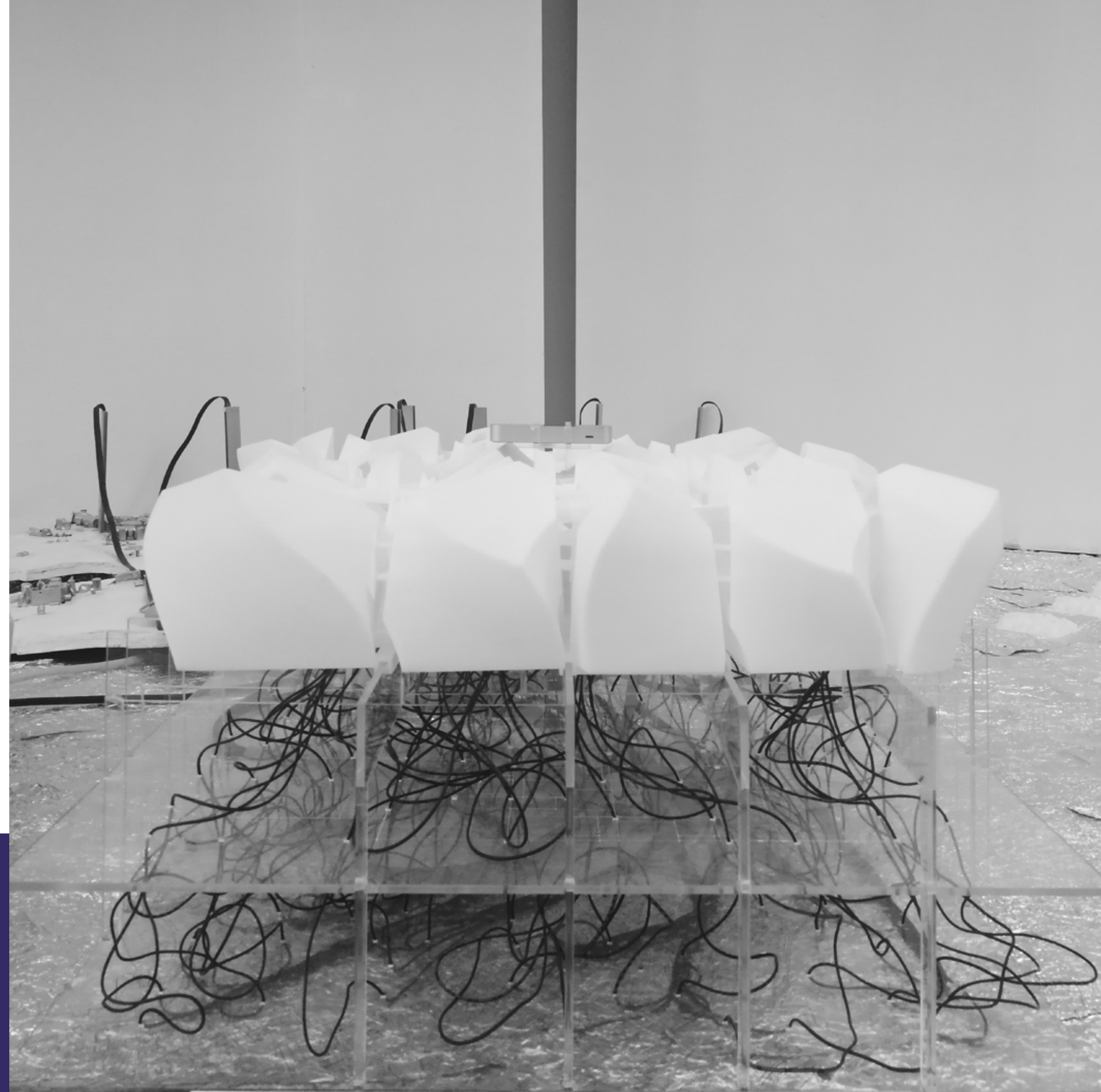
Wave
to start LiveSet!

Horizontal swipe
to switch sound

Vertical move
to modulate sound

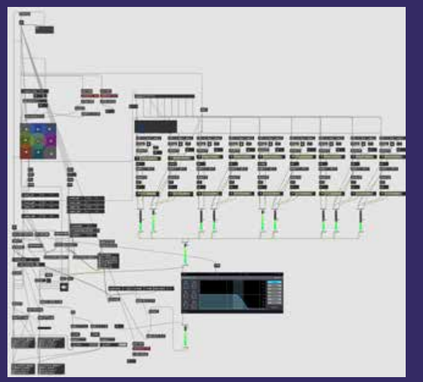


With sensors, it translate gesture into acoustic messages to control sounds from Kulangsu. When we play GAP-, we are linked with Kulangsu.



By waving our hands, we define our experience in this remote museum. GAP- brings Kulangsu to HERE and NOW, for every audience.

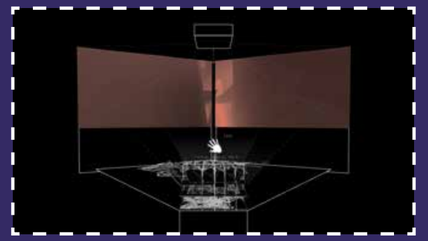
SPACE-DRIVEN SOUND SYNTHESIS



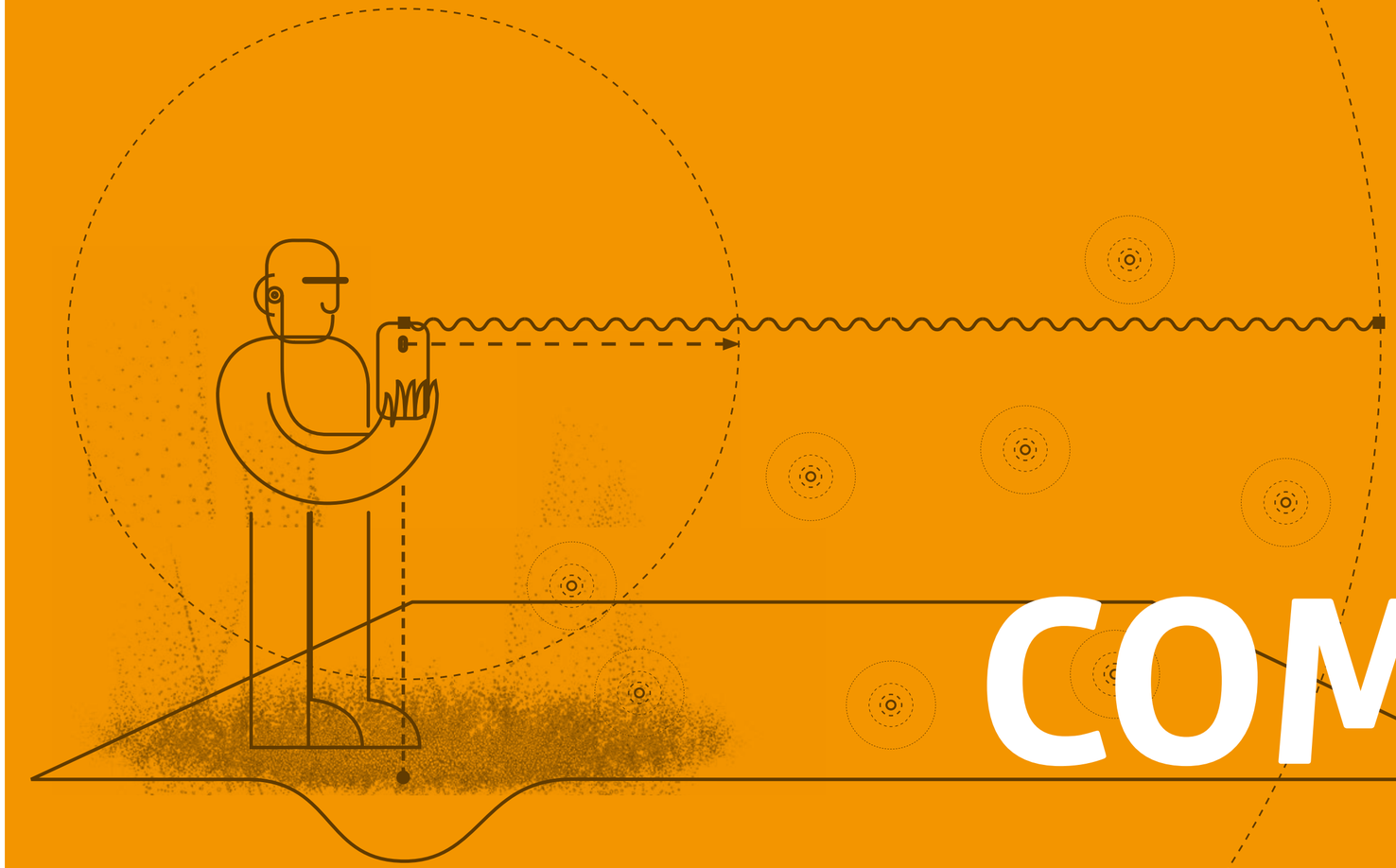
Screenshot from MAX/MSP project

This mechanism reveals a new perspective of sonification and audio immersion - a new practice beyond material and visual content.

