CHIEN-HUA HUANG

PORTFOLIO 2021

University of Applied Arts Vienna, M.Arch, 2020
University of Liverpool & Xi'An Jiaotong Liverpool University, B.Eng, 2014
Pannaschgasse 5-7, 1050 Wien (Vienna), Austria
6608651168
chienhua.huang91@gmail.com
www.chienhuahuang.com

6 Minute Video Presentation of Portfolio

> https://youtu.be/rvkfgRgtkbo <

Phygital Model
Reform Standard
Chien-hua Huang

Reform Standard

Material-informed design through reinforcement learning

Pass with Distinction / Exhibited at MAK Museum Vienna

Supervisor	Greg Lynn
Examiners	Hani Rashid, Karin Raith, Mario Carpo, Klaus Bollinger, Brian Cody, Christina Diaz Moreno, Efren Garcia Grinda, Matthias Boeckl
Advisors	Maja Ozvaldic, Bence Pap, Kaiho Yu, Martin Murero
Date	2020.JAN - 2020.JUN

Reform Standard is a machine-learning-driven searching process that designs new structures generated from existing wasted materials. Using reinforcement learning, machine vision and automated searching process, the project aims to promote a material-informed design circle and converts wastes into potential resources.

The project starts with questioning the problematic standardization that is widely practiced in all industries. Standardization brings significant benefits to social and economic value with its organizational efficiency. However, it also generates increasing wastes and wasteland due to its one-way process that takes homogeneous inputs and processes. Reform Standard argues that an alternative level of flexibility in standardization – or a counter-process, "de-standardization" - through AI and capacity of computers' searching power, will eventually revalue/objectify waste and redefine the notion of wasteland. With such an approach, architectural design can be informed by the material input at the beginning of design, which brings the potential to a better economic cycle and social value. The notion of wastes in the future world could then be redefined as new natural land to be explored, designed and occupied by inhabitants and economic entities.

The project sorts and transforms irregular chunks of wasted broken plastic into a new form. Instead of recycling those wastes in an energy-intensive process, the engine is finding the intricacy and new machine-oriented aesthetics in those otherwise neglected wastes. Reform Standard not only revitalizes waste materials' lifecycles but also develops a more sustainable way of design that fundamentally changes the way we perceive, and evaluate.

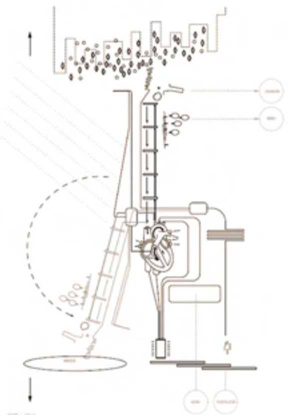
_Architectural Issues

Studying waste calls for disentangling the standardization within a contemporary industrial cycle, as it's responsible for a majority of waste. Timbers, for example, are usually cut into a uniform size and shape to be transported easily (Fath, 2001), which generates the first generation of waste due to machines' limited motion and standardized containers. Then the uniform timber plate will be further cut into smaller sizes for respective intention, which generates secondary waste due to the missing link from design to an original material source. Standardization essentially becomes the major role of generating the actual reusable waste. This is because of the concept's wide application in all fields such as production, agriculture, post-processing, etc. The reasons are mostly that the technology is not capable of dealing with reality and has to marginalize the real data down to platonic ideals. Standardization, "is the process of implementing and developing technical standards based on the consensus of different parties that include firms, users, interest groups, standards organizations and governments." (Xie, Hall, et al., 2016). Standard is particularly a protocol for communication, but not necessary for physical reality. Thus, a majority of waste is due to the standardization of a product's life cycle. For example, a redundant packaging for exceptionally long-term protection, standard material to be overcut to fit a particular building with less mass requirement. Standardization is good for a container to store them efficiently, but at the same time, it is uninteresting to define a container.

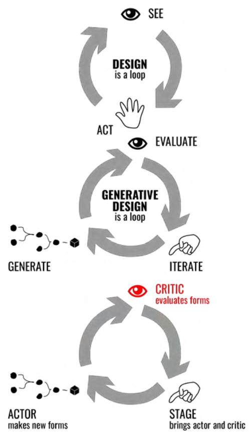
Tackling the shortage of standardization might be a growing thought of mass customization in the industry. However, the customization is built upon the efficiency evolution and power of computation in the delivery rather than on the material point of view. Thus, customization does not necessarily tackle the waste problem and the definition of waste.

Frontispiece of Nicolas Andry de Bois-Regard, Orthopédie, 1741.
Nicolas Andry

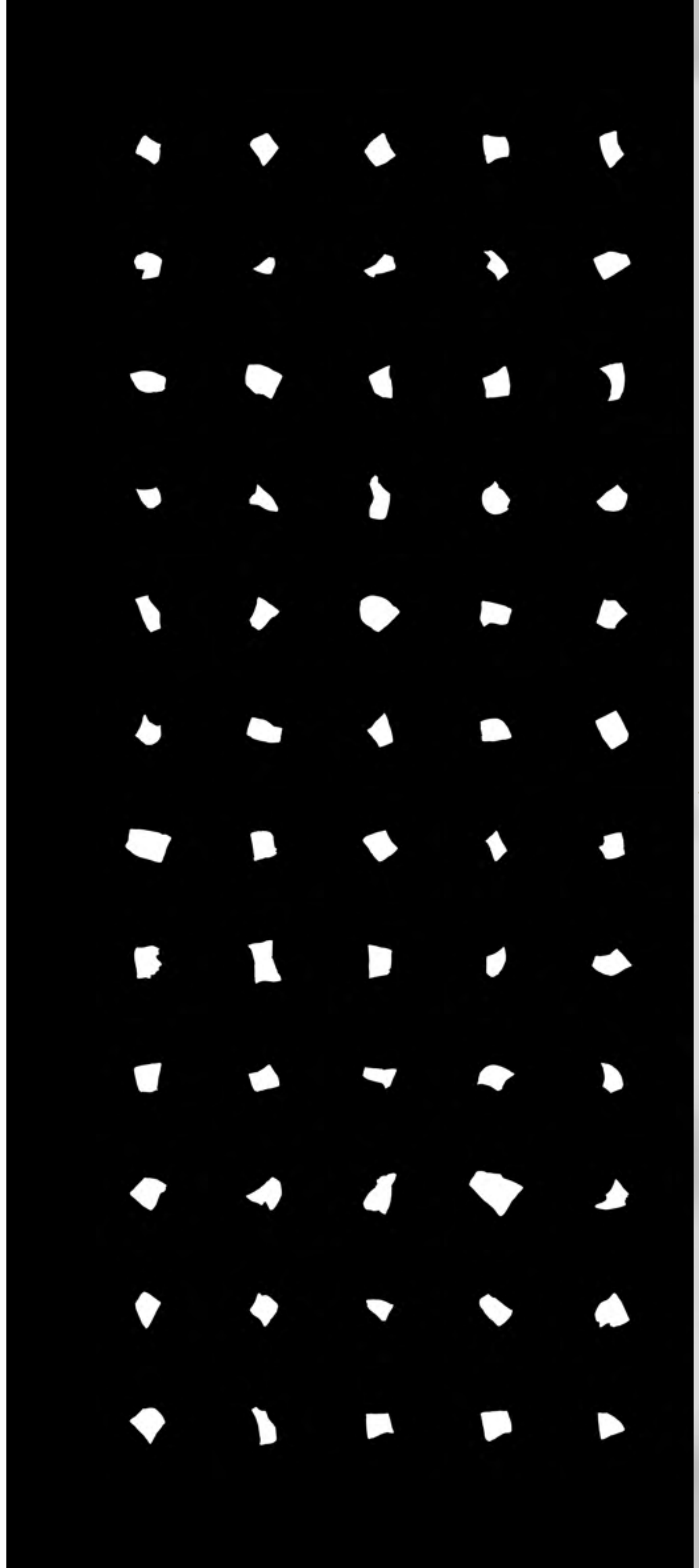
Frontispiece of Marc-Antoine Laugier: Essai sur l'architecture 2nd ed. 1755.
Charles Eisen