In such a future, architects will be able to create space for all sensory groups.



>>>>Watch "GAP+" on Vimeo



SPATIAL COMPUTING

ACOUSTIC GARDEN

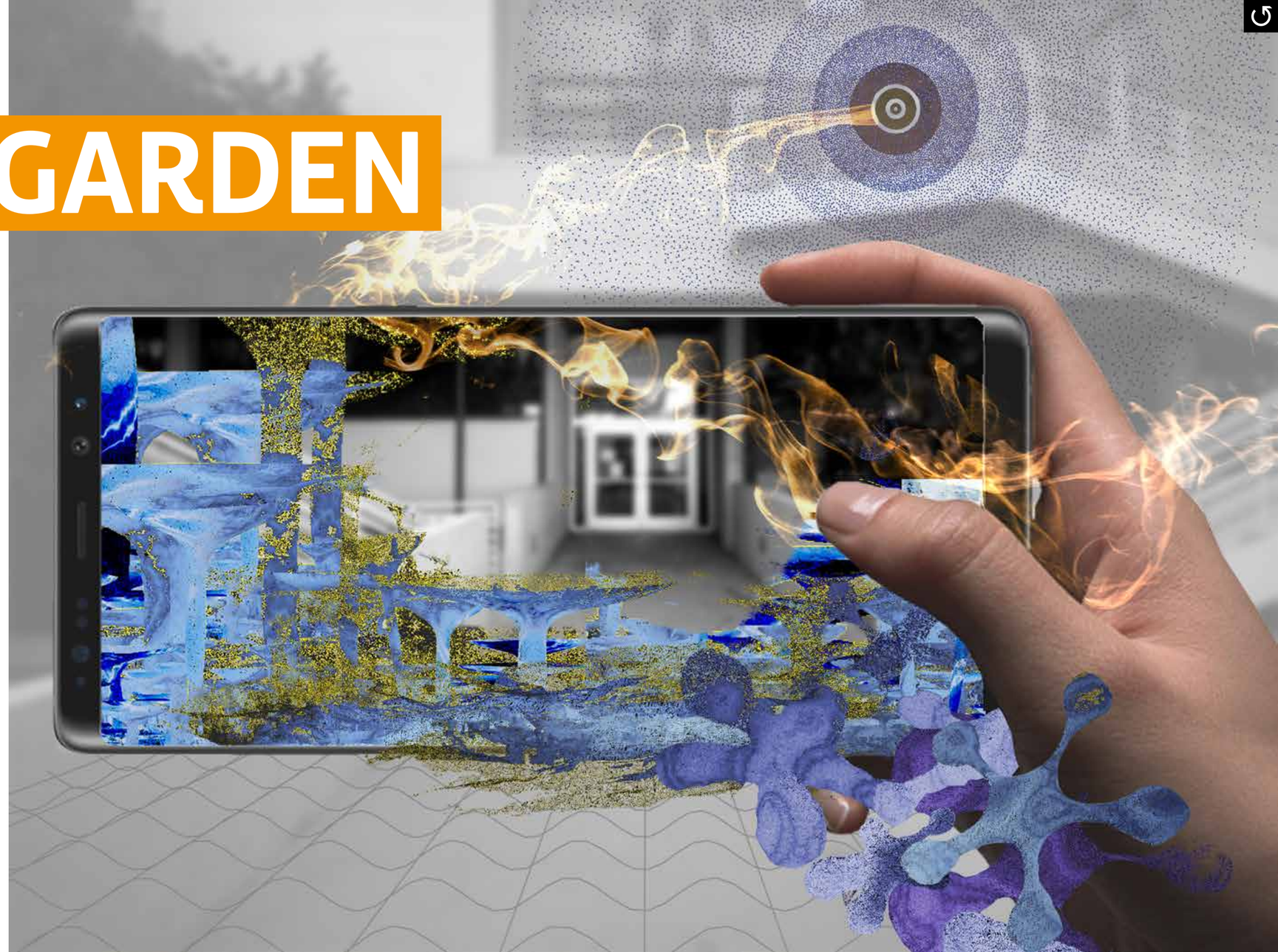
AUGMENTED ACOUSTIC SPACE

2021

Thesis(Prototype Stage)
Instructor: Lisa Little
Unreal Engine
ARCore
ARKit

PROTOTYPE BUILD
NOW AVAILABLE ONLINE!

>>>Check out HERE



WHAT IS

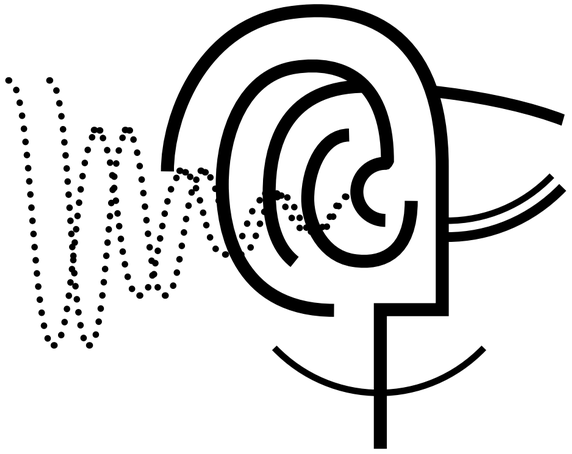
AUGMENTED ACOUSTIC SPACE ?

SPATIAL DATA ARE SO ACCESSIBLE THAT.....

Space is dynamic, and multi-sensory.

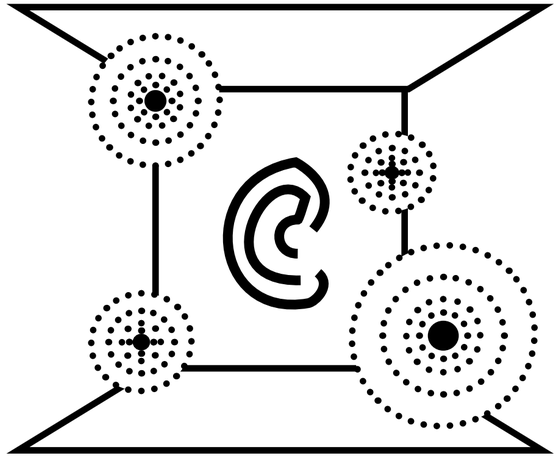
From spatialized messages,we relocate ourselves in our surroundings from scale, location and direction.

Nowadays, with emerging **smart devices**, we can create augmented spatial experience beyond mere visuals, to enhance **sensory diversity**, which serve a broader user base.



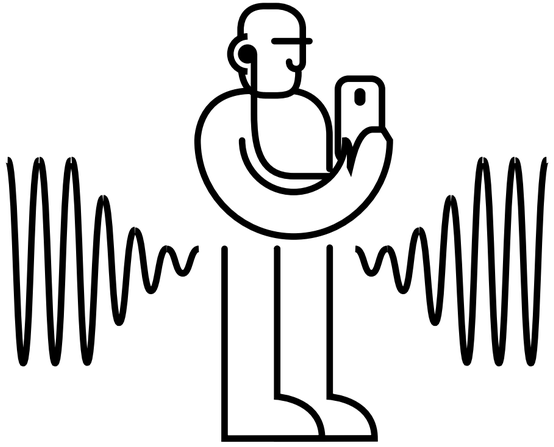
1 ACOUSTIC PRIORITY

- Sonification
- Sound Navigation



2 SPATIAL SOUND

- Distance
- Direction



3 SPATIAL CONTROL

- Non-linear
- User-Driven

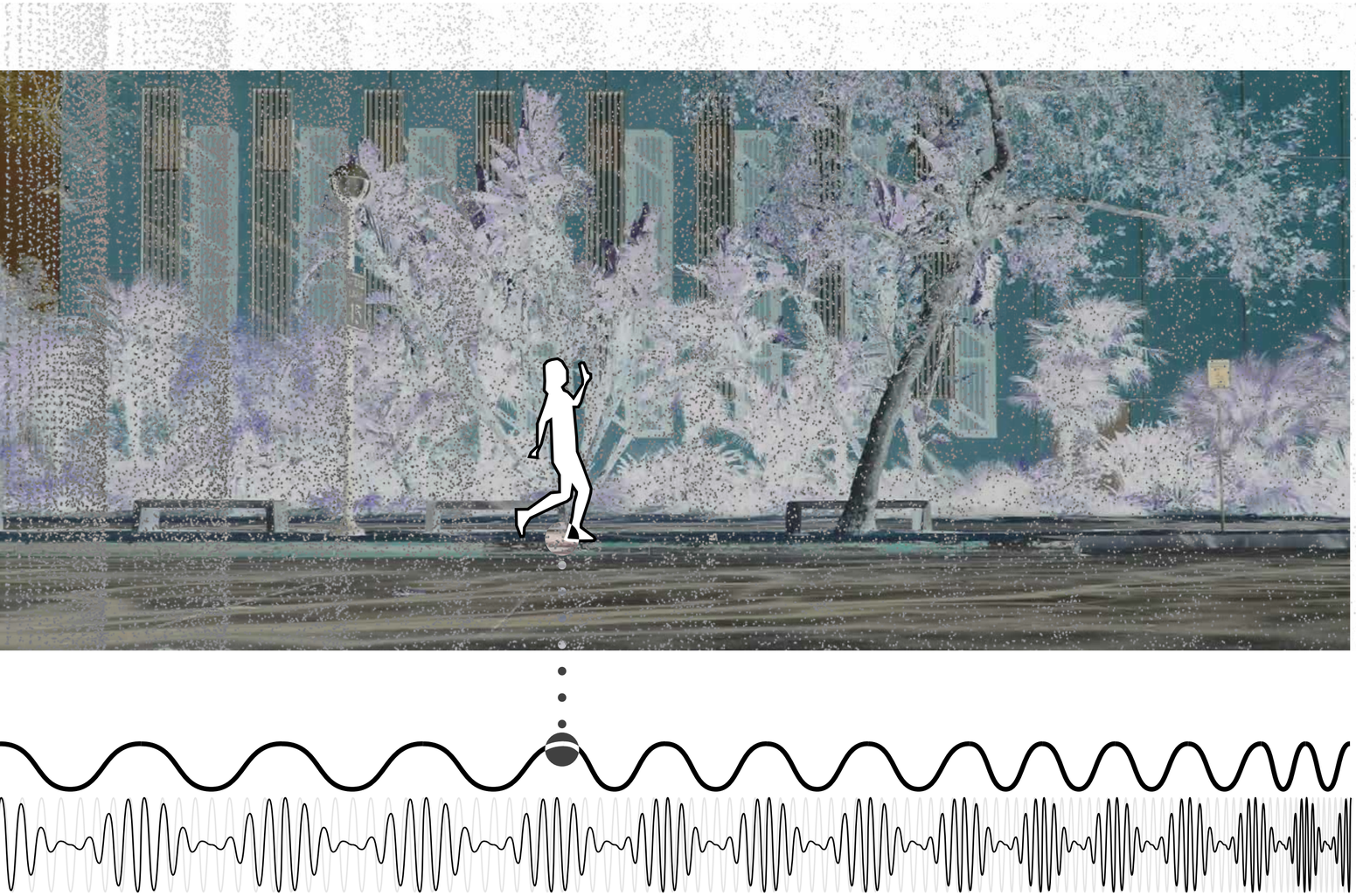
WHAT IS
ACOUSTIC GARDEN?

Acoustic Garden applies spatialized sound synthesis to the physical world with handheld AR.

When the virtual world is mostly hidden in sight, sound becomes the core of narrative and guides us to rediscover our surroundings. Listen, and discover, our movement distorts the soundscape in turn, constructing an augmented acoustic space. Find the sound, a virtual garden “bloom” above both the visual and acoustic world.

3 types of spatial control are designed, to form spatial narrative.

"Oh this is one feet...faster...slower.....Let's run!"

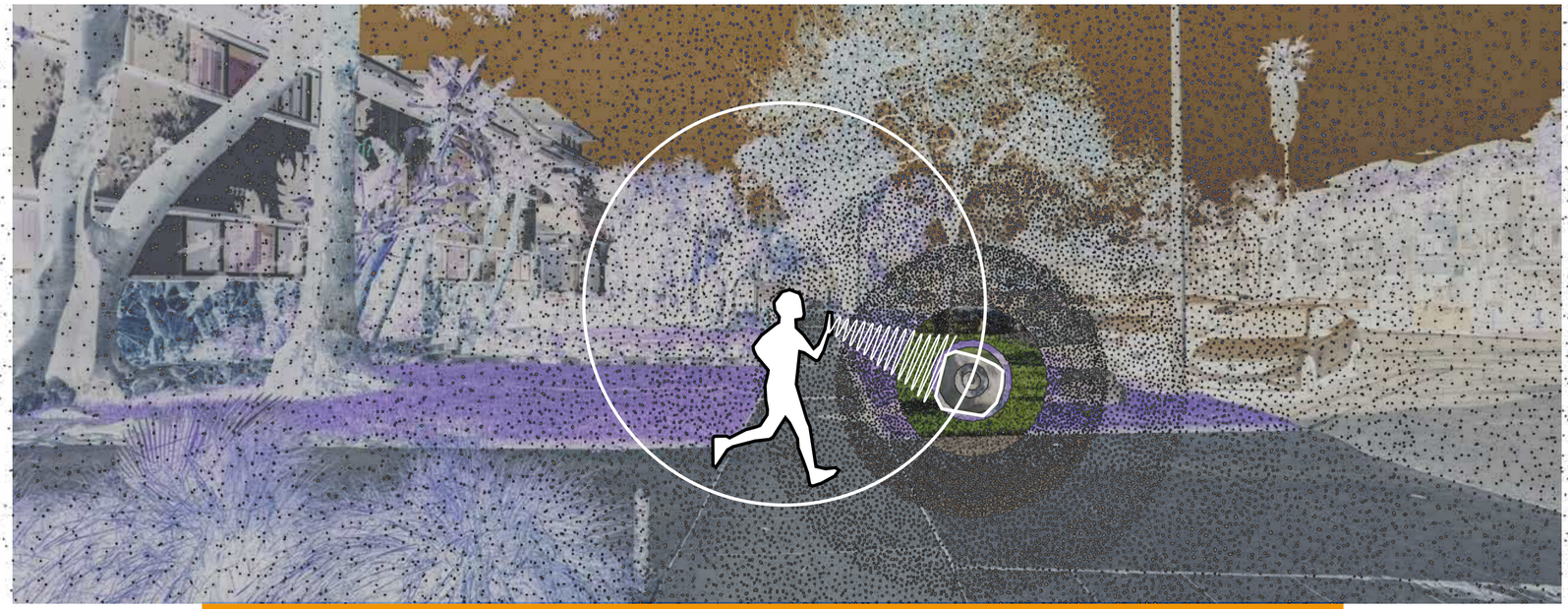


1.SCALE PATTERN

■ Repetitive Variation ■ Distance:0

Our linear movements are transformed into continuous variation of sound, in real-time and real-scale. We can relocate ourselves via the pattern.

"Seems to be a rock in front of me....."