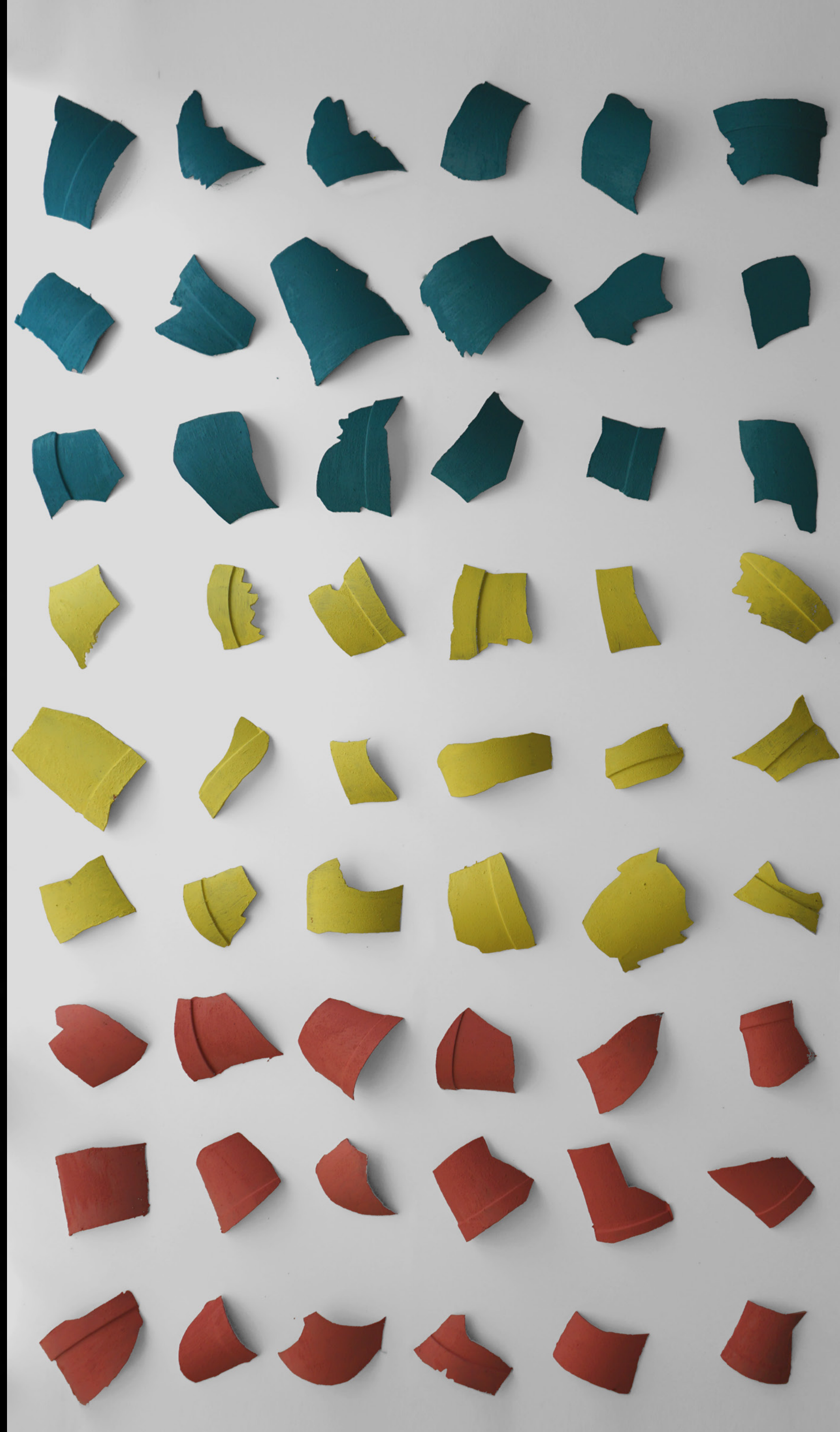


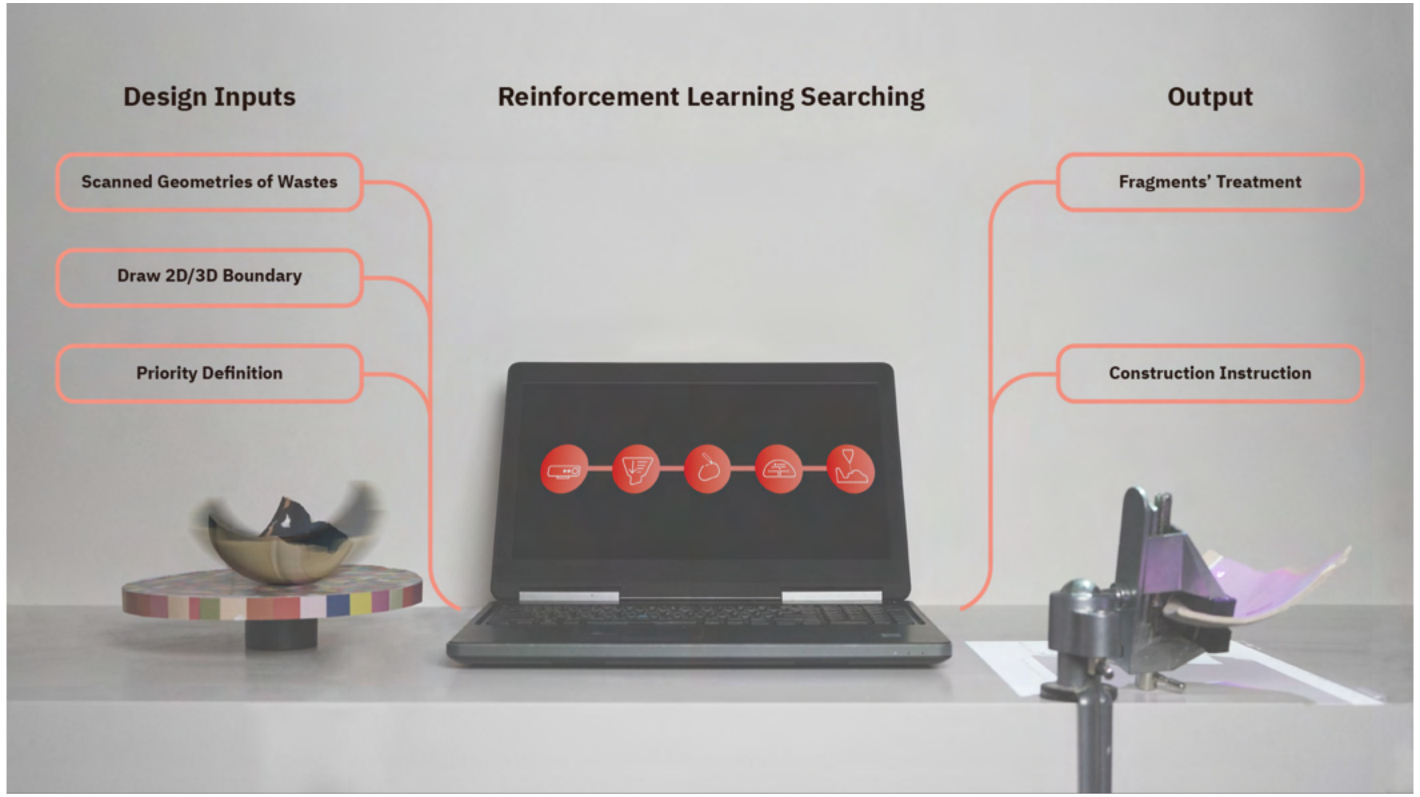
Giraffe diagram, 2012.
CODA



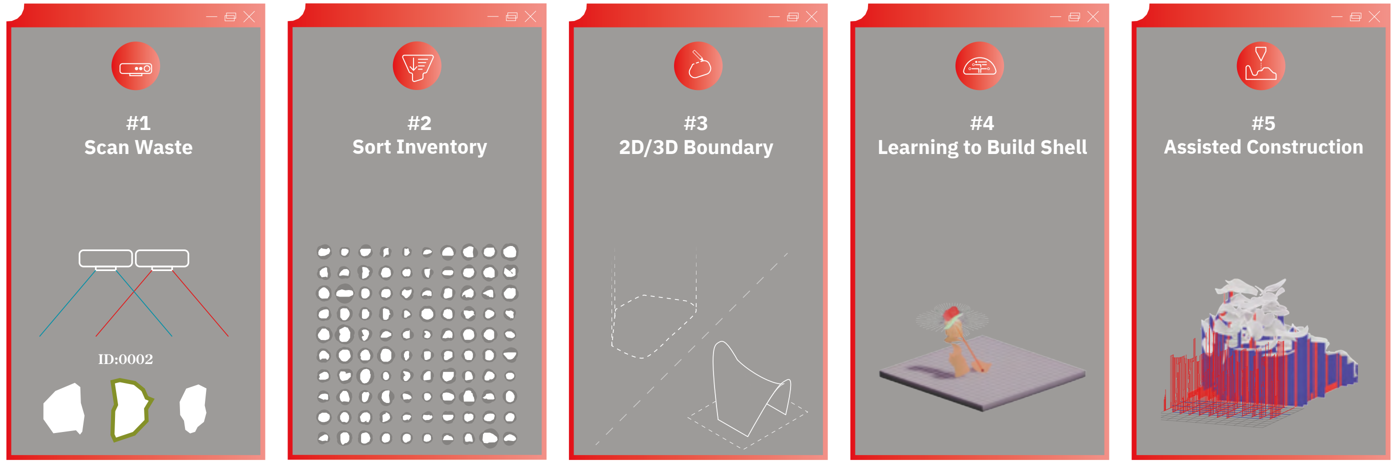
Design Loop, 2018.
Kyle Steinfeld







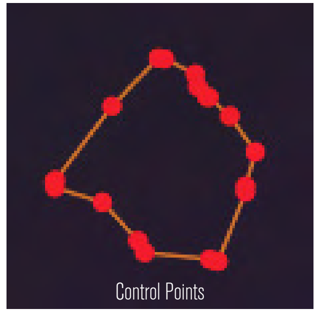
Programme input and output



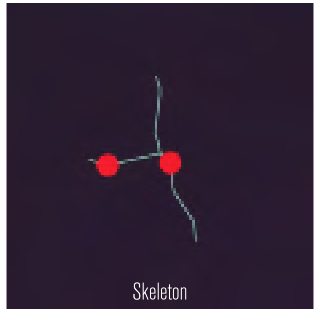
Digital workflow

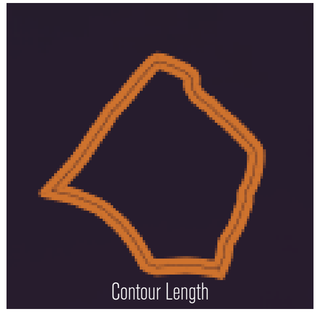
_Machine Vision: Analysis

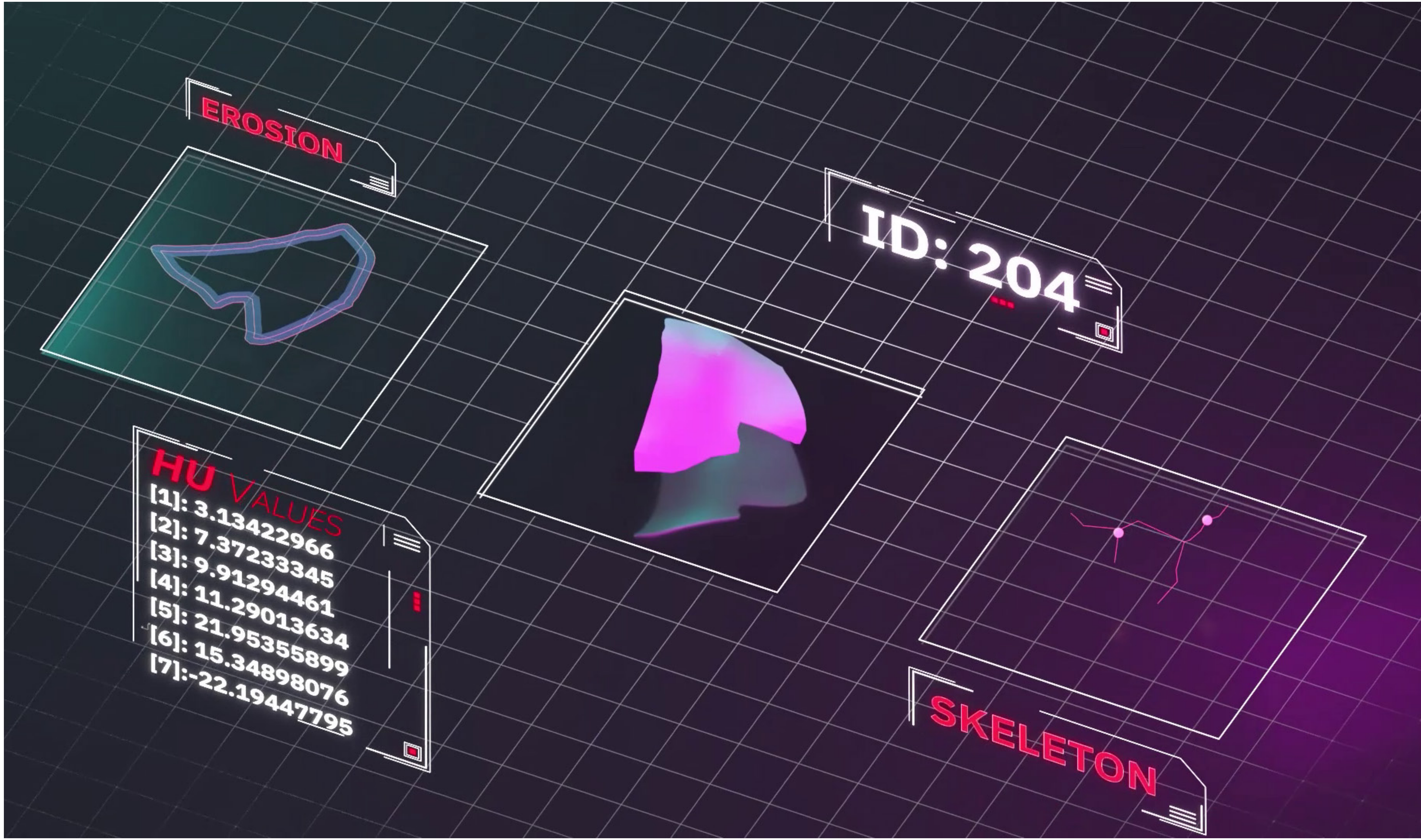
The first digital workflow process requires architects' first input sets of waste geometries, which are digitized with RealityCapture (RC) so they can be analyzed in Rhinoceros and Grasshopper. The following figures show the setup for photogrammetrically scanning the target with the highest possible resolution to build a precise 3D model resembling its physical counterpart. High-resolution scanning can ensure proper geometrical analysis and digital assembly. Each geometry is analyzed and sorted to enable sequential assembly in the searching process as the Unity program can place only one fragment at a time.


Control Points


HU

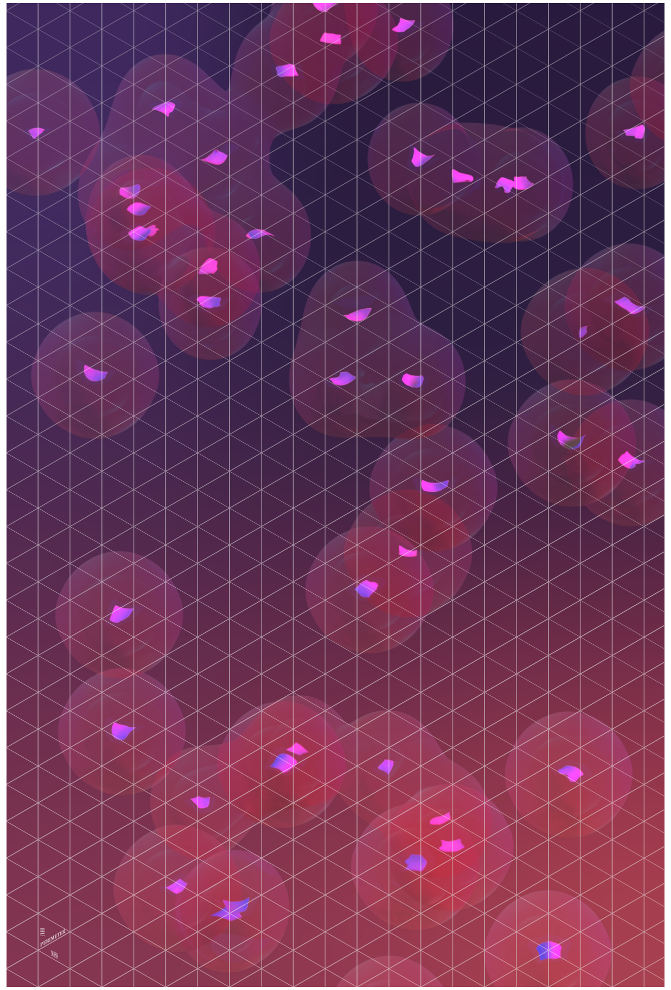

Skeleton

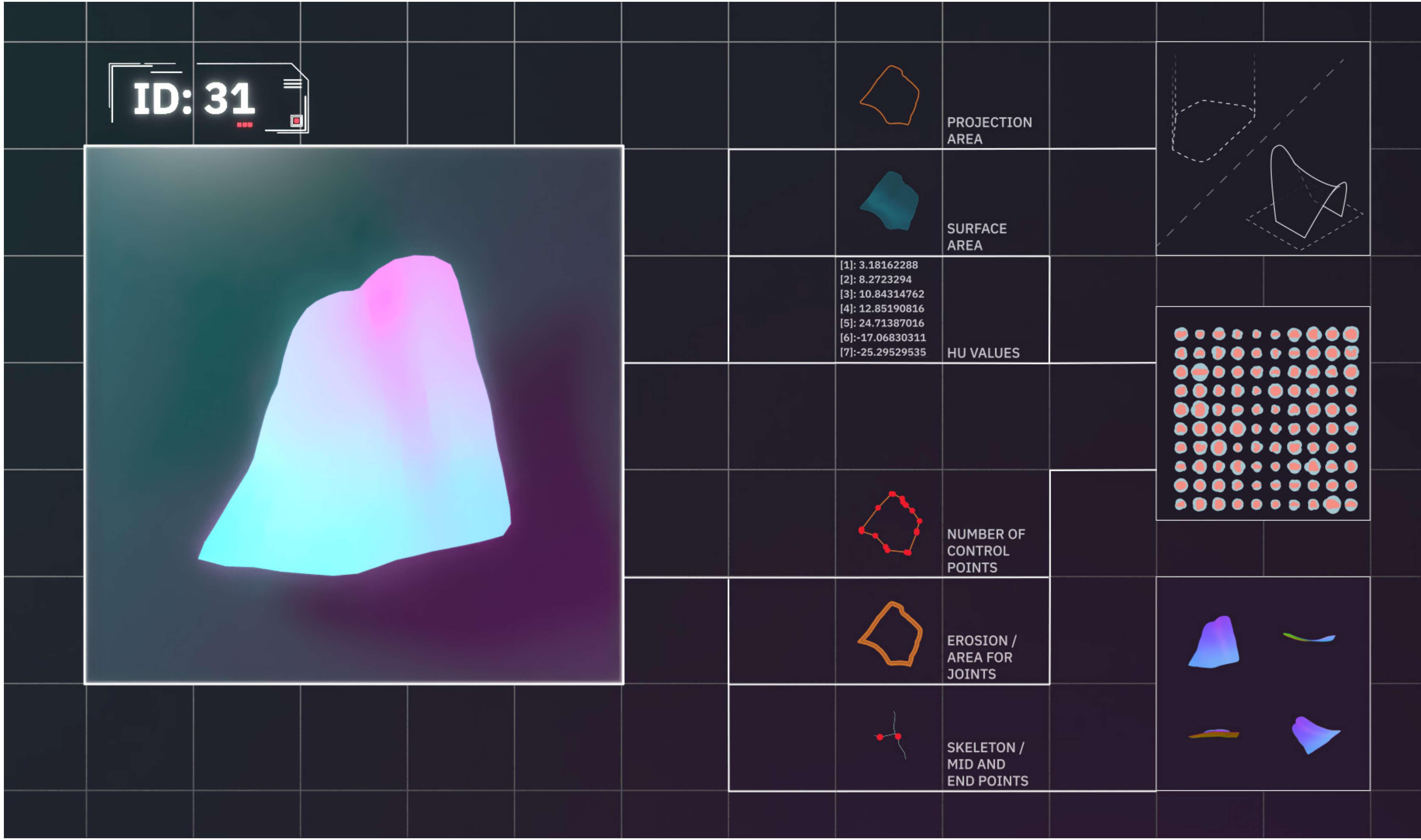

Contour Length



_Machine Vision: Sort

Through Grasshopper, different data are extracted from each fragment for their implementation in future processes. Specifically, projection areas are used to define the maximum boundaries of the assembling procedure. The surface areas, HU invariants, number of control points, and erosion maps' areas are multiplied with different weights to sum them up into one number for every fragment so as to sequence the inventory. The skeleton's midpoint and end points are exported to Unity so that ML-Agents can act according to the respective geometries' topologies.





_RL Smart Assembly

All the sorted fragments and optimized boundaries are inputted into Unity for an assembly simulation test to search for the best structural shell. The most important benefit of introducing RL in ML-Agents is that the complex methodology of constructing a structural shell with various criteria does not need to be exclusively developed by architects. Rather, designers merely input priority criteria to direct ML-Agents. ML-Agents summarizes the data collected from the previous steps and learns to build a method that can construct a shell with different priorities defined by the users. Eventually, the method can be saved as a neural network model (NN-model), a model resembling a brain, to control the agents' behavior.

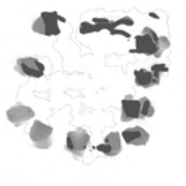

Plan ID:01


Plan ID:02


Plan ID:03


Plan ID:04

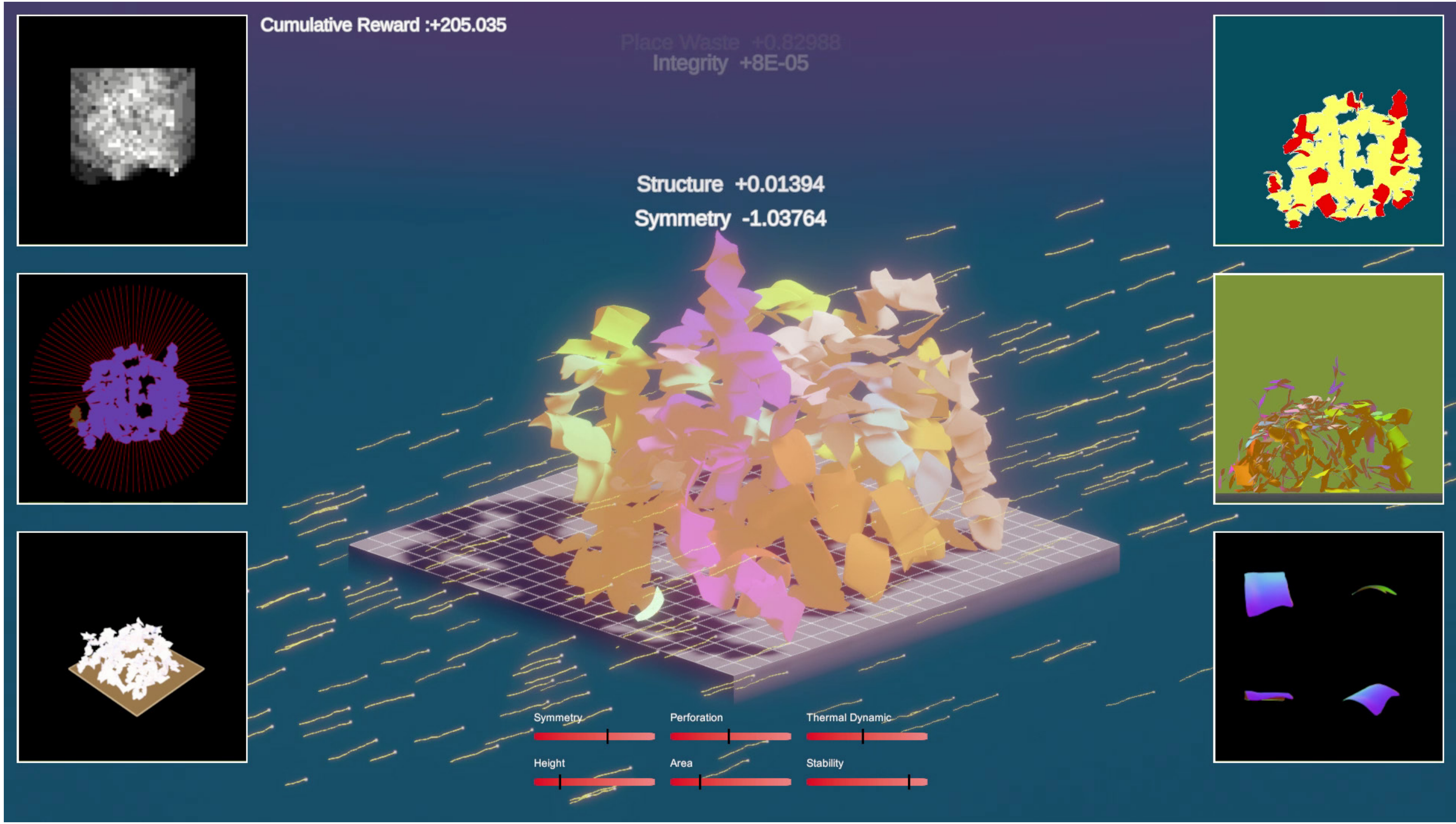

Plan ID:05


Plan ID:06

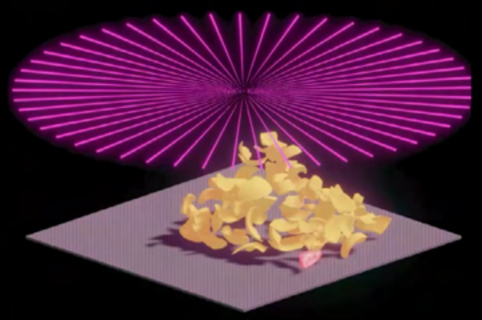

Plan ID:07


Plan ID:08

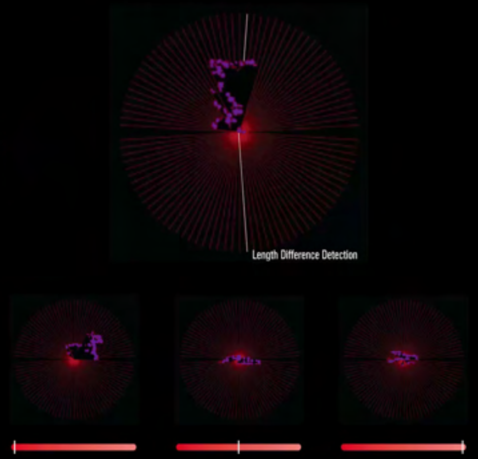

Plan ID:09

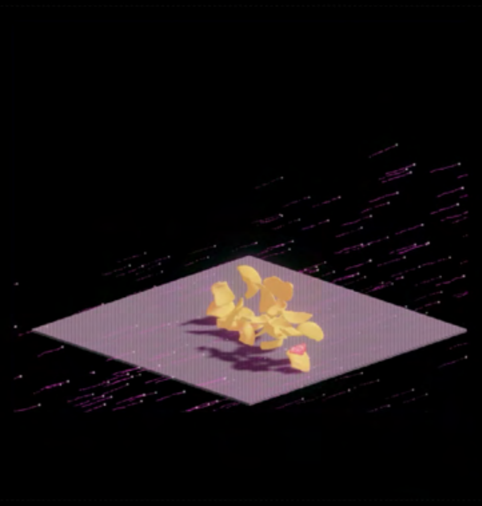


_Real-time Evaluation

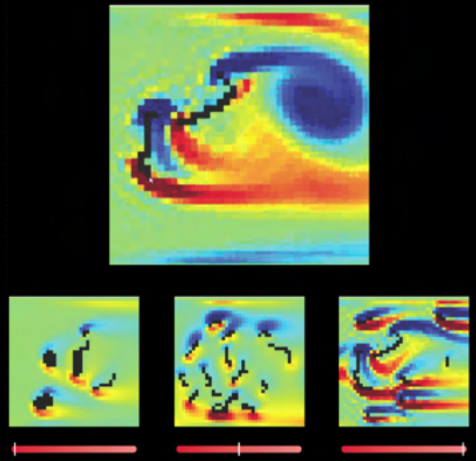


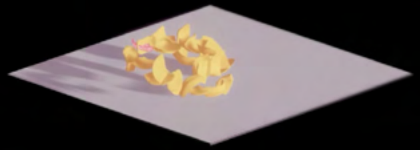
Symmetry Observation



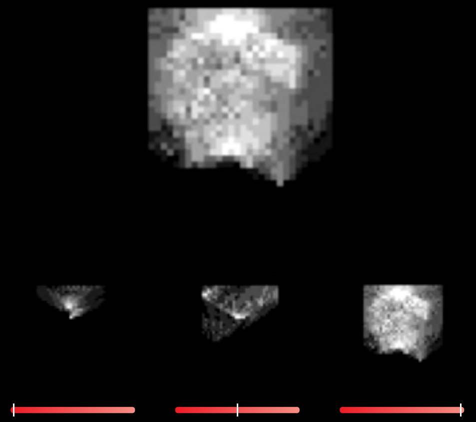


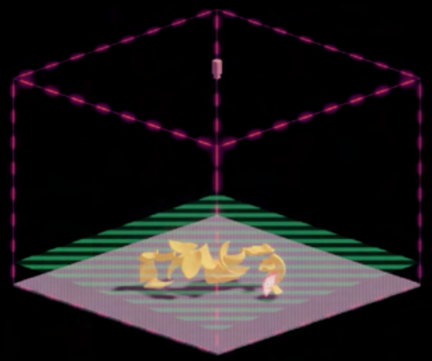
Wind Flow



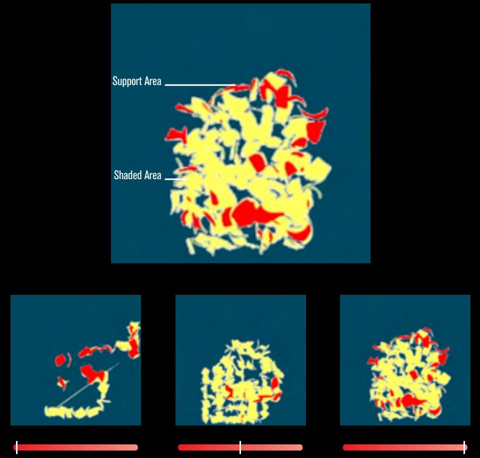


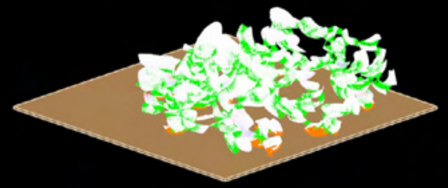
Perforation



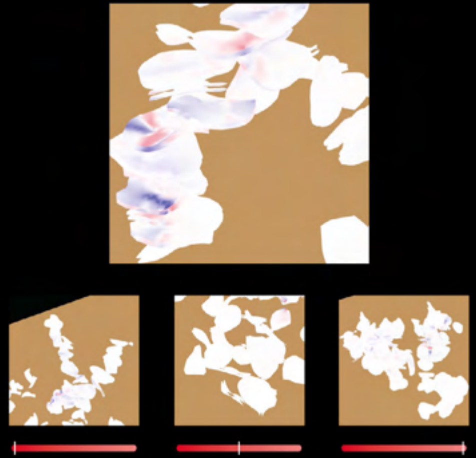


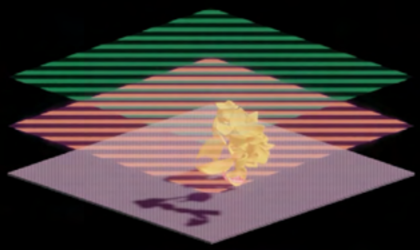
Floor Area



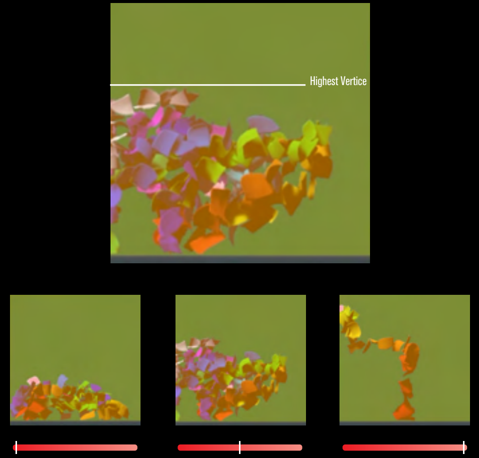


Structural Observation





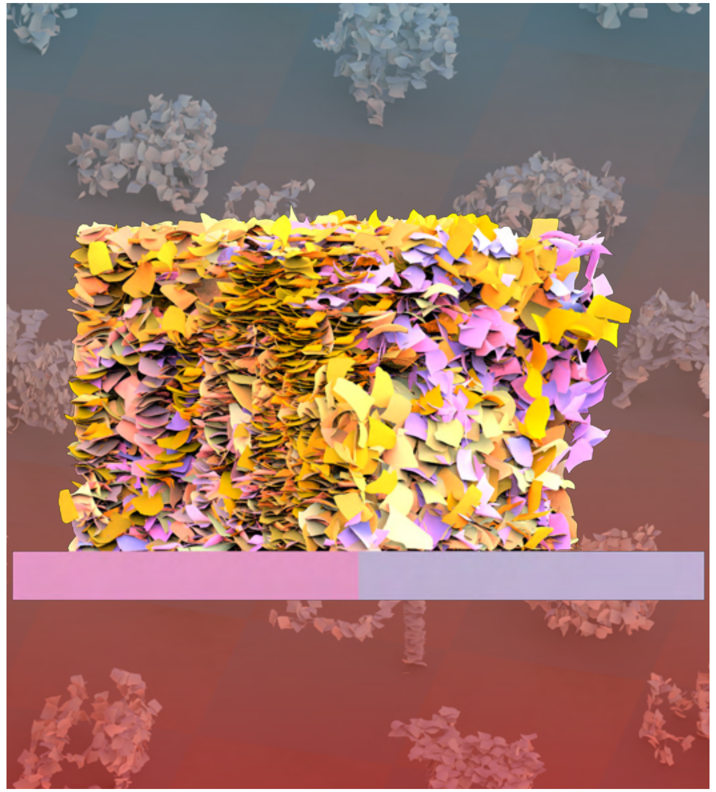
Height

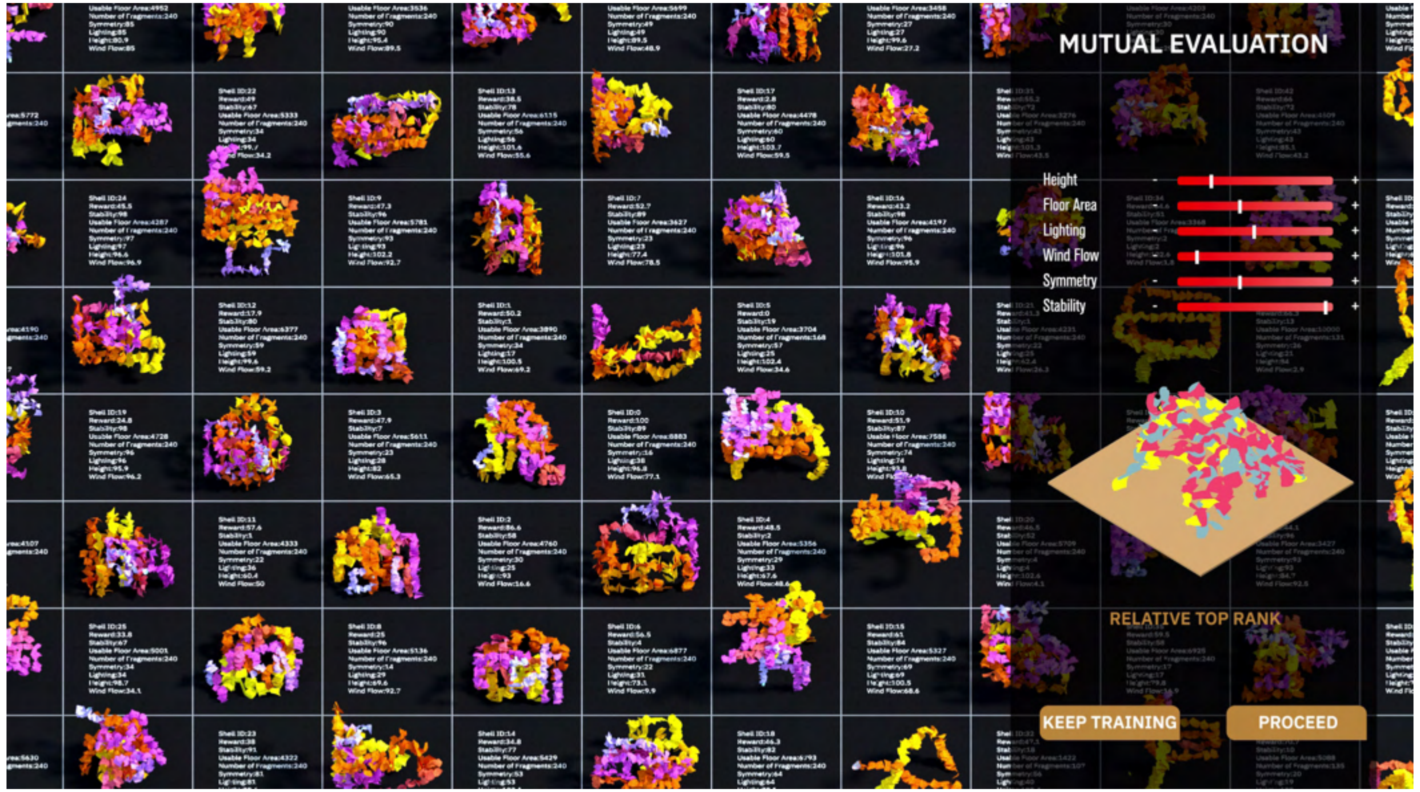


_Evaluation and Intervention

Six major types of data are observed to train ML-Agents to assemble according to the performance of such priorities. These data are obtained via the cross-platform synchronization of shell model and analysis. Rhinoceros and Grasshopper are connected to Unity through a user datagram protocol (UDP) connection. The geometries are streamed from Unity to Grasshopper for Karamba structural analysis. The analysis result is then streamed back to Unity through UDP for rewards stating. Other observation data, such as floor areas and thermal dynamics, are obtained using a camera within the game and RGB distribution analysis.

After the assembly simulation, the model of all the finished shells, their six scores, and an NN-model are saved. One shell can be selected to proceed based on the scores and the users' choices. The multiple reward evaluations and weights open up options for the users to curate their priorities according to their programs' needs. However, the nature of the evaluation may bring about results different from the users' expectations. The problem is caused by the different non-linear training trajectories used to obtain better scores for different evaluations.





_Construction and Test

After a decision is made by the user and the machine, the workflow will generate guidance on how to treat each fragment. This will aid the assembly of each fragment and ensure control and precise sequence. First, the connection points, drilling points, and their connection IDs indicating the fragments to be jointed are projected and marked on the geometry to exclude the digital devices' dependency. Plastic blind rivets were chosen as the joint because they are efficient for assembly purposes, homogeneous to plastic fragments, and lightweight. Despite the construction simplification, however, unexpected difficulties may arise when the assembly sequence is changed due to the need for temporary support. Thus, the whole procedure requires a fixed sequence.

_Future Implementation

.Artisanal Assembly via ML and Robot

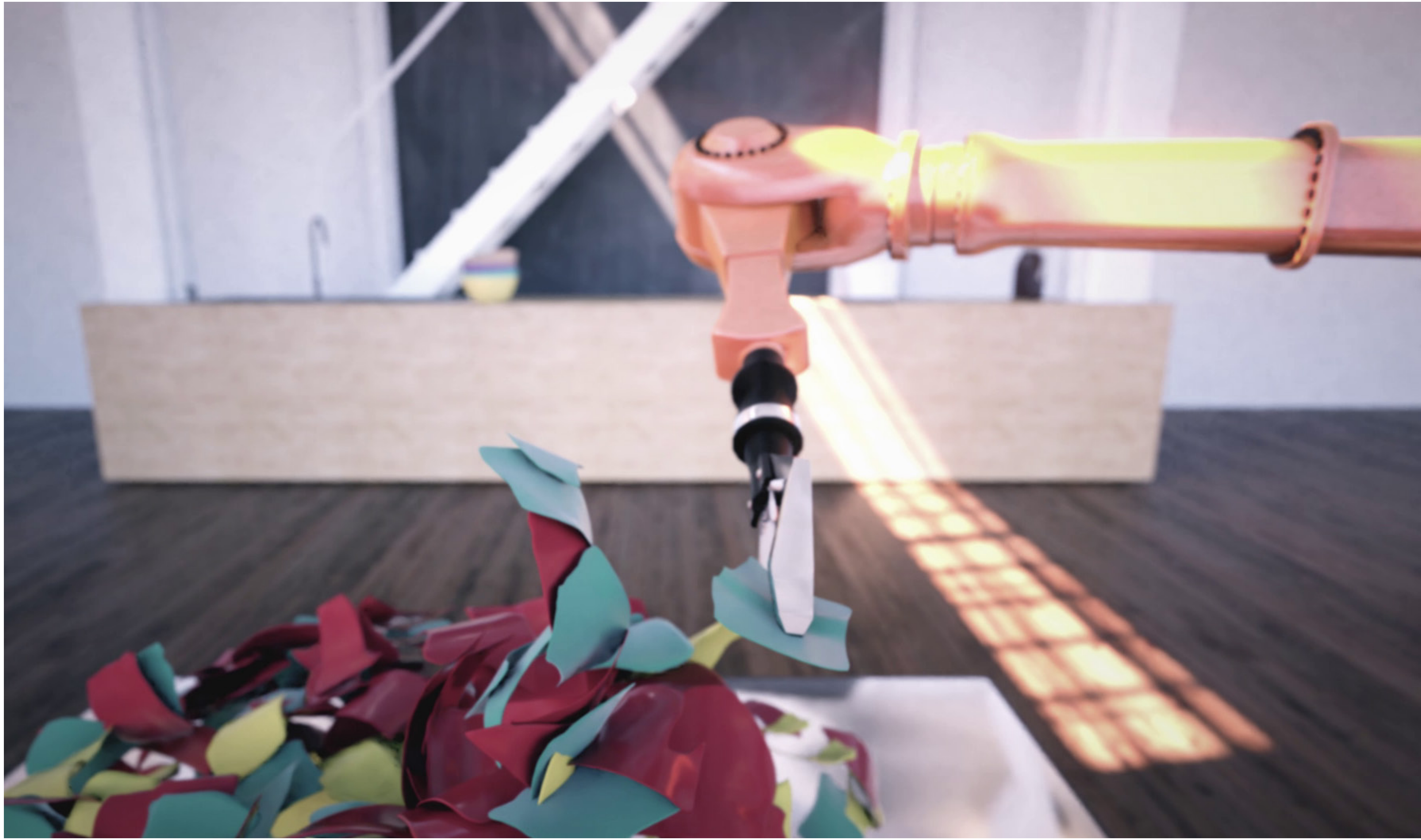
Through the combination of ML and robotic assembly, future architects can adopt an individual artisanal approach toward assembly. In the project, the workflow outputs instructions for complicated manual construction. However, robotic arms have the potential to handle such a complex assembly. Additionally, RL can enable robotic behavior and can interact with the environment. Therefore, it can be part of the input of ML so that during design, robotic movement becomes a design parameter. Specifically, after the digital assembly phase, the program can train the robot to find an assembly strategy and proceed to physical control, and to perform a task similar to digital simulation. Therefore, future experiments with robotic assembly in the digital environment will ensure the profitability of this workflow and will contribute to the industrialization of this procedure.

.Mixes of Materials and Joints

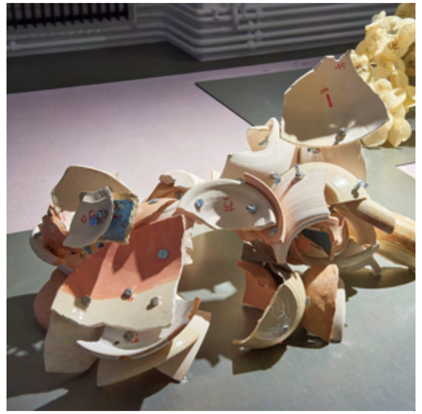
The mixed assembly of different materials is feasible by allowing the use of other types of joints, which offers a wider variety of building types. The double-pin joints in the project can already be applied to a significant number of materials, such as metal sheets and planks. A mix of different joint types may be necessary to enable other structural systems.

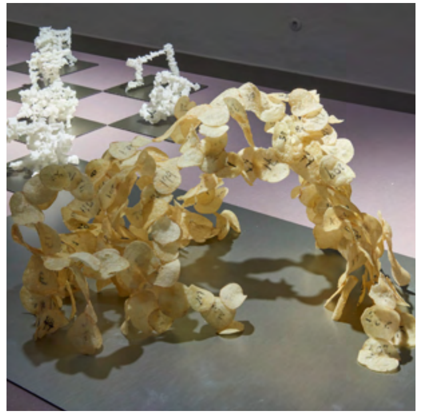
.Material and Computation E-Crowdsourcing

The digital production of the design algorithm promotes a potential new mass collaboration method through e-crowdsourcing. The potential new ways of practice through e-crowdsourcing are significantly beneficial as 'the ideas of permanent variability, parametric mass customization, and digitally driven mass collaboration that designers test drove during the age of the first digital turn are now spreading in all areas of contemporary society, economy, and politics' (Carpo, 2017, p. 75). The inventory of fragments for design inputs can ideally be scanned, stored, shared, and delivered everywhere. In such a case, the users do not need to scan all the objects found. They can order the wanted construction materials from the web inventory and build a desired geometry from the selection. This will help the users build more comprehensive structures with various textures and programs, which can build a more comprehensive inventory that considers all kinds of non-standard resources.






MAK Exhibition View, 2020
CREATIVE CLIMATE CARE
Reform Standard
MAK Gallery
photo: MAK/Georg Mayer

Sound, Light Simulation [Video :https://vimeo.com/313541784]

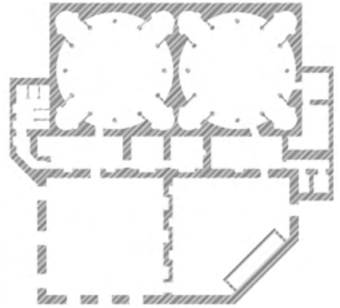
HAMAMI

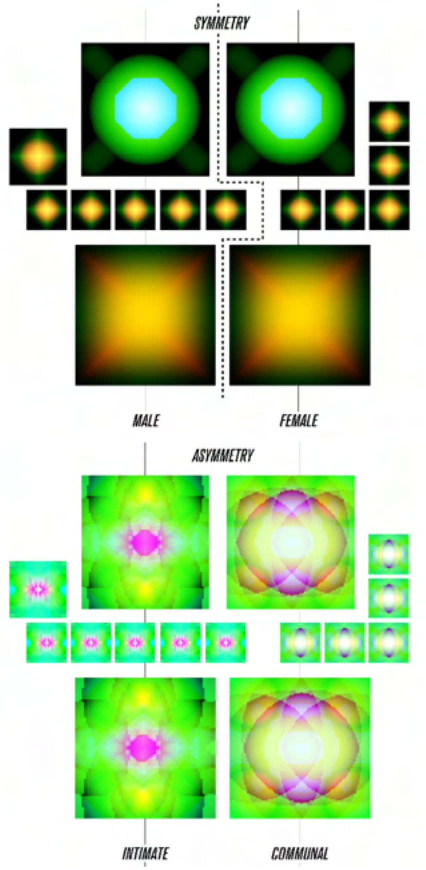
Tool to Sensual Landscape

Supervisor	Greg Lynn
Advisors	Maja Ozvaldic, Bence Pap, Dominik Strzelec Martin Murero
Partner	Zach Beale
Date	2018.OCT - 2019.JAN
Place	Istanbul, Turkey

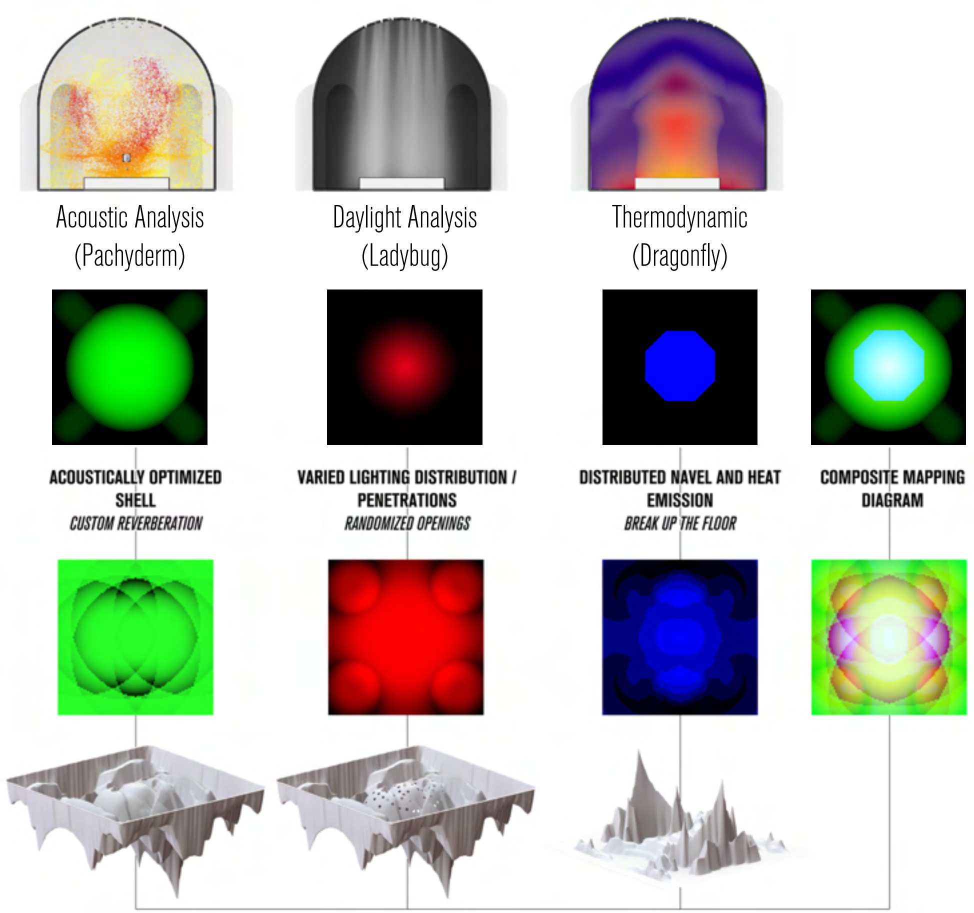
This semester we are asked to design a concrete shell structure for a hamam in Istanbul. Through active structural analysis and energy design tool, the shell structure should perform as a viable system that inform the space and quality. We invent a tool that allow a dramatic shift of sensation within one space by controlling the geometry of shell to respond to the environmental condition.