2.VIRTUAL TOUCH

■ Triggered Sound ■ Distance:Short

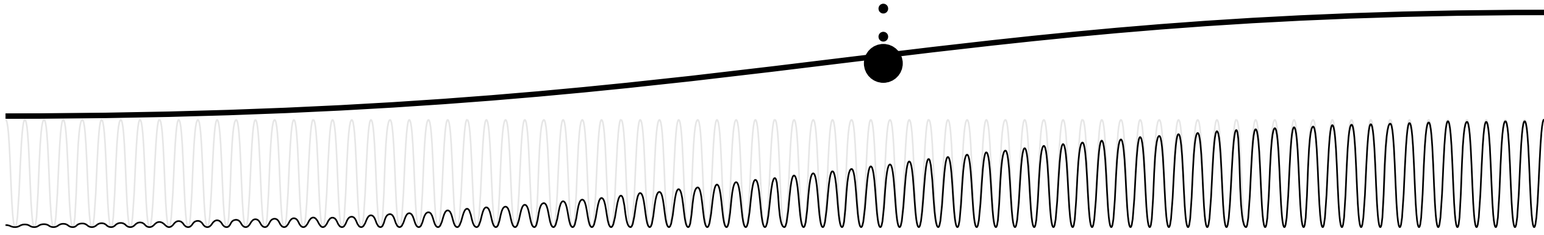
We touch through virtual extent of our body, to probe our surroundings. Creating a virtual sound from a distance and direction in space.

"I heard that...seems to be on my right.....I'm reaching it..."

3. NAVIGATION SOUND

■ Linear Motivation ■ Distance:Far

Direction of a navigation sound can be perceived on L/R channel.
Distance towards a navigation sound can be perceived via sound variation.



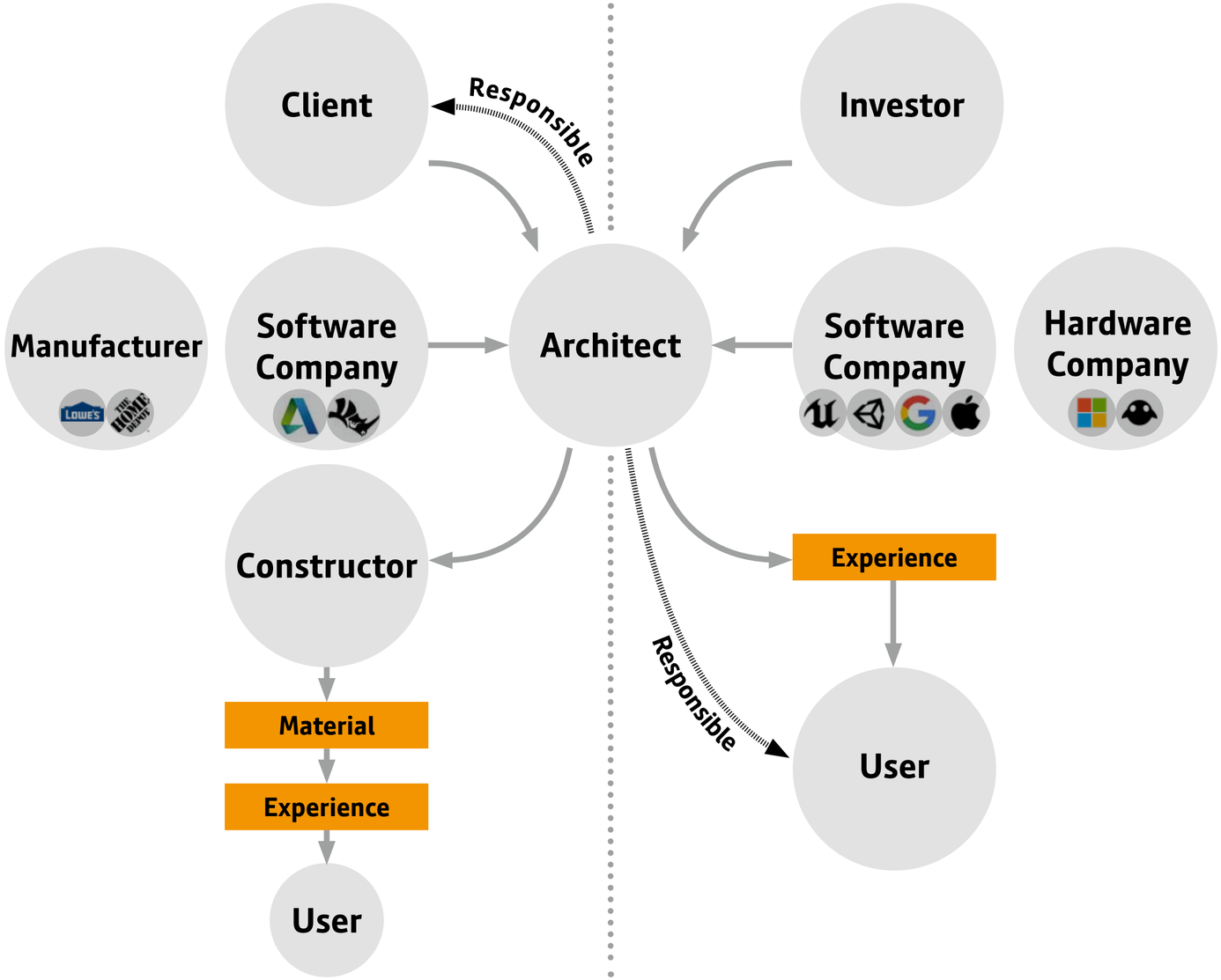
Finally, as you naviagte to the sound, an acoustic garden of virtual sound and visual space will be revealed, "blooming" above the reality.

BLOOM!

ACOUSTIC GARDEN

>>>Watch video on youtube

*Screenshot from Real-time Demo



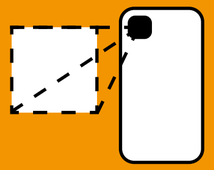
PAST VS FUTURE

ARCHITECTURAL PRACTICE AS

SPATIAL COMPUTING

Architects will practice using spatial computing, as a virtual rules designer for user-centered experience, in real-time and human scale.

We can learn from decision system and mindset in entertainment industry, to start such practice.