In our concept, we choose three profound effects: Acoustics, given that the Hamam was exceptionally reverberant, Lighting, given the changing qualities of light in the space, and Thermodynamics, given the importance of heat in the spaces. We used pixel-based diagrams. A green channel represented the acoustics, a red channel, the density of penetrations for lighting, and a blue channel for the distribution of the heat source on the floor, known as the navel. Because we could generate these maps automatically and manually, we had a nearly limitless combination of spaces to choose from simply draw three different channels in RGB. In the example, we chose two options, one with more intimate effects and spatial qualities, and one with more communal effects and spatial qualities. Finally, these two systems are connected by four self-supporting shell to separate it from urban influence.



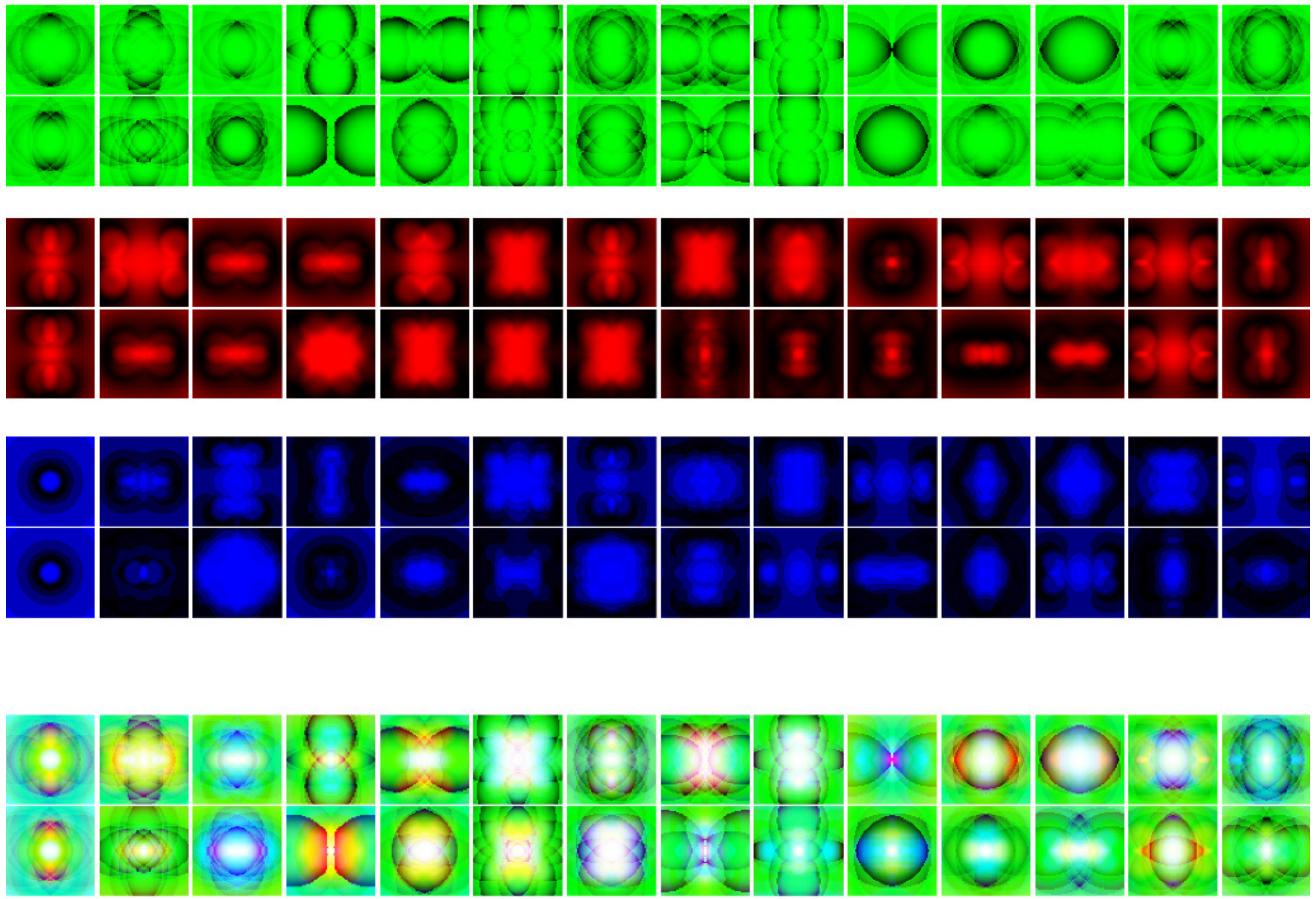


_Inner Shell: Sensual Experience as Design Tool



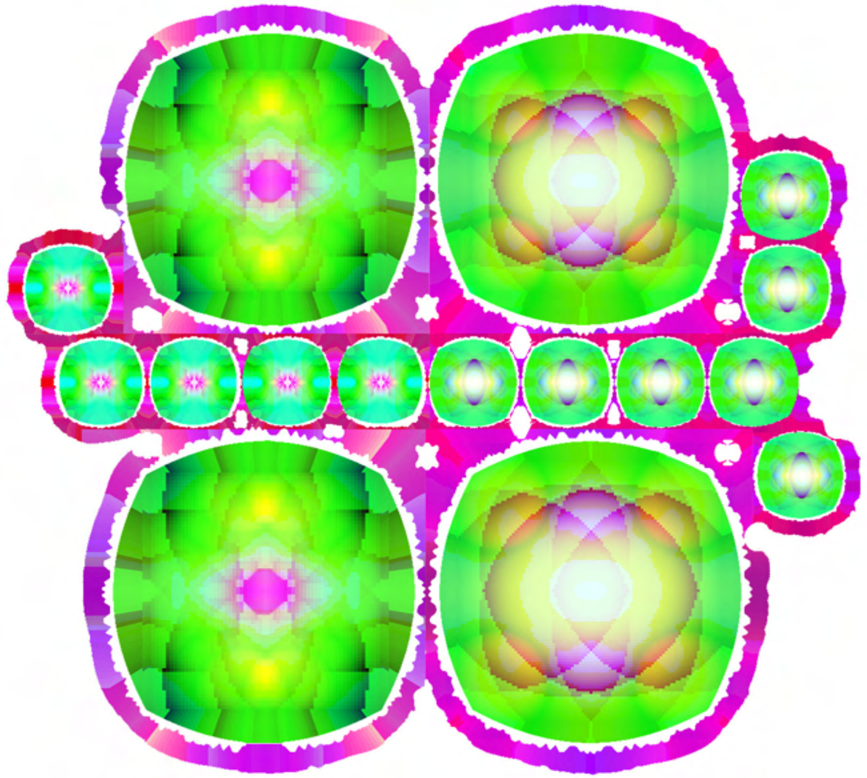
RGB Patterns as generator for sensual landscape within space

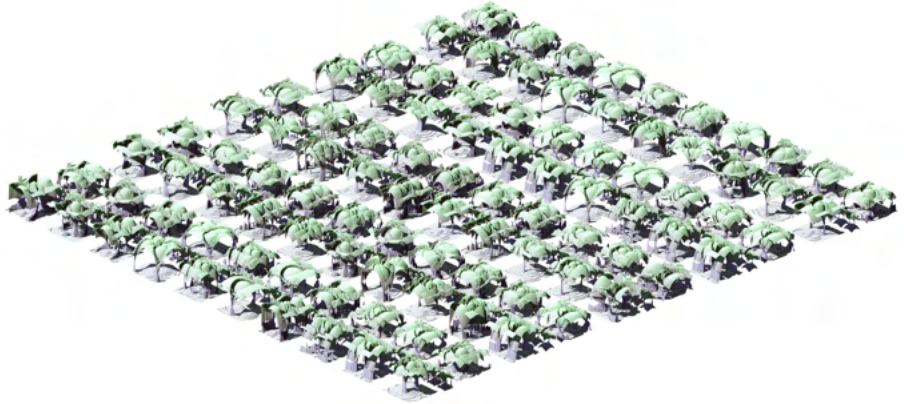
Space embedded with sensual info



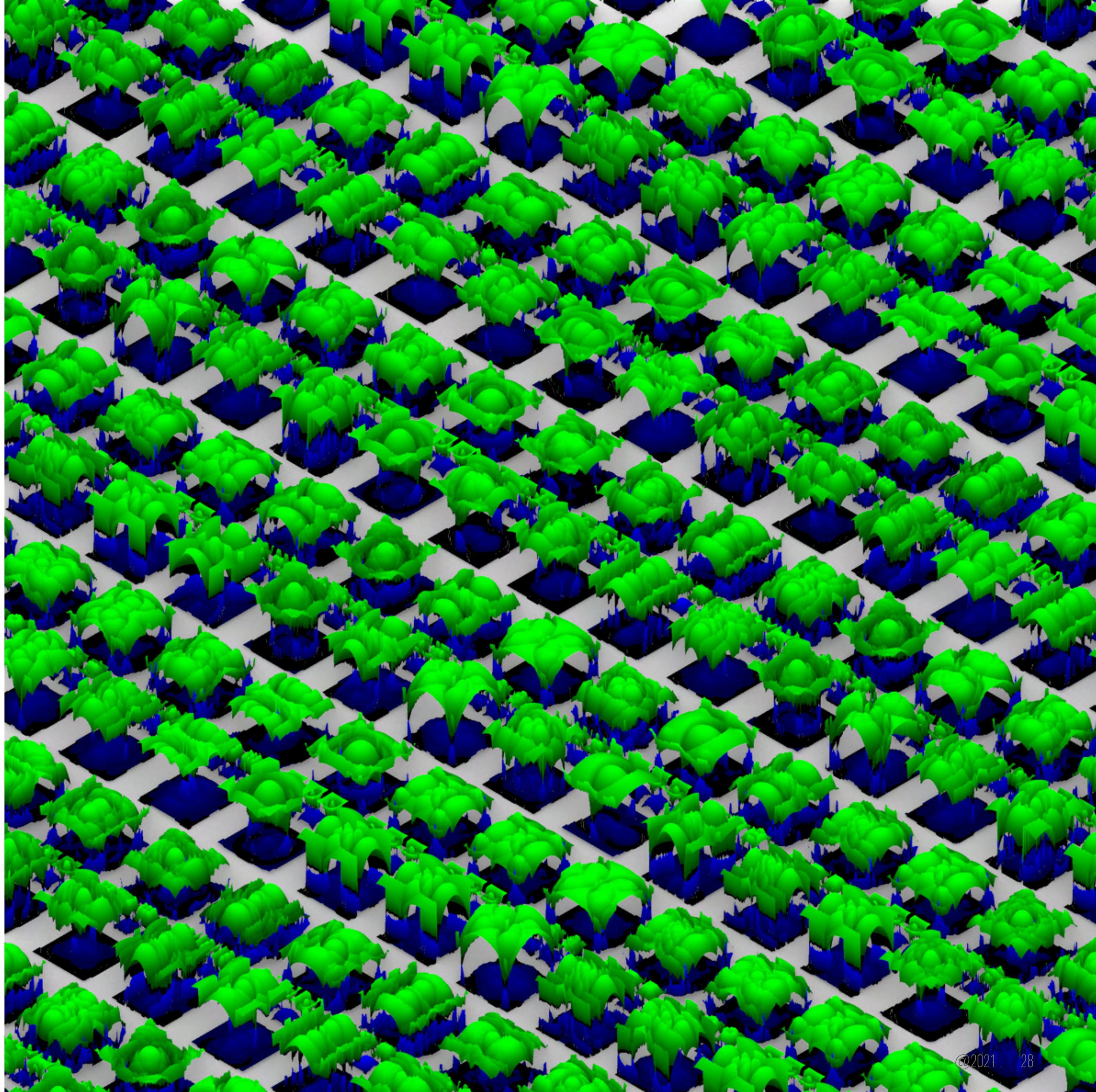
Green (acoustic) / red (lighting) / blue (thermal) maps and RGB composite maps

_Inner Shell: Generation

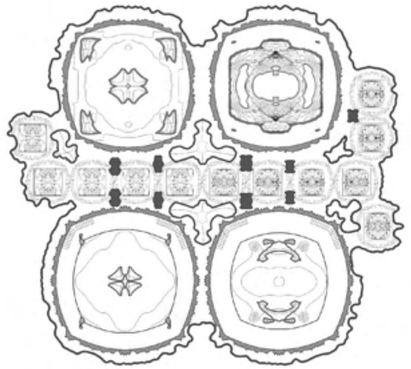




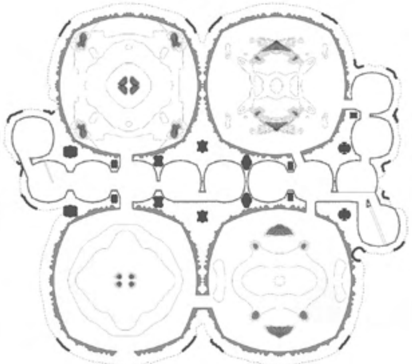
Floor and ceiling generation according to RGB maps



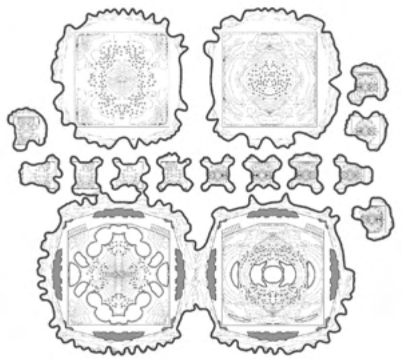
_Outer Shell



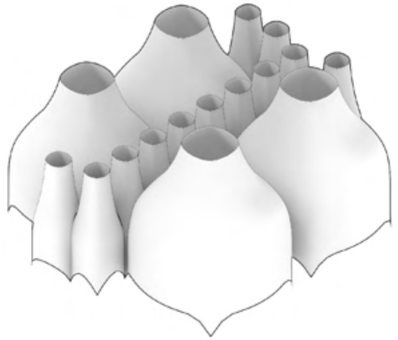
Plan GF



Plan 1F

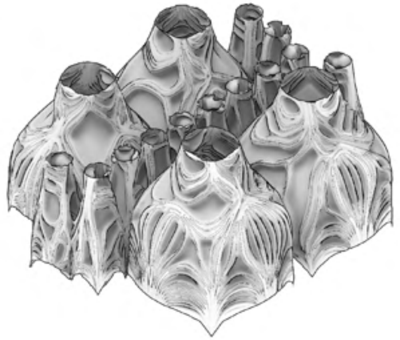


Plan TF



Primitive

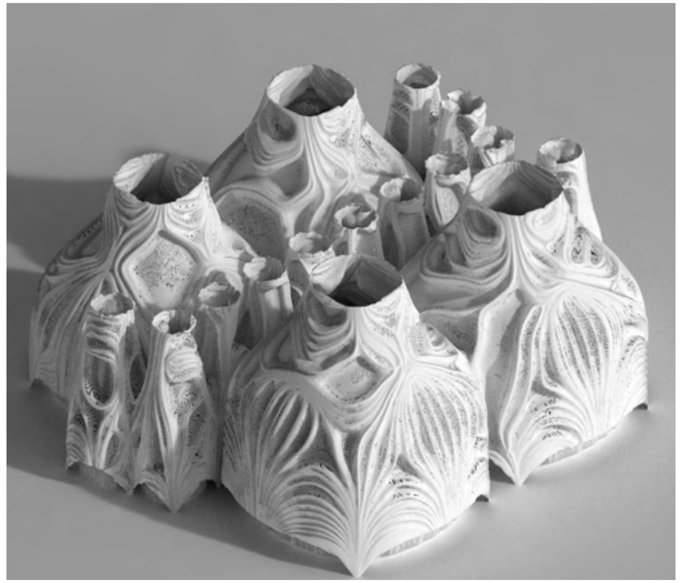
Stress lines



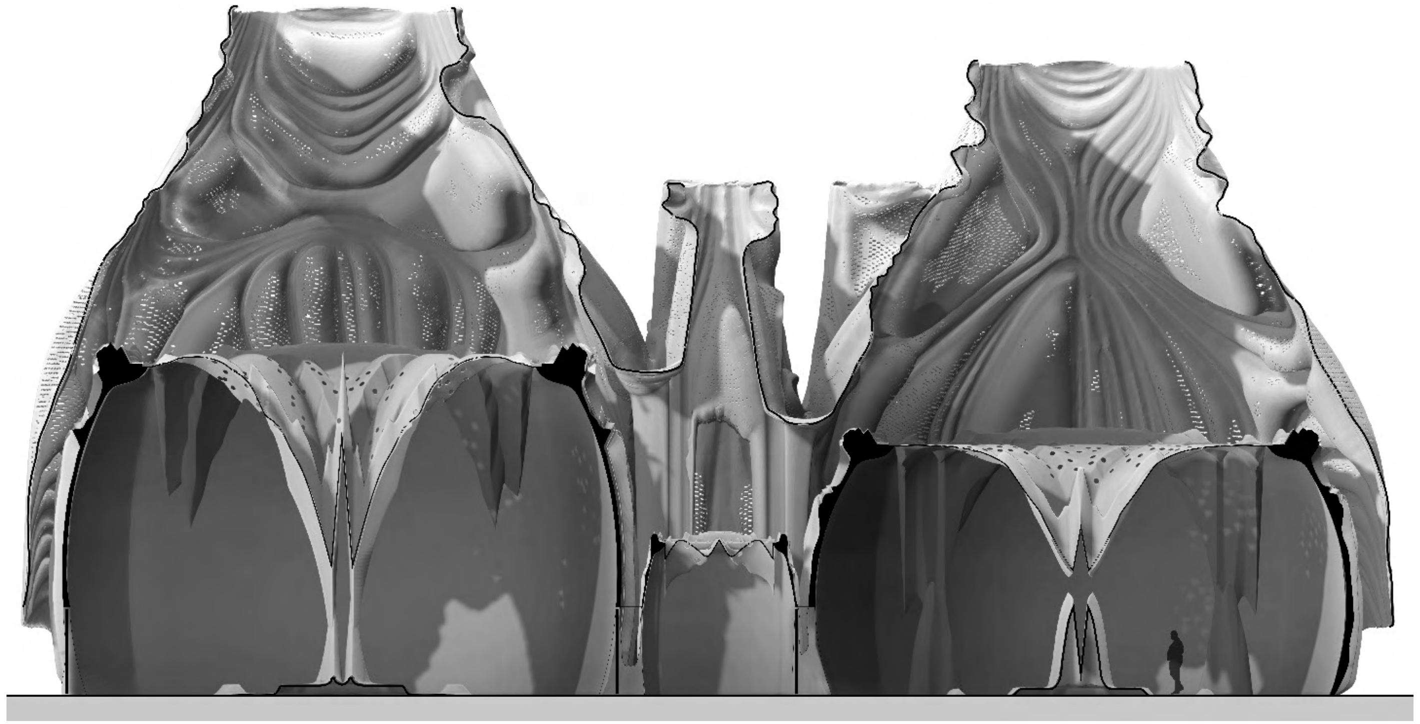
Thin shell generation

Once these spatial objects are arranged in plan, it becomes apparent that the interstitial spaces between the objects still require shelter. Thus, we generate an exterior shell system, totally self-supporting and separate form the interior shells. Both the interior shells and the exterior shells are corrugated based upon the forces against the shells under gravity. This reduces their necessary thickness, and increases their stability.

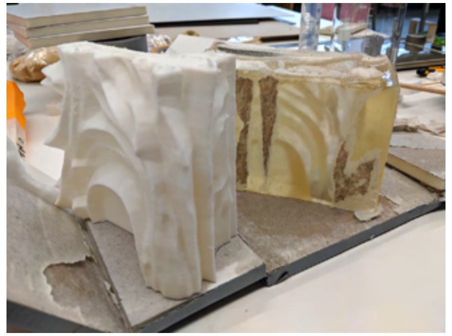
Inner shell

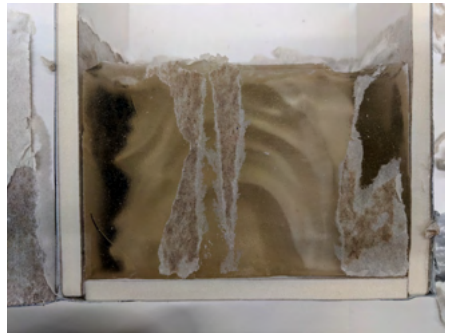


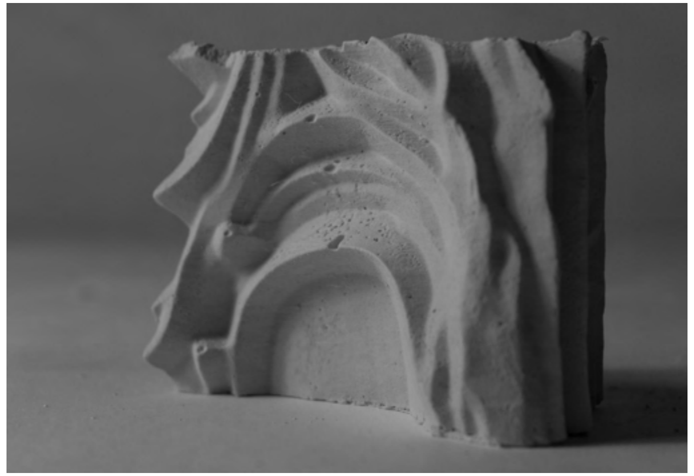
Outer shell

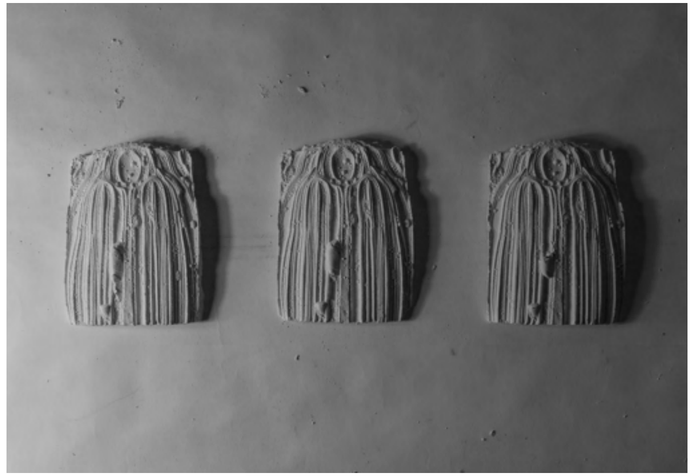


_Material Research









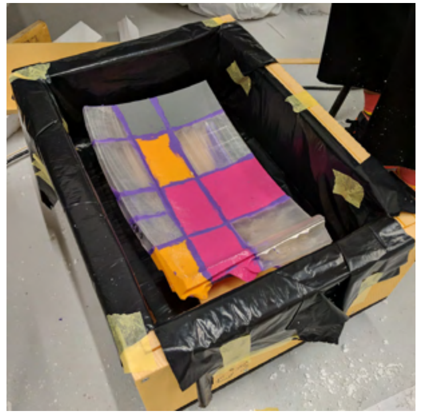
Gelatin Casting - Small Scale

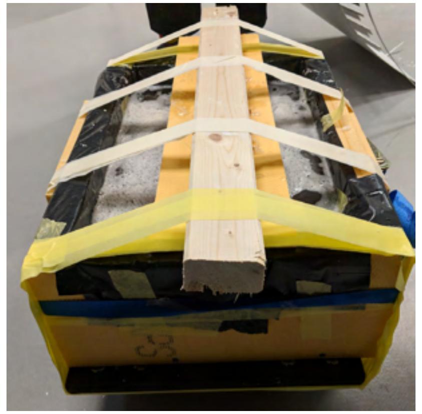
Gelatin is mixed with glycerin and water to create a firm, reusable molding material similar to silicone, for a fraction of the price. Benefit being that the molding material can be re-melted and re-cast. Gelatin compound was cast around 3D printed positive. Once cured in the freezer, printed positive was removed from gelatin, and plaster was cast in its place. Heat from the curing plaster did not seem to affect the mold, and a significant amount of detail was preserved.

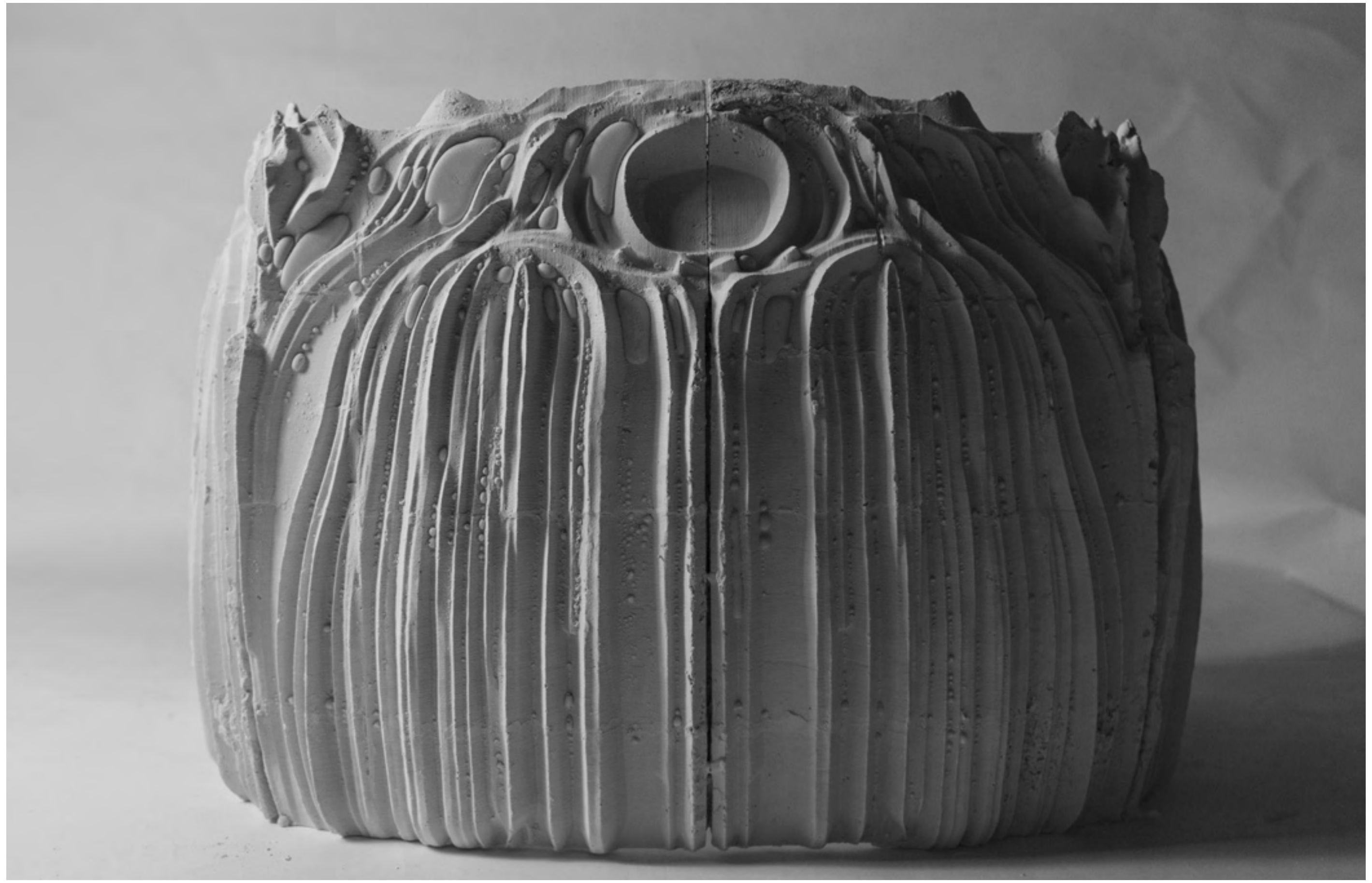
_Fabrication Research

Gelatin Casting - Large Scale

For casting larger components, the formula for the gelatin needed to be adapted to remain firm at a larger scale, incorporating less glycerin, and more gelatin. a total of 30 Liters were mixed, allowing us to cast pieces as large as 40cm x 25cm x 10cm. For these complicated shapes, we 3D printed the positives, then suspended them in a sealed box, which we poured the liquid gelatin into. Left to freeze overnight, the top layer of gelatin was cut away, along the perimeter of the print suspended below. The top was carefully removed, as was the print. The mold was chilled, then an equal volume of plaster to the print was poured in its place. The top was replaced to form the back side of the print, and evenly displace the plaster throughout the molding cavity. After 30 minutes, the top was removed to allow the plaster to continue curing, since the gelatin is water-based, the plaster will not fully cure unless exposed to the air. The plaster piece was carefully removed, and the mold was cleaned and chilled for re-use.







_Fabrication Research

Thin-Shell forming with Reinforcement

Supports are constructed using simple wooden sticks and tape as 'ribs'. Plaster bandages are laid across the supports, and once dry, the bandages are painted on both sides with liquid plaster. Layers of plaster are added until the thickness of the shell allows it to be stable without the supports. In this case, a thickness of 2-3mm was achieved. A hand-carved Styrofoam scaffold was used, matching a digital model, and a projector was used to draw the reinforcement lines from the digital model.

photo: Juergen Strohmayer

NEW GUABULIGA MARKET

Research>Design>Build

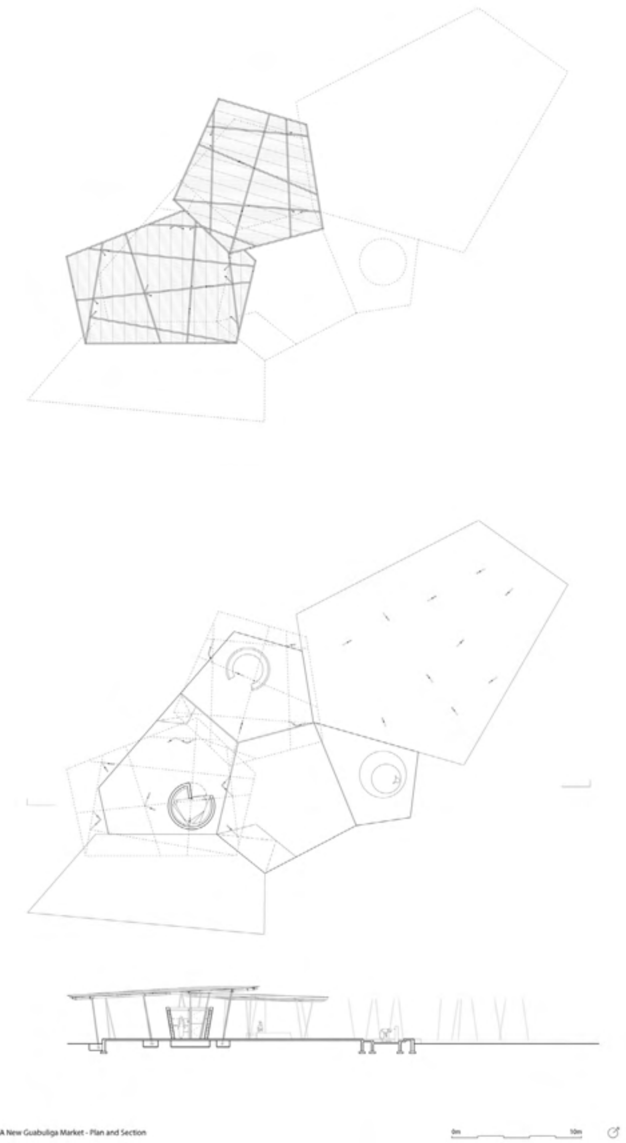
Discovery of the year - Architecture MasterPrize 2020
Finalist - Archdaily Building of the Year 2021

@ [applied] Foreign Affairs

Supervisor	Baerbel Müller
With	Magda Gorecka, Toms Kampars
Support	Juergen Strohmayer, Abdul-Rauf Issahaque
Date	2017.OCT - 2020.FEB
Place	Guabuliga, Northen Region, Ghana

The New Guabuliga Market is the latest design and implementation project that has been growing from the [applied] Foreign Affairs lab's engagement with the community of Guabuliga in northern Ghana since 2011. The design innovates by bringing ideas of growth and appropriation to a market through ambitious form, high quality, robust materiality, and novel construction techniques.

The market was built with local labor and professionals, from architectural design expertise to local masons and welders, (un)skilled laborers, women, and the networks of local architects and development partners. The project was not conceived as a design-build but rather as a way to engage diverse people and partners that foster a local and regional network of experts. The construction has provided income-generating opportunities for people in the community itself, for whom unemployment during the off-farming seasons is high.



[a]FA New Guabuliga Market - Plan and Section

_Redefine Contextual Sustainability

The project was developed not only as a piece of infrastructure but also with visions of Guabuliga's urban and commercial growth in mind. The design comprises a floorscape and roofscape that respond to programmatic, climatic, and urban parameters.

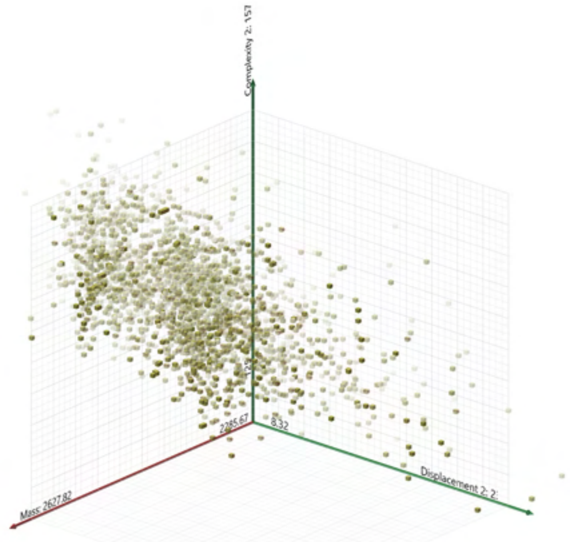
We developed parametric cellular geometries for the floorscape and roofscape that respond to urban situations and future expansions of the market. The project marks an iconic renewal of market life in Guabuliga and has led to an increase in trade activities, attracting traders from the region. Extension zones allow for the setting up of informal scenarios and include pylons that can be appropriated by sellers for display or shade. By providing an attractive trade environment in this rural town, the market counters migration from rural to urban parts of Ghana.

Plan

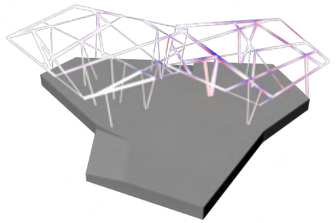
Aerial View
photo: Juergen Strohmayer

_Optimization of Structure and Typology

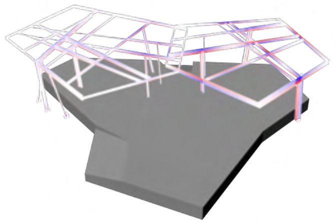
Due to the limited resource, budget and cost of transportation. The structure has to follow the circulation simulation of the market and the general organisation, and minimise its material mass and complexity. I develop a parametric model whose structure is finding the best positions for columns and beams, while keeps the minimum mass, displacement and complexity (score 0~100). The complexity score is calculated by the number of intersection and types of beams. Eventually, we chose among 10 best results and opted for the simplest result to build with good scores on mass and displacement.