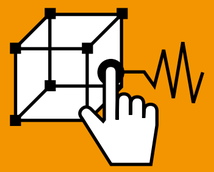


LOCAL SENSOR

- Private
- Subjective

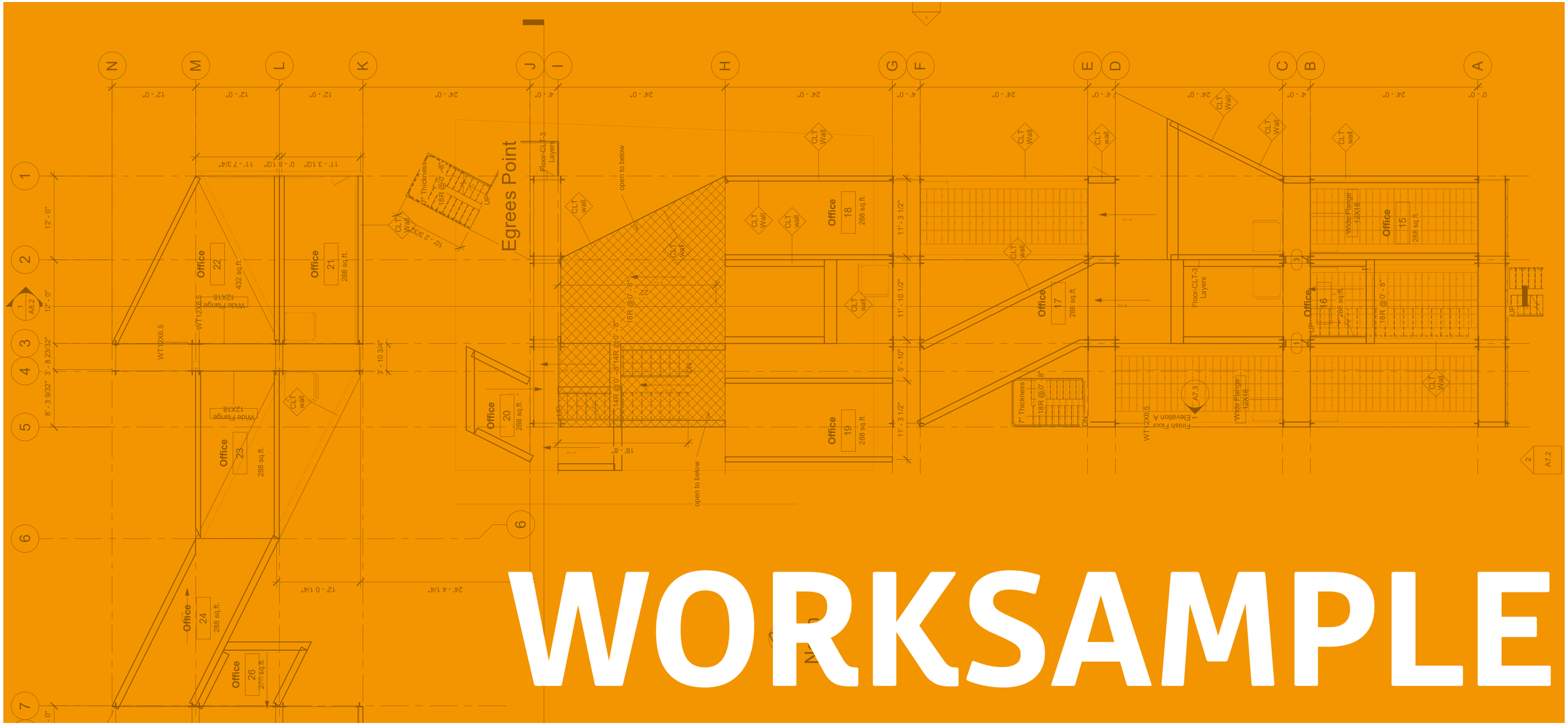
MULTI-SENSORY

- Real-time
- Virtual

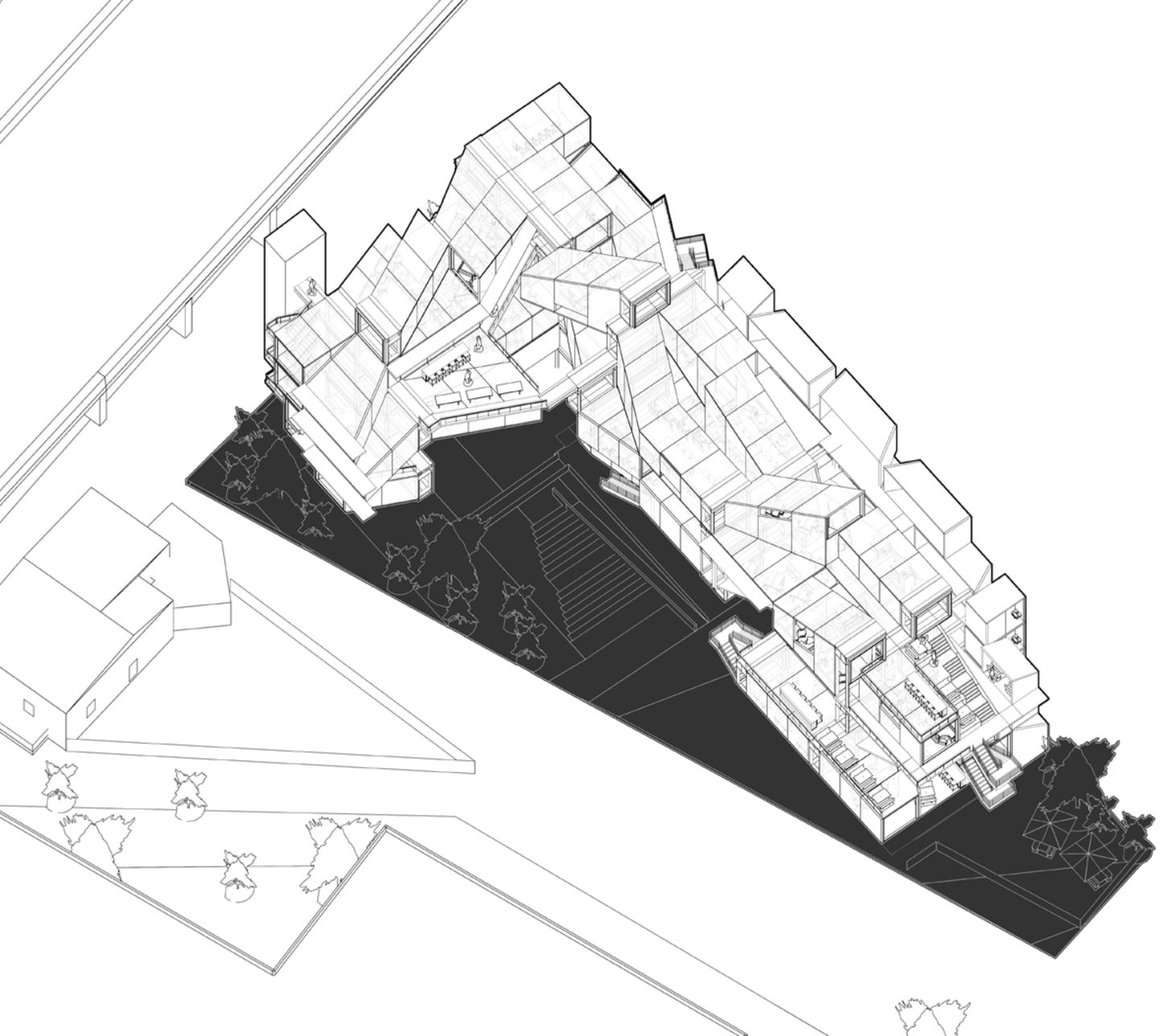


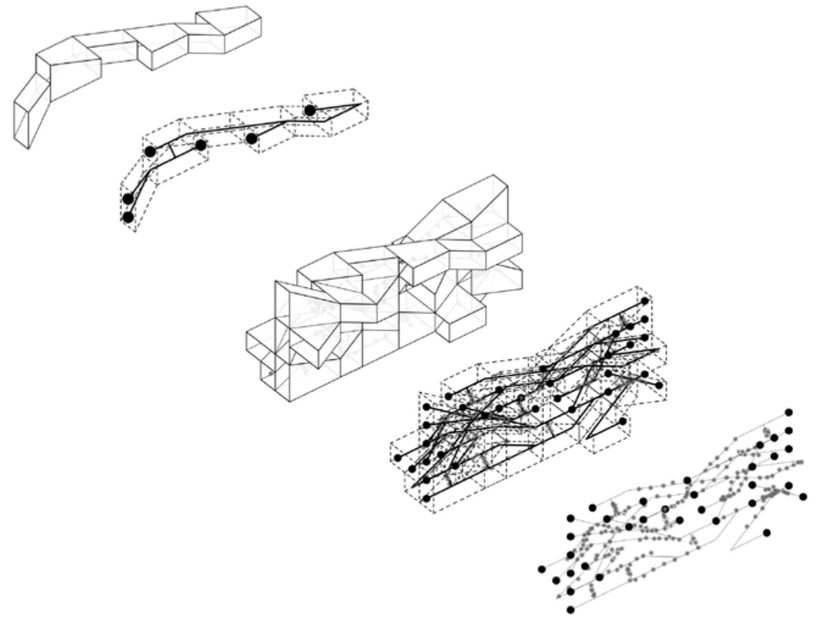
BUSINESS SHIFT

- Usability
- Subjective


Egrees Point
Office 22
Office 21
Office 23
Office 24
Office 26
Office 20
Office 18
Office 19
Office 17
Office 16
Office 15
CLT Wall
open to below
Floor-CLT-3 Layers
Wide Flange 12X18
WT12X6.5
Finish Floor Elevation A
A7.3
A8.2
A7.2

WORKSAMPLE





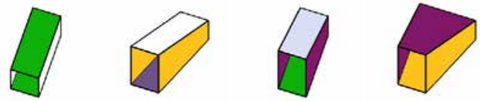
ANT FARM

De-centralized
Co-Working Space

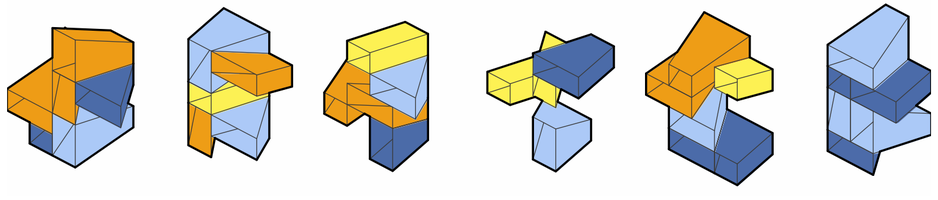
USC ARCH 605B
Instructor: Doris Sung
Revit, Grasshopper