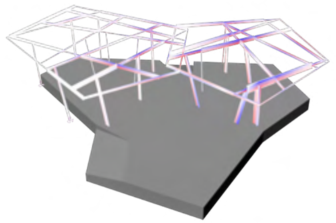
Octopus Multi-objective Optimization and Search



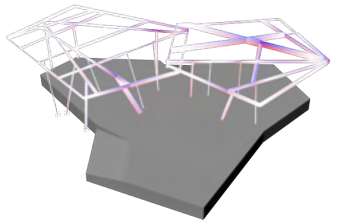
Complexity: 97
Mass: 93
Displacement: 91



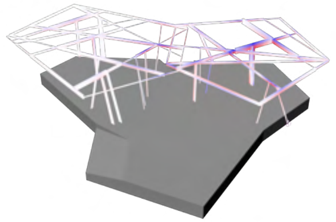
Complexity: 91
Mass: 92
Displacement: 90



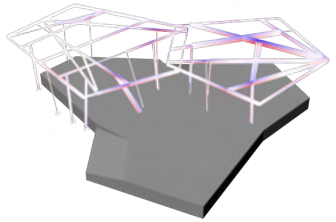
Complexity: 82
Mass: 87
Displacement: 95



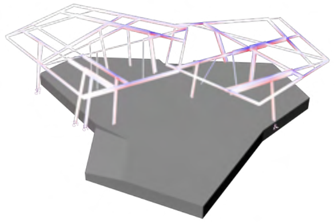
Complexity: 80
Mass: 92
Displacement: 89



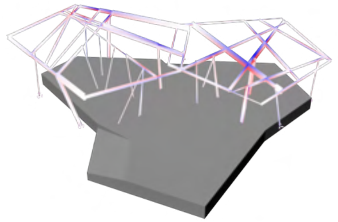
Complexity: 92
Mass: 88
Displacement: 84



Complexity: 95
Mass: 88
Displacement: 93



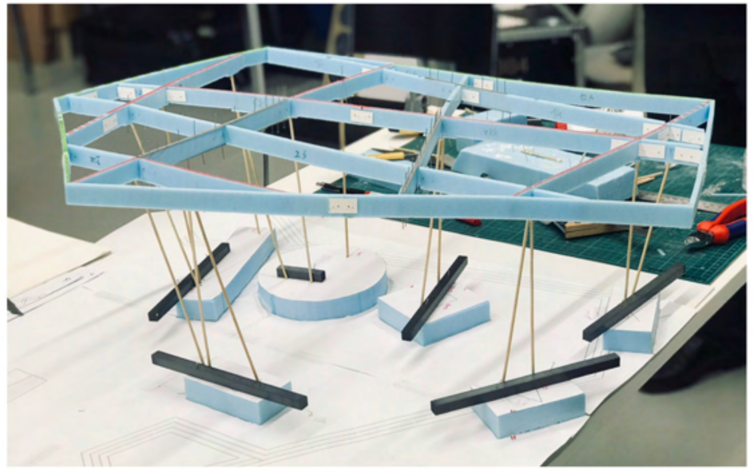
Complexity: 91
Mass: 90
Displacement: 89



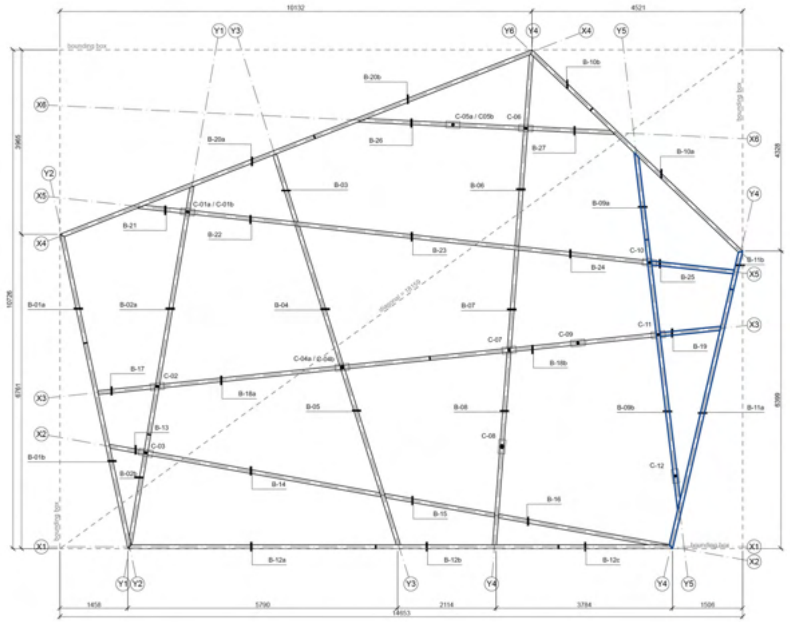
Complexity: 90
Mass: 92
Displacement: 81

Market day
photo: Toms Kampars

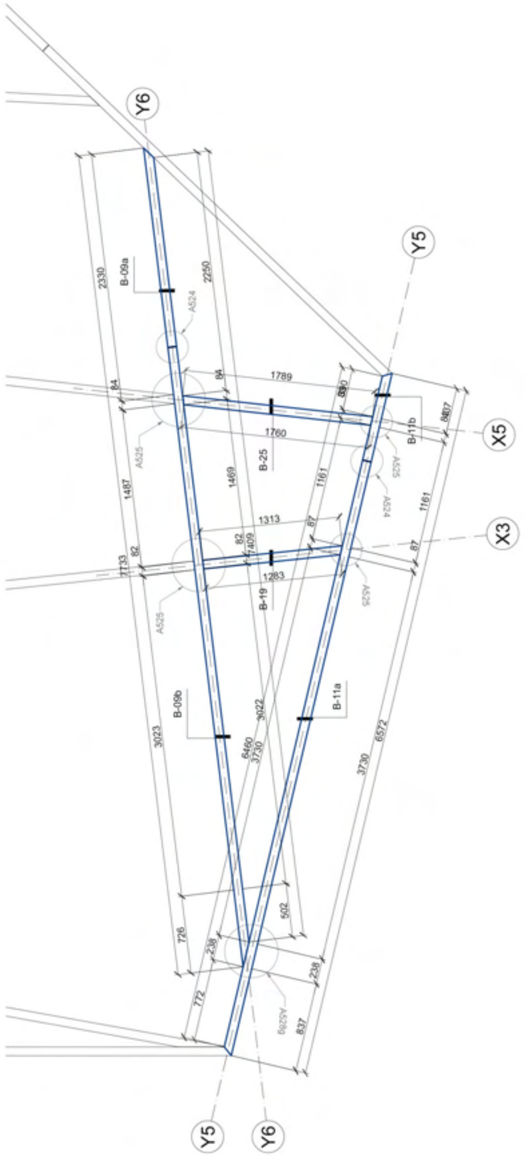
_Structural and Construction Research



Test Model for Struction and Construction Procedures



Roof Plan



Prefabricated Element

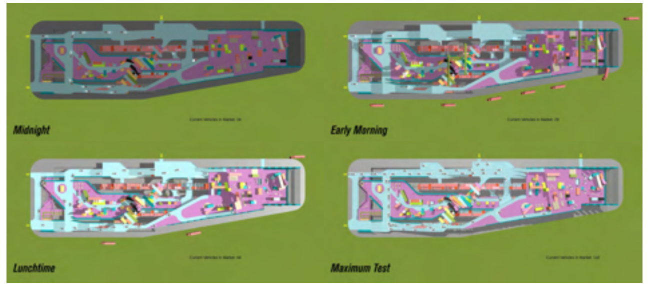
Construction process
photo: Toms KamparsJuergen Strohmayer

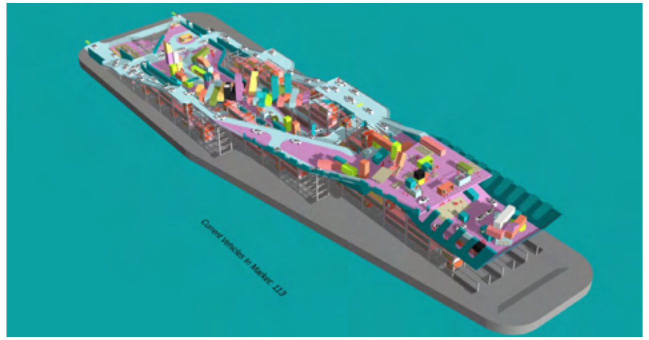
photo: Juergen Strohmayer

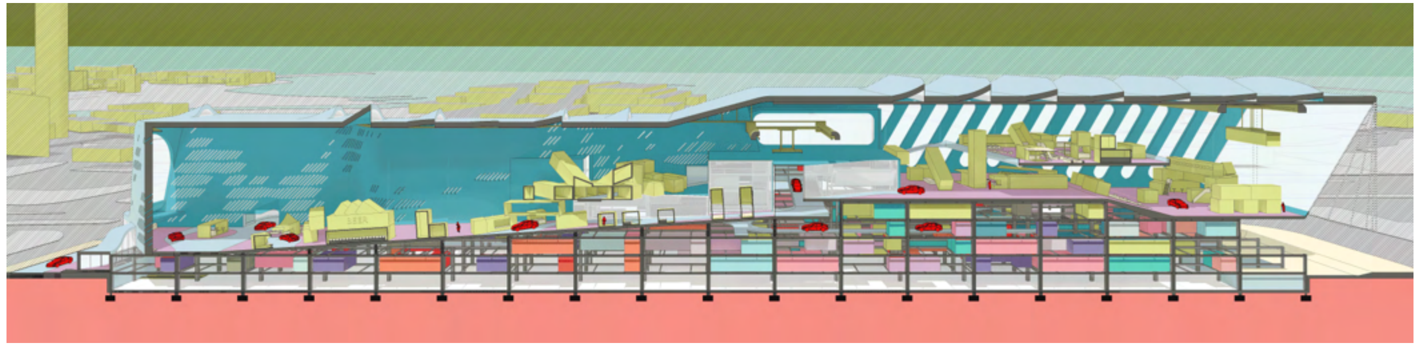
Work Samples
_Simulation-based Design

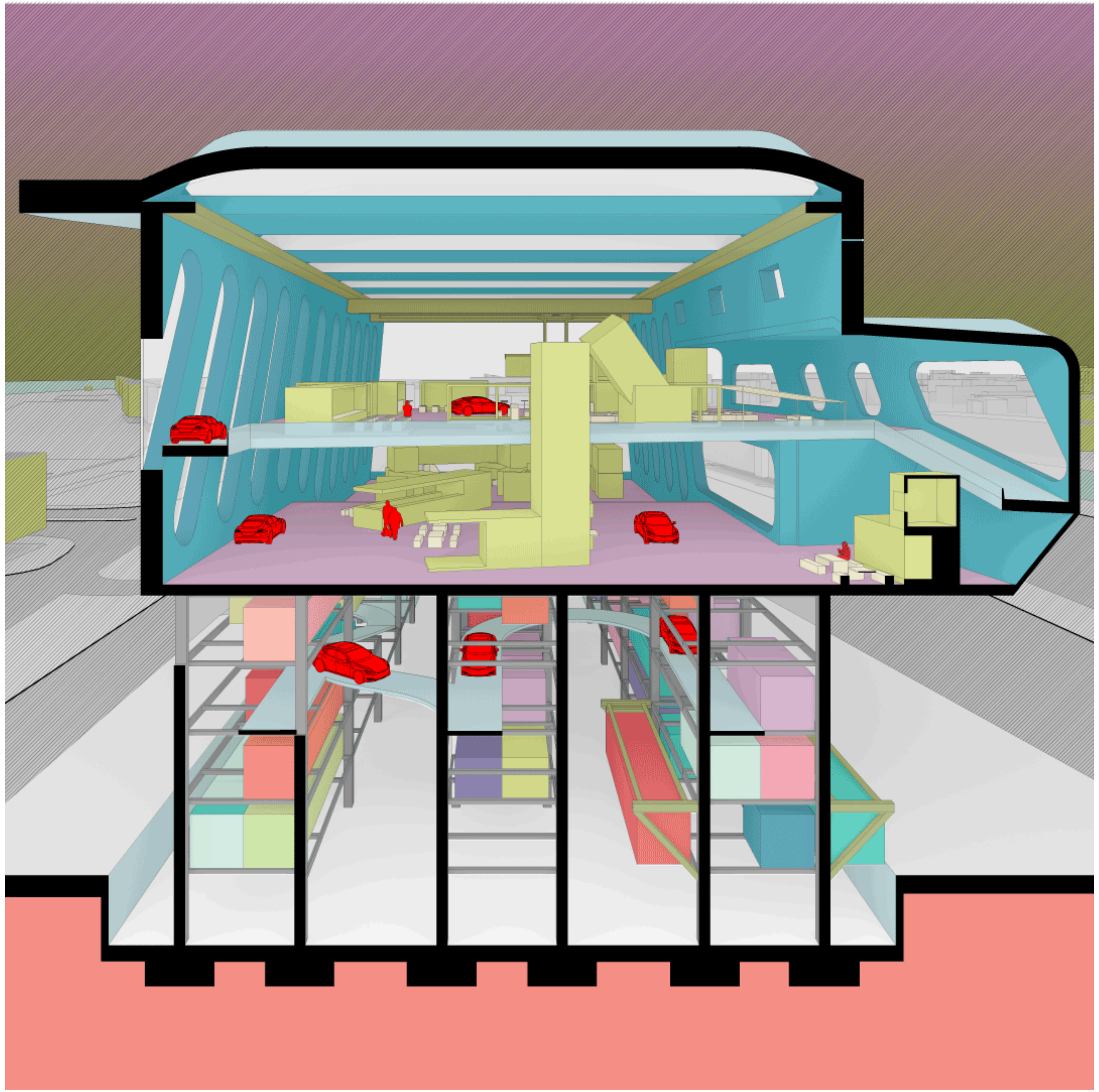
Supervisor Greg Lynn
Advisors Maja Ozvaldic, Bence Pap, Dominik Strzelec
Martin Murero
Date 2020.JAN - JUN
Place Tallinn, Estonia

Entering a new age of self-driving car start to dominate the market. I anticipate that the significantly popularized communal car and self-driving system will be dominated in the city of Tallinn. To fully satisfy the individual needs and celebrate the individuality. The project treat everyday grocery of individuals as positive activities, as relaxation, as part of civic life, not just a daily mission. At the same time, it maximizes the efficiency by reducing parking time and parking space, exchanged by communal space, altogether create a dynamic and efficient shopping experience. For the methodology, I applied 3 agents where the priority of human-figure as standard is decreased. And the other two become the major agents. When we re-evaluate the full self-driving car as an agent in space. The way we see and interact in such a car is fully changed.The vision is liberated from conventional driving. Machines' vision frees up humans' visual experience, and the spatial experience become partially private, and extended physical ability and efficiency.







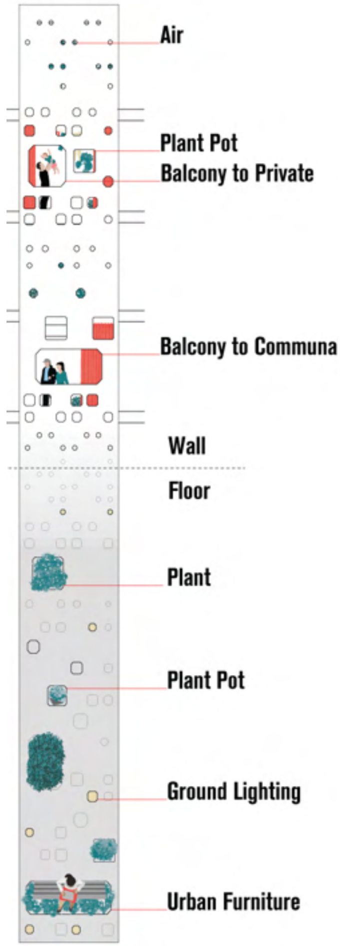


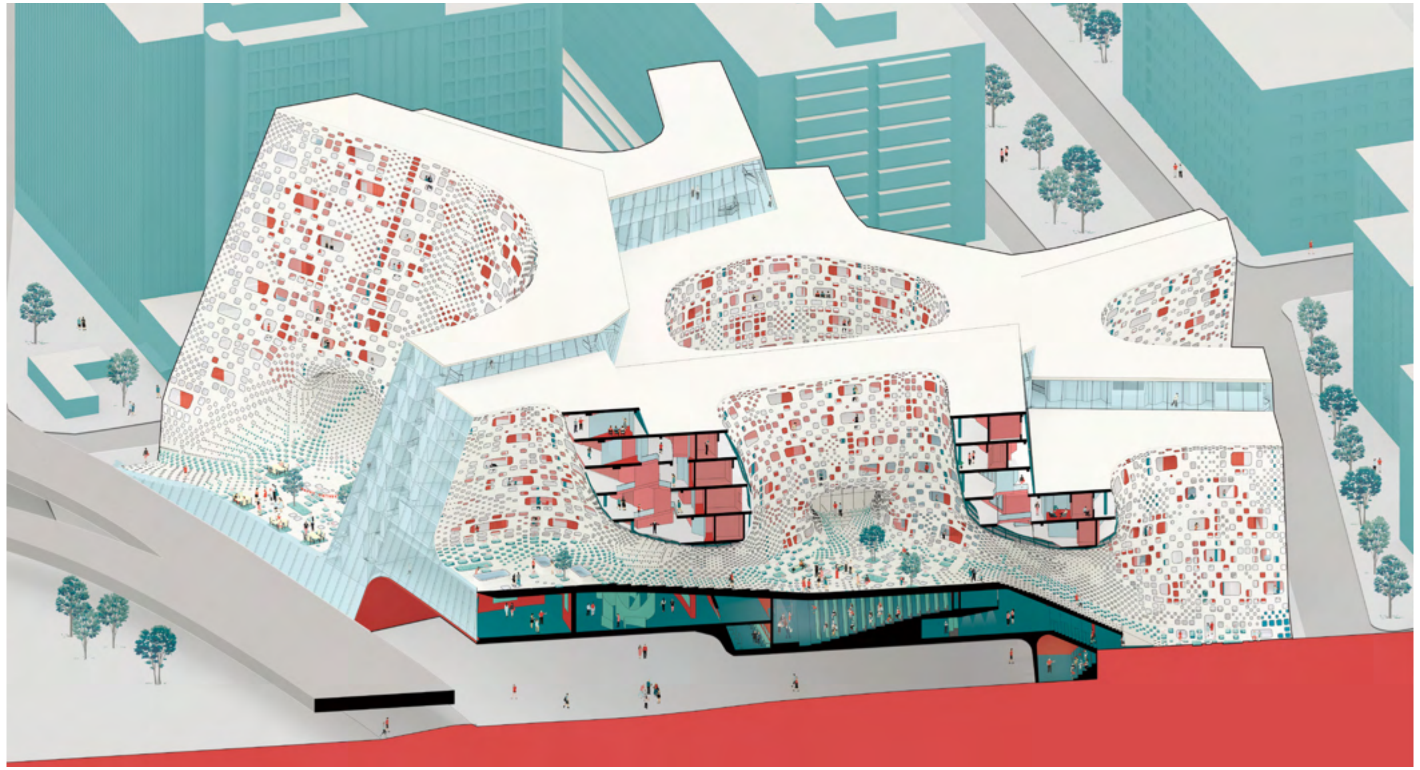
Work Samples
_Theater of Everyday Life

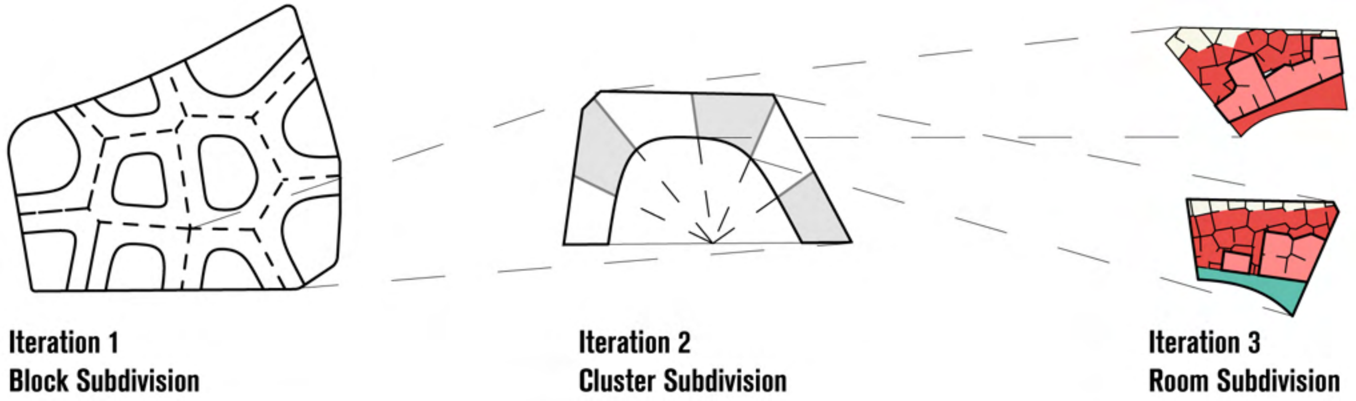
Supervisor	Greg Lynn
Advisors	Maja Ozvaldic, Bence Pap, Dominik Strzelec Martin Murero
With	Velina Ivantchva
Date	2019.MAR - JUN
Place	Madrid, Spain

This project aims to rethink dwelling through the notion of identity as performance in everyday life. Taking advantage of the opportunity for the formation of meaningful visual connections between housing and mixed uses, we plan to explore the relationship between spectator and performer on various scales and different realms of social activity.