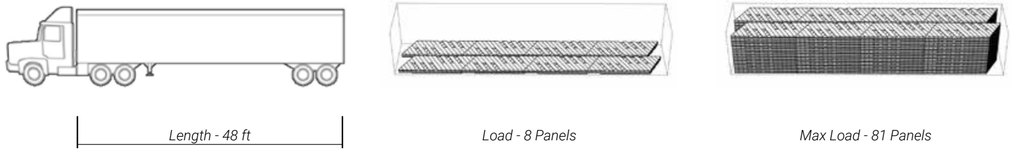
ALGORITHM CUSTOMIZING
PRE-FABRICATED PANEL

6 Basic Panels
4 Type & Branches
Infinite Choices

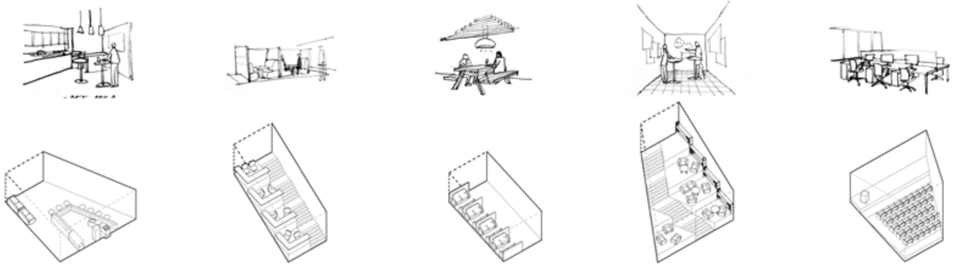


TYPE A TYPE B TYPE C TYPE D

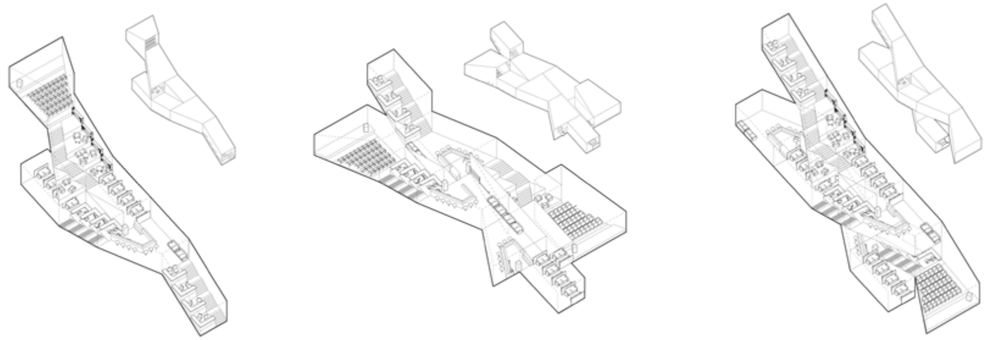




Length - 48 ft *Load - 8 Panels* *Max Load - 81 Panels*



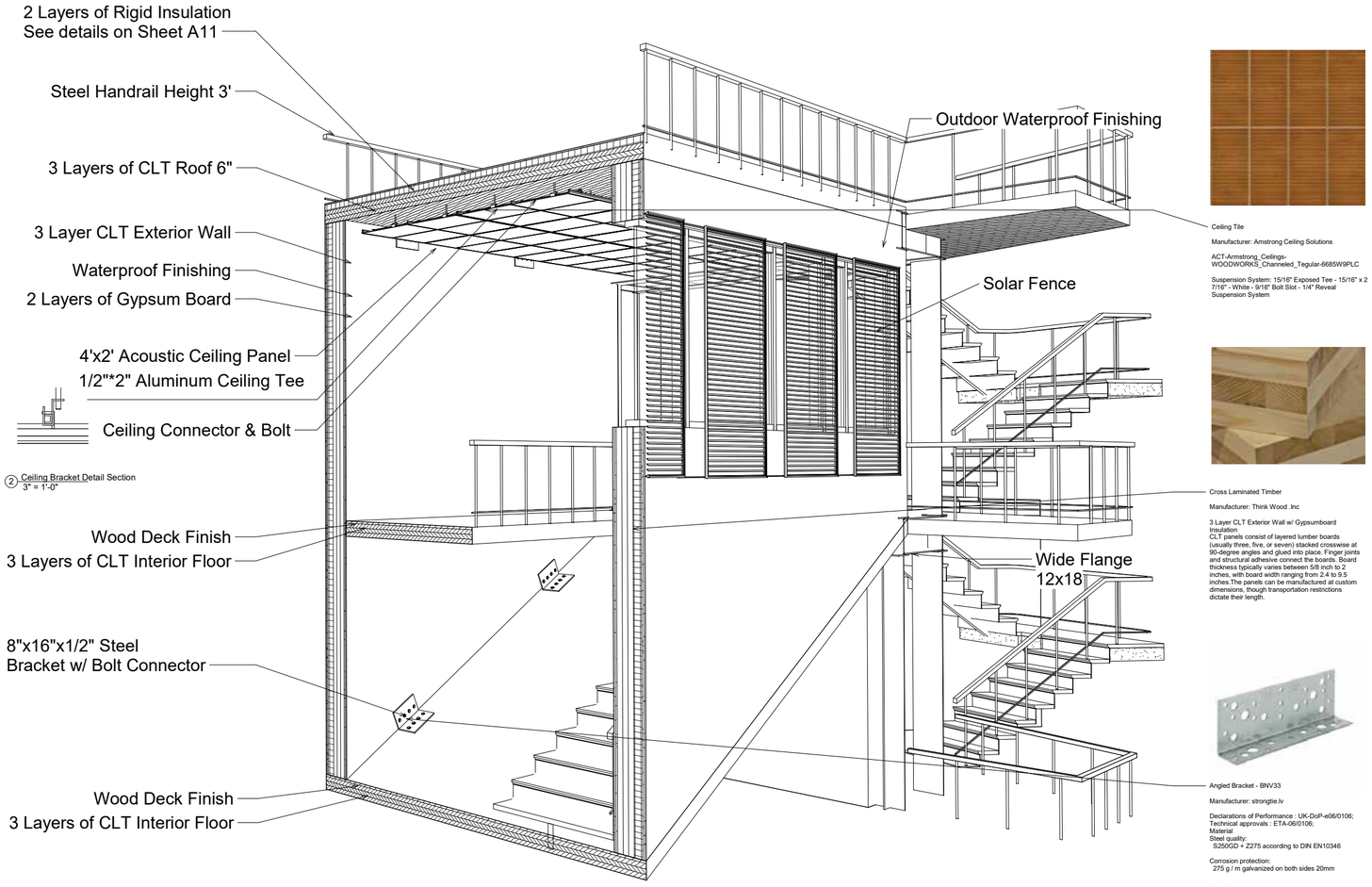
Brached Bar Stair Workplace Single Room Co-working Stair Auditorium



Solution 1 Solution 2 Solution 3

ASSEMBLY

Cross Laminate Timber
+
Pre-fab Units



Ceiling Tile

Manufacturer: Armstrong Ceiling Solutions

ACT-Armstrong_Ceilings-WOODWORKS_Channeled_Tegular-6685W9PLC

Suspension System: 15/16" Exposed Tee - 15/16" x 2 7/16" - White - 9/16" Bolt Slot - 1/4" Reveal Suspension System

Cross Laminated Timber

Manufacturer: Think Wood .Inc

3 Layer CLT Exterior Wall w/ Gypsumboard Insulation
CLT panels consist of layered lumber boards (usually three, five, or seven) stacked crosswise at 90-degree angles and glued into place. Finger joints and structural adhesive connect the boards. Board thickness typically varies between 5/8 inch to 2 inches, with board width ranging from 2.4 to 9.5 inches.The panels can be manufactured at custom dimensions, though transportation restrictions dictate their length.