We create a hierarchy consisted of mixed uses, communal spaces and family units. They represent different degrees of privacy versus exposure and relationships between visitors and residents, neighbors and family members - from masterplan to courtyard, courtyard to cluster, finally cluster to one micro-community of the family.

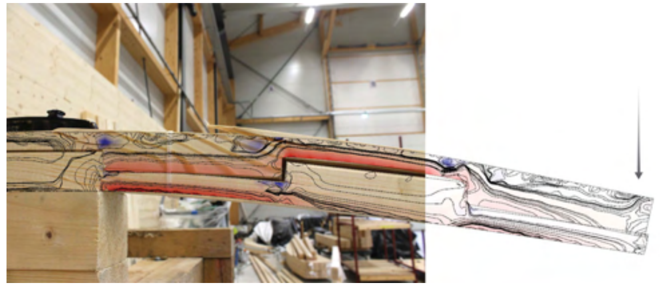


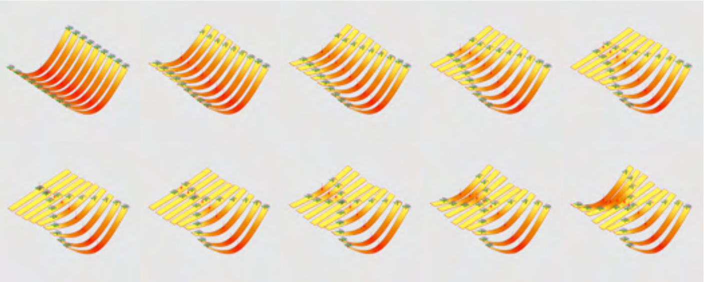


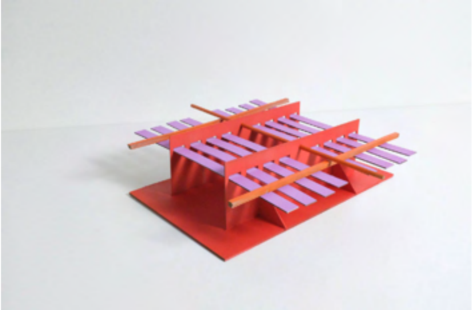


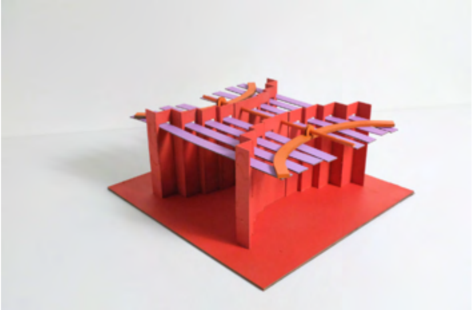
Work Samples
_Active Bending Chair

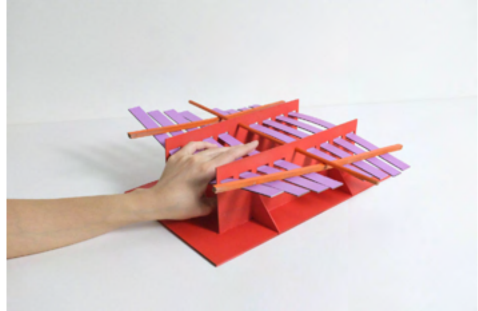
Supervisor Andrei Gheorghe
With Juliette Valat, Konstantin Kim
Date 2018.Oct
Place Vienna, Austria

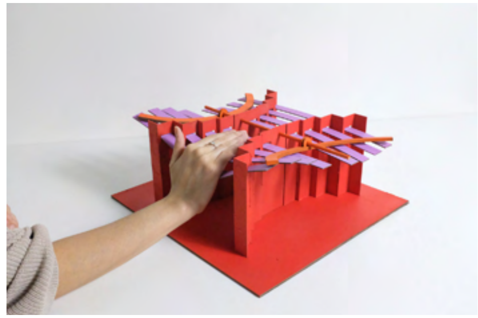


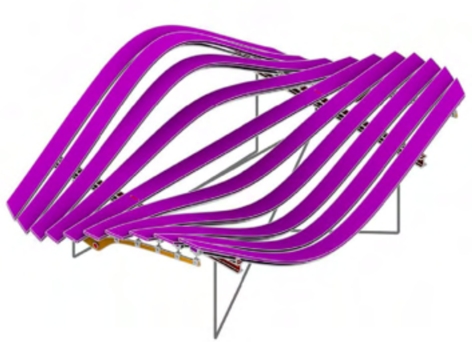


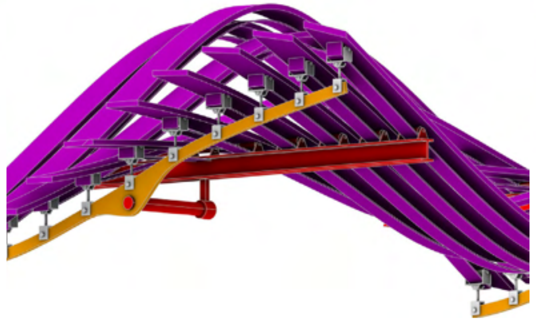


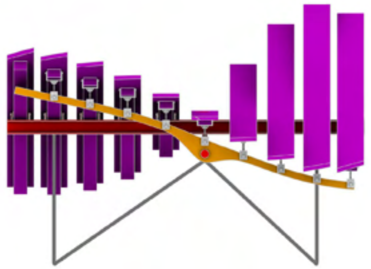








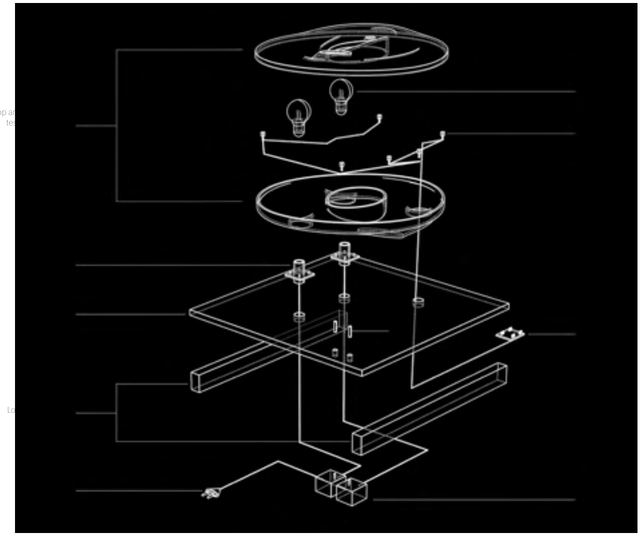




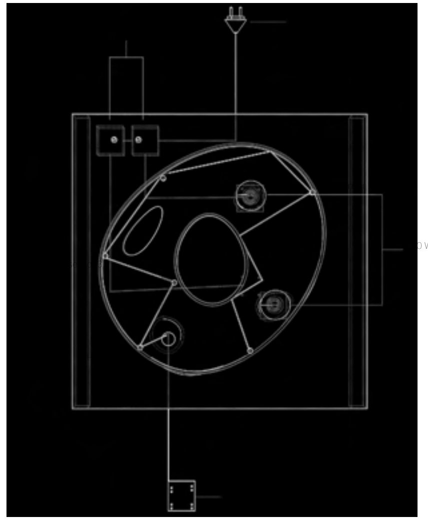
Work Samples
_Heating Torus

Supervisor	Galo Patricio Moncayo Asan
With	Minho Hong, Afshin Koupaei, David Rüßkamp
Date	2017.SEP - 18. JAN
Place	Vienna, Austria

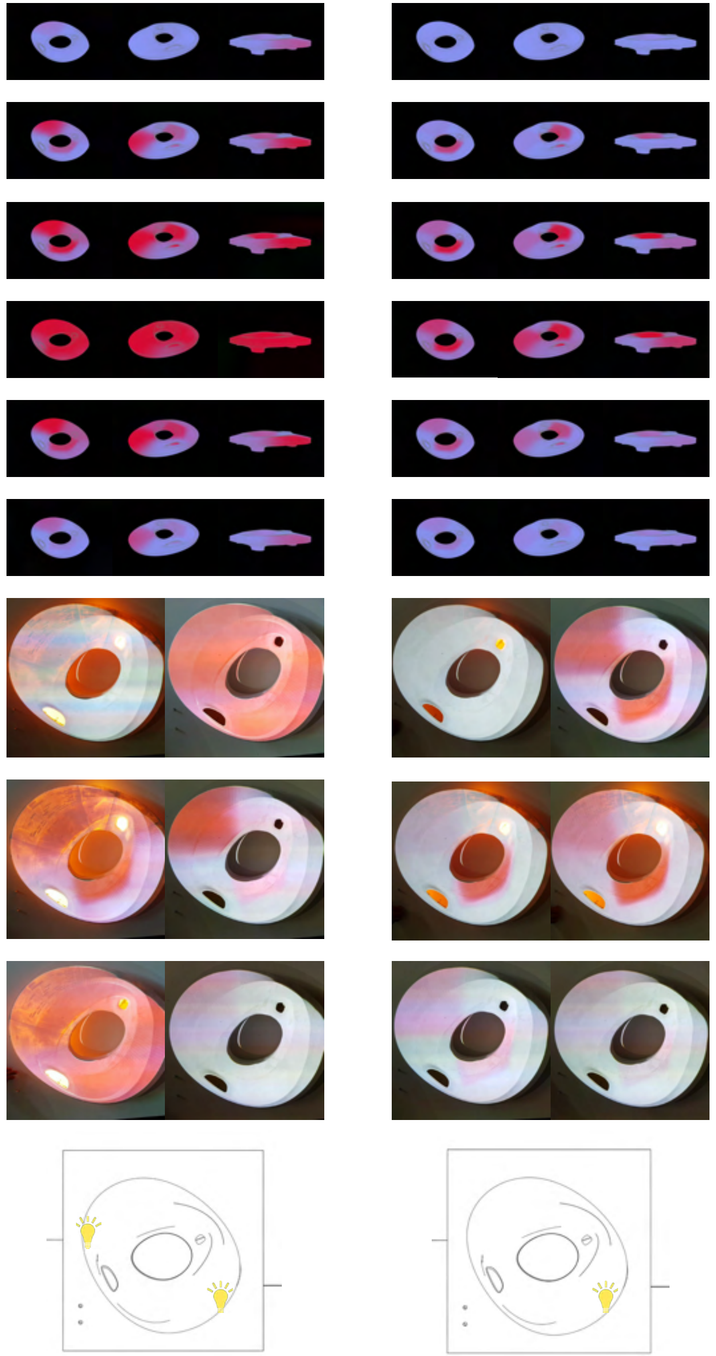
For the course "Adaptive Strategies" we came up with the idea of creating a volume in shape similar to a torus, in which we could to a certain extend control the interior climatic conditions and with sensors installed track temperature gradients caused by the light bulbs used as heat sources. Fabricated as a double sided mill the geometry functions as a test chamber for temperature increase and heat dissipation, varying in height throughout the volume and with changing apertrures and distances fom the heat source, variable conditions are established inside the ring, measured by the sensors inside of the object which are connected to an arduino board and analysed and visualized on the computer.



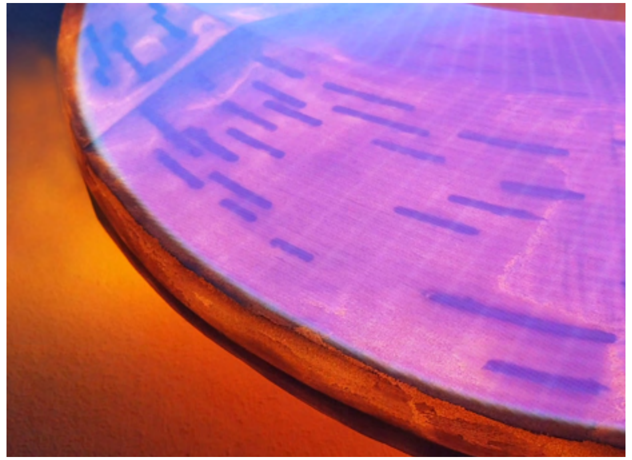
Modelling and Set Up Process

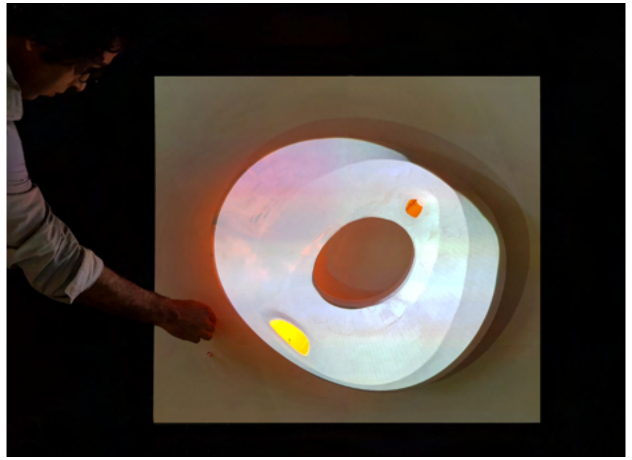


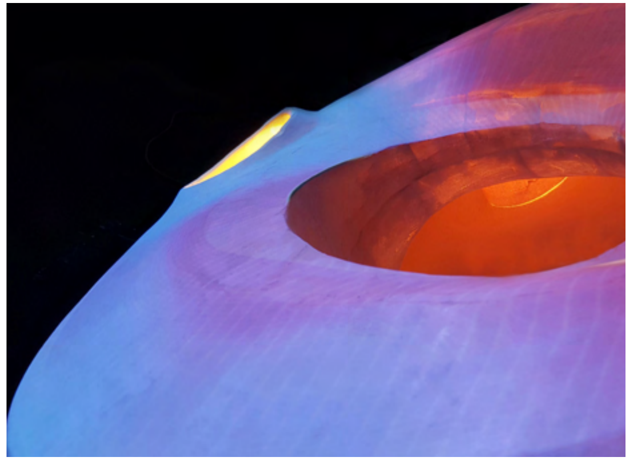
Sensor Setup



Test runs with different light bulb environments

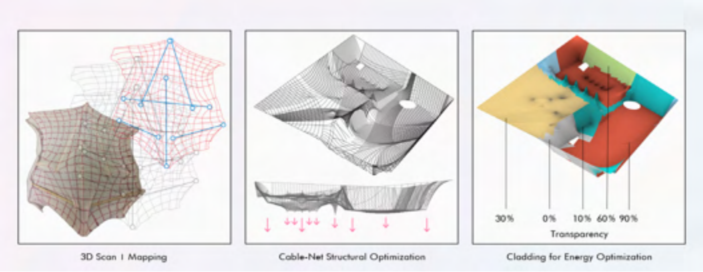




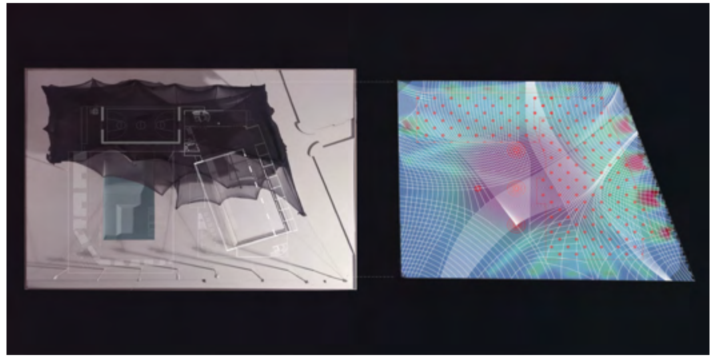


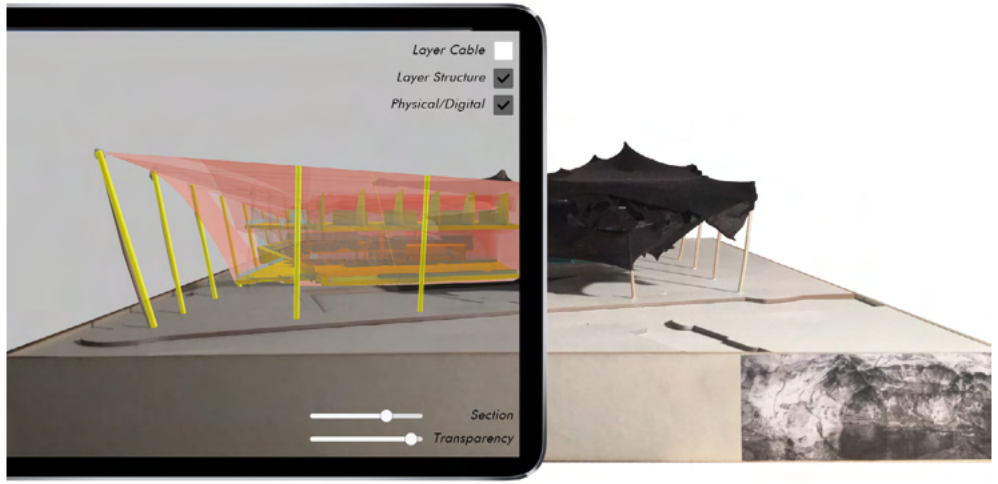
Work Samples
_Multilayered Tensegrity

Supervisor Greg Lynn
Advisors Maja Ozvaldic, Bence Pap, Dominik Strzelec
Martin Murero
Date 2018.MAR - 2018.JUN
Place Vienna, Austria



In this project, I develop a design tool to synchronize the tensile behavior in digital modelling environment that can match the physical counterpart. The digital matching process is achieved by observing the grid-patterned physical tensiles' deflection and simulating it via Kangaroo and Karamba analysis. With the possibility to predict the behavior, the tool easies the form finding process for tensegrity structure. Thus, I can propose a multilayered tensegrity structure for a complex program of stadium and support a multiple floors' structure with tensegrity structure. This novel structure minimizes the sense of gravity in visual and maximizes transparency. The physical model can be further tested with Augmented Reality (AR) in Unity3D to check the matching rate of digital tensile and physical one.