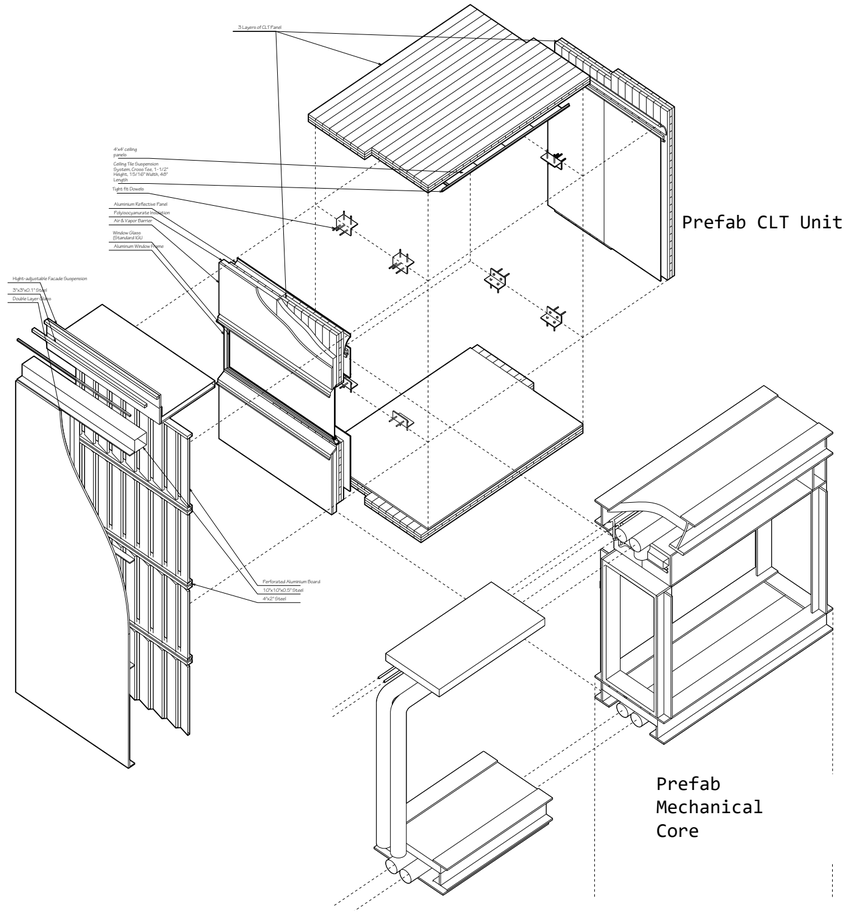
Angled Bracket - BNV33

Manufacturer: strongtie.lv

Declarations of Performance : UK-DoP-e06/0106;
Technical approvals : ETA-06/0106;
Material
Steel quality
S250GD + Z275 according to DIN EN10346

Corrosion protection:
275 g / m galvanized on both sides 20mm

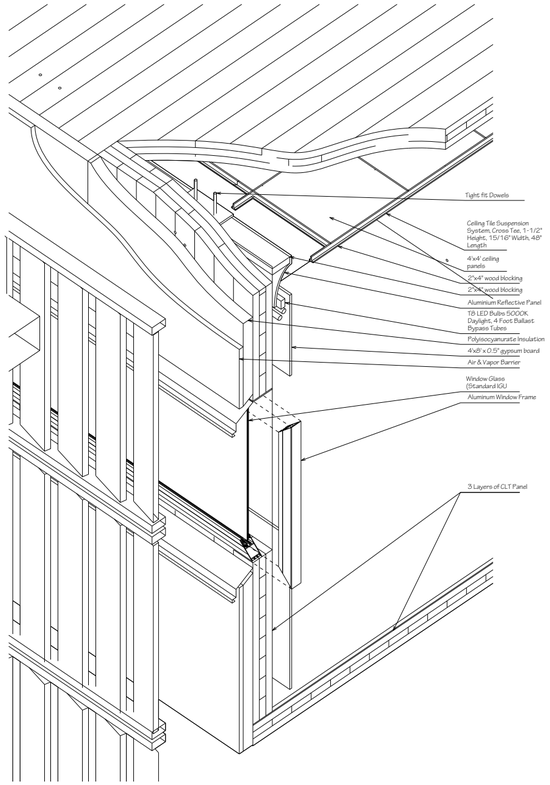
Benefits

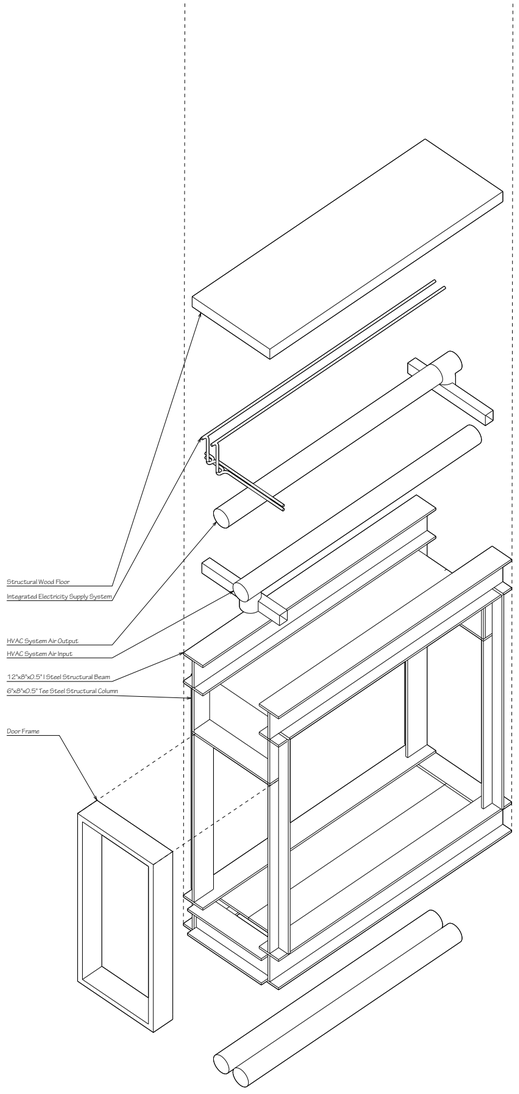


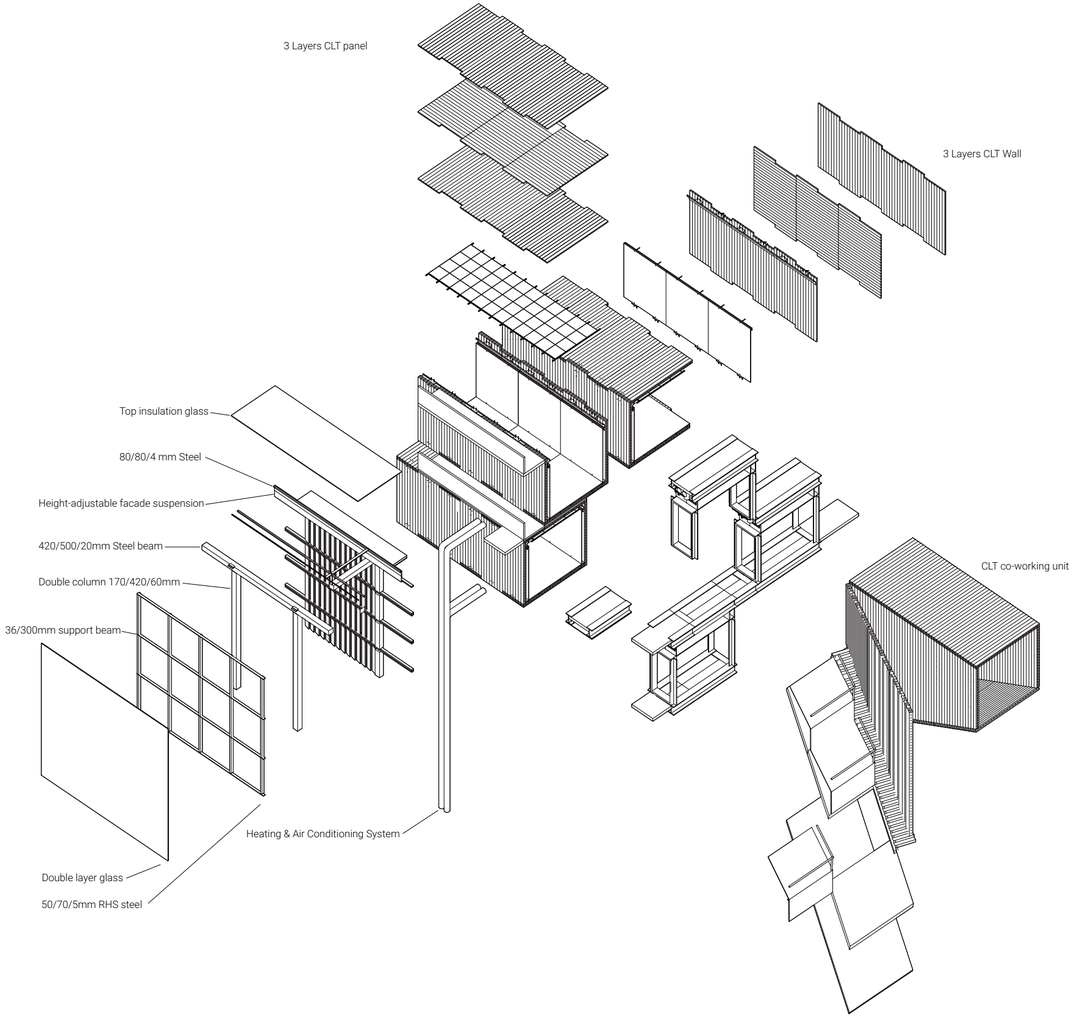
ENVELOPE

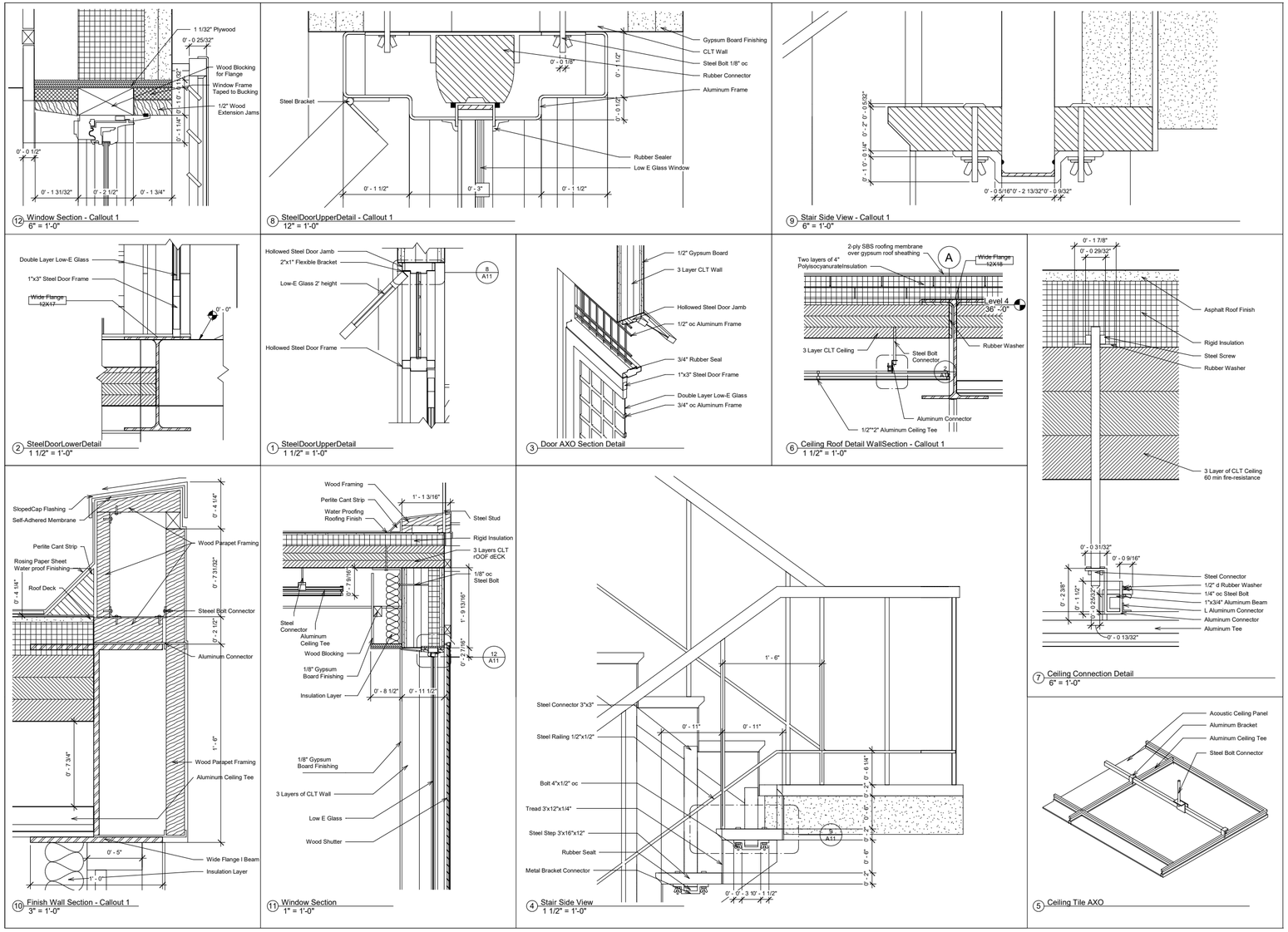
Insulation/Facade

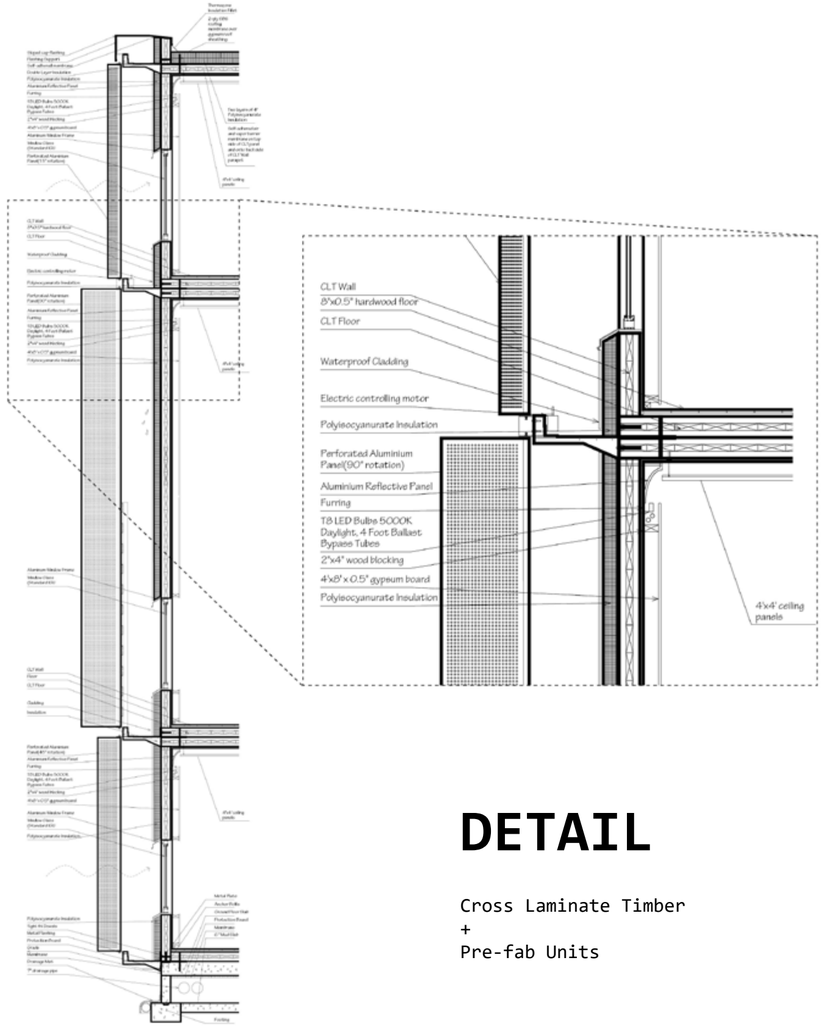
Mechanical/HVAC system are integrated into panel, and fast installed on site. Panels are prefabricated with Cross Laminated(CLT) Panels, and fast constructed on site. Mechanical pipes are fabricated in modules, and supplied from ends of CLT units.











DETAIL

Cross Laminate Timber
+
Pre-fab Units

>>>>Document Available HERE

THE FUTURE

IS HERE.

THANKS FOR READING

More Dynamic Content at

uvnlab.com

Visualization Show Reels

http://uvnlab.com/archive/

All rights Reserved Yufan Xie 2021