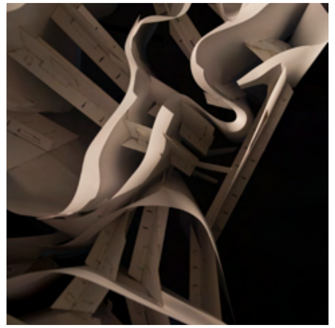


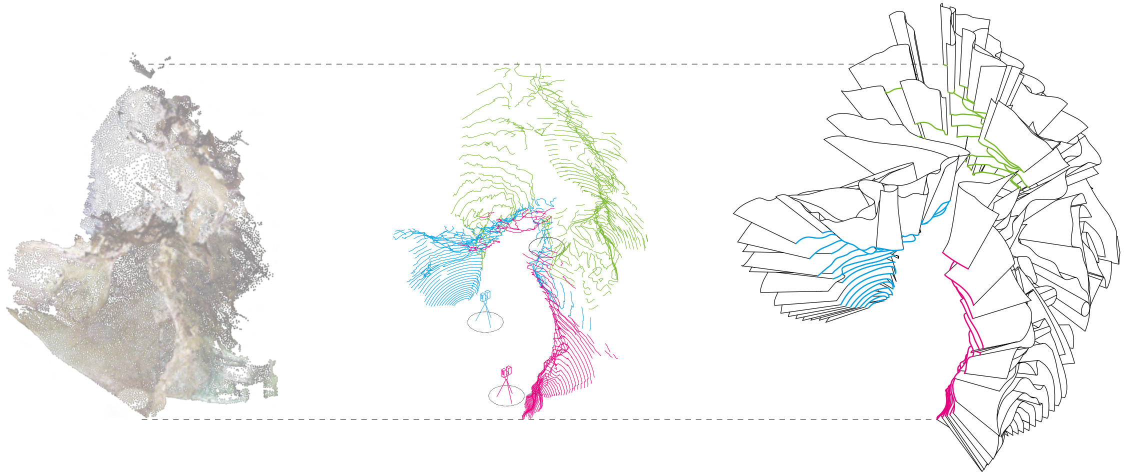
Work Samples
_Paper Cave: 3D-2D-3D

Supervisor Greg Lynn
Advisors Maja Ozvaldic, Bence Pap, Dominik Strzelec
Martin Murero
With Marck Maric
Date 2017.SEP - 2018. JAN

How the idea of laser scanning process can be translated/reinterpreted in a physical way? Looking into the process of laser scanning, one gets the 3D model directly through the scanning point clouds. And the resolution is relevant to the distance from the points to the scanner. Also, it is built on a Tripolar Coordination system rather than Cartesian coordinates.

Paper, always manufactured as planar. We study the physical transformation in between Tripolar Coordination and Cartesian Coordinate which is easier to be projected in a planar surface. Laser-scan generates different points wich indicates a new coordination for geometries.





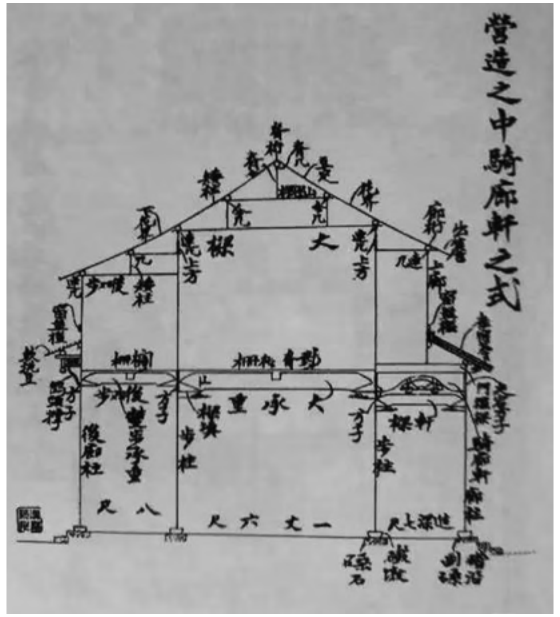
Point Cloud Line Extracted from Scanner Extruded Line from Scanner

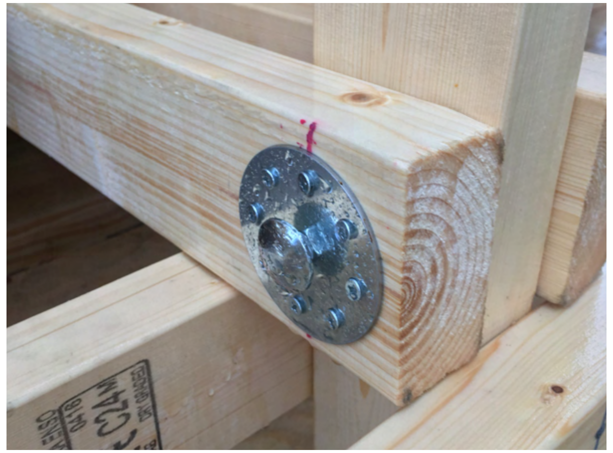
Work Samples
_Architecture for People

@ Atelier-3/Hsieh Ying-chun Architect

My Role	Superviser, Exhibition Designer
Date	2017.JUL - SEP
Place	Helsinki, Finland

In Helsinki Design Week 2017, we deliver our proposal to build a transitional shelter together with refugees, citizens and international students. The built shelter can provide a decent living space for participating refugees to sooth any sense of anxiety from having to leave their homeland. Furthermore, through their own efforts, the participatory and collaborative construction process can comfort the refugee's sense of uncertainty and rebuild their sense of value and dignity, while nurturing their ability and creativity for the future reconstruction of their homeland.





Work Samples
_Temporary & Permanent
:The Invisible Structures

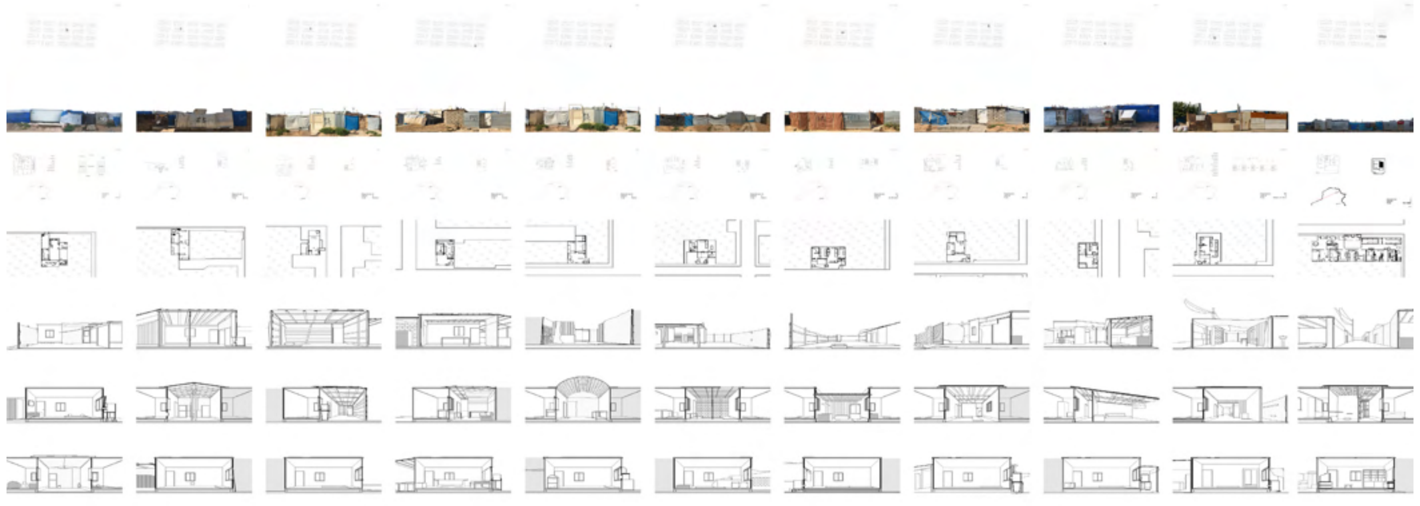
@ [applied] Foreign Affairs

Supervisor	Baerbel Mueller
Date	2018.SEP - 2019.OCT
Place	Erbil, Kurdish Region, Iraq

The camp signifies temporary. While people living in the camps might spending decades before moving to other places. Therefore, IDPs in the camps are transforming their current temporal living space into their future home. The ways how they reprogram their living space might have connection to their previous living conditions which altogether form a new vibrant community within the camp which function like a city.

However, the images of the camps remain superficial on the internet. Most of the information, maps and images are highly humanitarian-oriented and thus merely cover basic supply chart and infrastructure inforgraphes. The focuses on the actual living condition and how IDPs reuse the material are missing. Thus, the project aims to trace the habitation of different families' houses by studying how they transform, extend and re-fabricate their caravans provided by UNHCR . It represent the habitation through sets of detail drawing and programs. The drawing and programs reveal the difference of their re-fabrication in between different families.

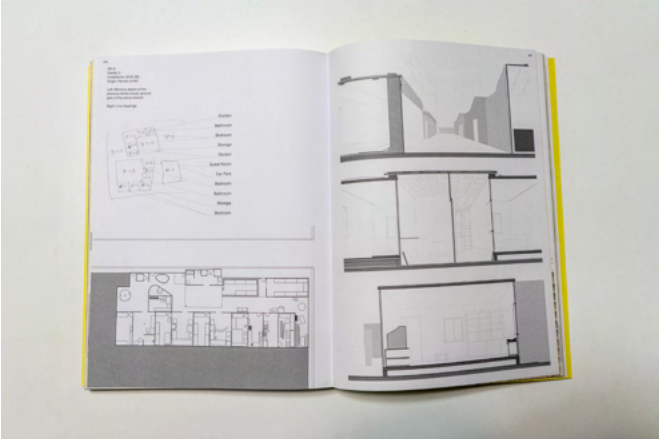
Entrance C12



11 IDPs' House Catalogue

Plan of Camp

Book Structures of Displacement : Resident 01-05



Book Structures of Displacement : Resident 01-05

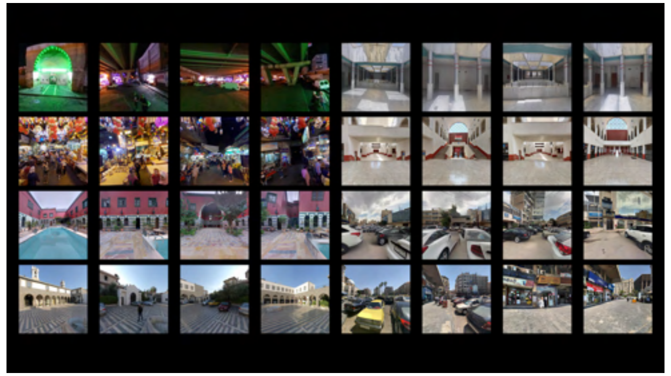
Work Samples
_Damascus Dialogues: Made in Damascus

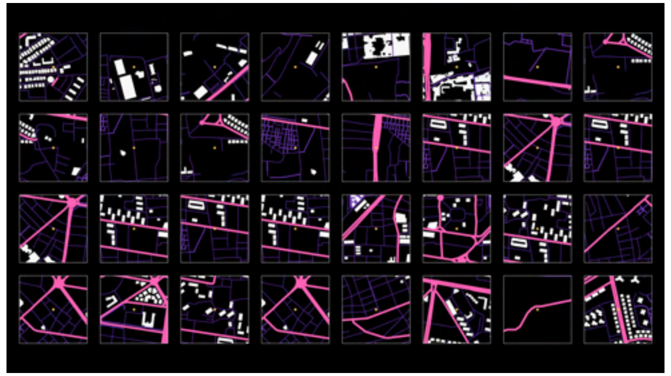
@ [applied] Foreign Affairs

Supervisors	Baerbel Müller, Gregorio Lubroth
With	University of Damascus
Date	2017.OCT - Ongoing
Place	Damascus, Syria

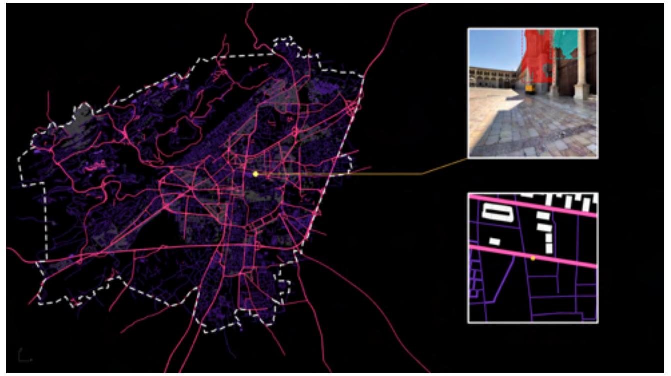
Made in Damascus looks into the material of the city in multiple scales, and turn it into an innovative way of participatory design which can be applied to post-conflict region such as Zamalka as an example. The project starting from looking at the static city and focusing on balcony as the essential static element of Damascus that represents private and public as well as shapes the city's social-cultural identity. The potential of the material in Zamalka that can be repurposed and reprogram into the city. How do we design a public balcony that both represent the form and facade of the building in terms of its residents and the city altogether? How the act of the design and build of balcony together could potentially design the new region?

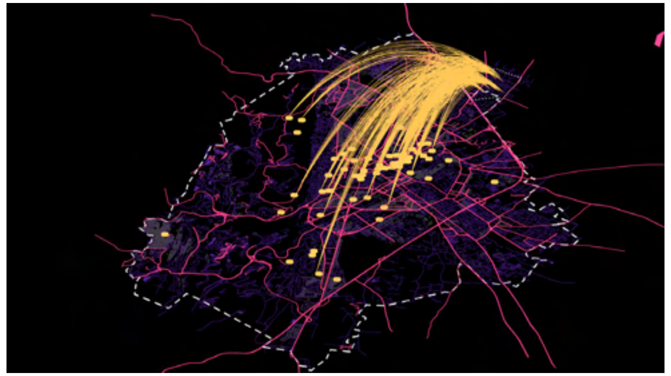
By using machine-learning-driven image segmentation and data mining of street images, the project manages to connect a subjective selection of objects and the city context in detail. The personally selected objects can be trained in the program to define detection targets, which will be used against the whole dataset of street images to search for similarity. Finally, a map of similarity will be extracted to demonstrate areas of interest for further investigation. A similar method can be used not only for analysis but also for regeneration of a new image set which is based on selected and detected objects from the city. The project manages to combine the individual and urban scale of materiality through machine learning and data mining.

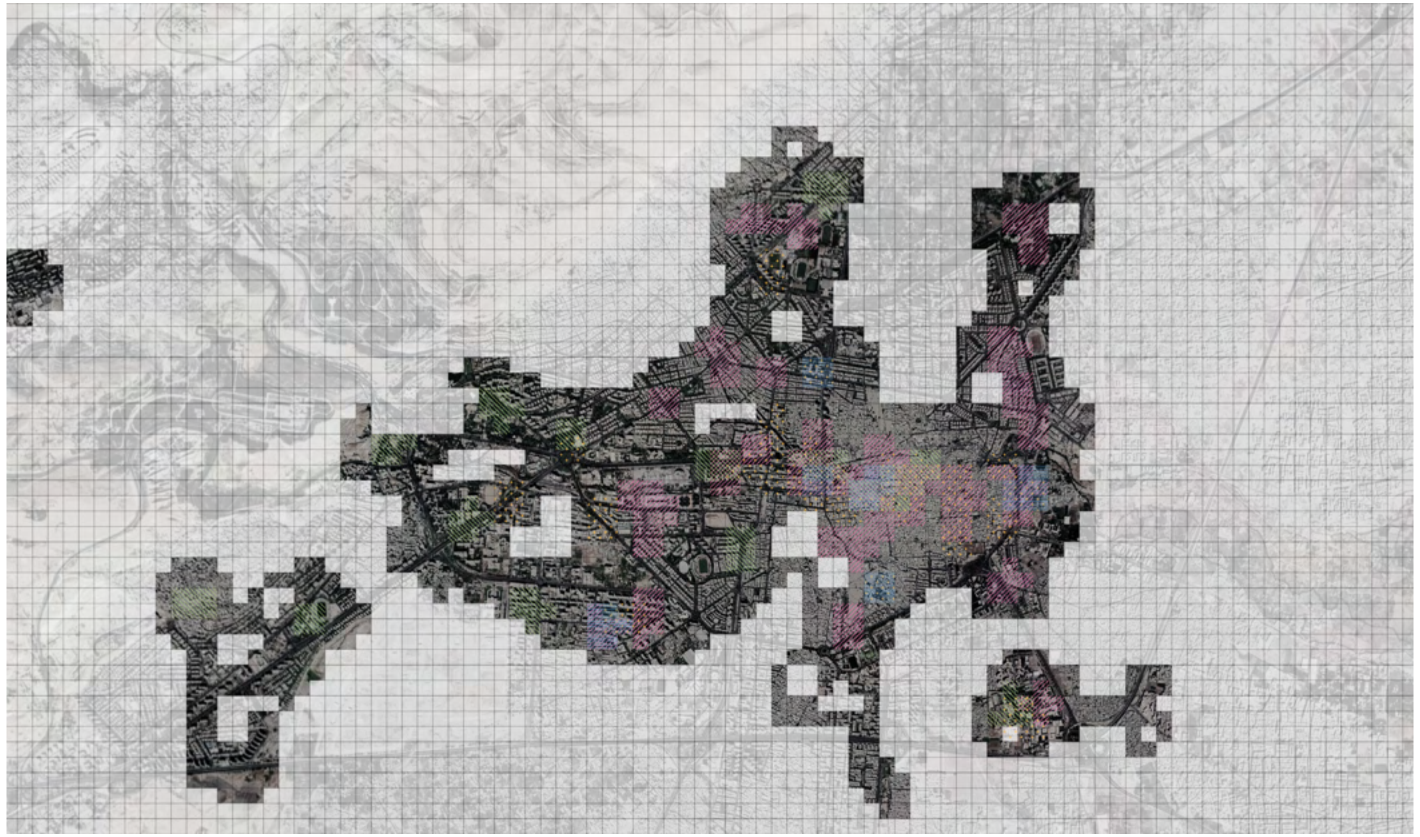

Street images scrapy


Street typologies

Machine learning workflow


Map of detected objects and their typologies


Similarity of areas in terms of materiality


Distribution of detected objects

More at
https://www.chienhuahuang.com/