

DATA & DESIGN

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NJ Design Lab / <http://www.njstudio.co.kr>

NJSLabs/ <http://njslab.com/wp/>

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DATA

at

geometry

architecture

urban

Landscape

computation

visualization

material

Interaction

building energy

Fabrication

...

METHODOLOGY

Discretizing information

numerical descriptions as design tools

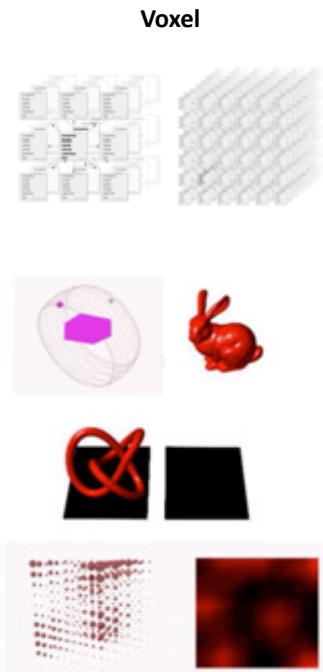
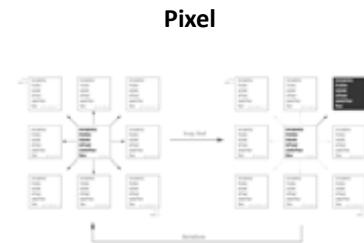
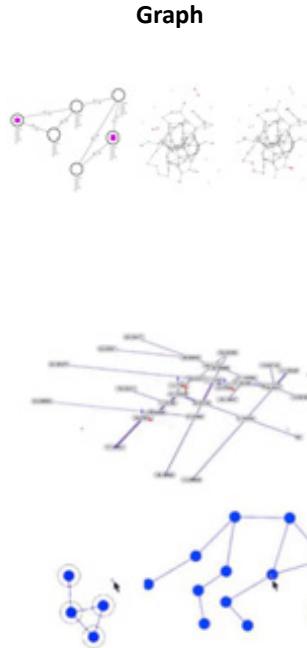
data structure

graph

pixel

voxel

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SYSTEM FOR DESIGN

translating information to insights for design decisions

Optimization

Automation

Agent-Based / multi agent based design system

Rule-Based

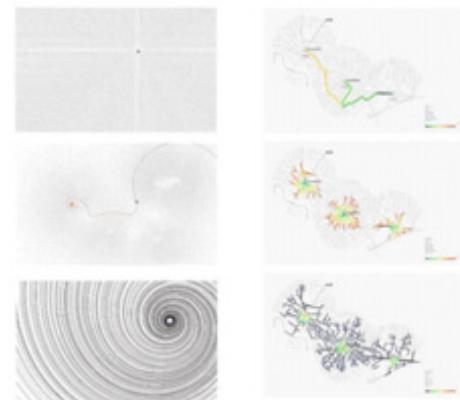
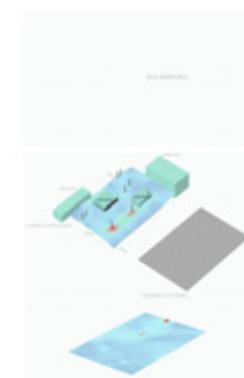
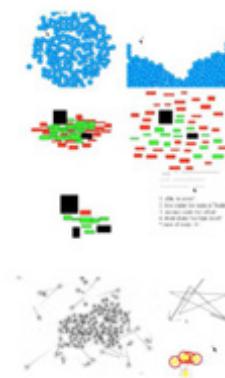
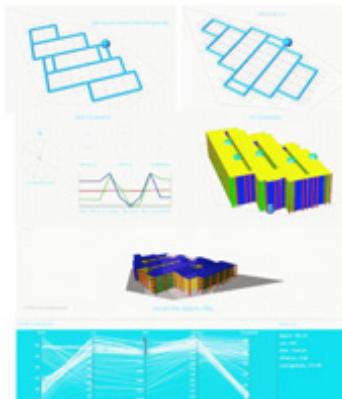
Generative Design System

Interaction in design

Data driven decision making process

Complex system in design

...



DATA & PROCESS

COMPUTATIONAL THINKING

Computational Design Thinking

Writing, Medium - [https://medium.com/@josephmccabe/what-is-computational-design-thinking-10f3a2a2a2d0](#)

Lecture Video - <https://youtu.be/6gGSpYoFca8>

1. Question
2. Methodology & Approach
3. Policy
4. Implementation : algorithm

THE QUESTION / IMAGINATION / HYPOTHESIS

Understanding Problem, Concern & Issue
Declaring Inputs & Outputs
Writing Instructions

THE METHODOLOGY & APPROACH

from Whole to Parts & from Part to Whole
from Simple to Complex & from Complex to Simple
from Generic to Specific & from Specific to Generic

THE MANIFESTO & POLICY

Deterministic or Stochastic
Converge or Diverge — Design Space, Optimization, Pareto efficiency
Top-down & Bottom-up
Holistic or Partial
Existing or Emerging (Rewriting)
Oriented or Disoriented
Centralized or Decentralized
Procedural or Iterative
Ultimate(Best) or Optimal

THE IMPLEMENTATION

from Infinite to Finite — FEM, Structure Analysis
from Implicit to Explicit
from Ambiguous to Certain
from Entangled to Separated — Pipeline
from Inactive to Interactive — Complex system
from Phenomenological(Observation) to Predictable(Model & System)
from Intuition(Imagination, Hypothesis) to Implementation

SPATIAL DATA MANIPULATION

Dumb or Smart — Component Oriented Programming, React, Unity3d
Reciprocal (Mutual & Dependent) or Isolation(independent)
Public or Protected or Private
Abstract or Concrete — Implementation and Inherent
Connected or Disconnected
Static or Dynamic(Instance)

THE TOOL & THE PRINCIPAL

Analytic-Oriented & Object-Oriented & Functional & Procedural & Component...
Relational Hierarchy
Properties and Behaviors
Pure & Impure
Condition & Loop
Coordinate system, distortion, projection remap interpolation ...

1. Differentiating Issues, Problems, and Tasks
2. Developing Spatial Data Structures
3. Deploying Algorithms

Workshop: Introduction to Computational Design: Data, Geometry, and Visualization Using Digital Media - [link](#)



00:24 - overview : data, methodology, and system
06:43 - urban data / network
08:46 - urban data / machine learning
11:00 - geometry data / deep learning
13:00 - optimization / parametric design
15:58 - structure data / optimization
18:41 - geometry data / dynamics
20:24 - landscape data / environmental data
22:28 - image data processing
25:13 - fabrication data / digital mockup
26:07 - material data / computation
28:20 - interaction / robotics
31:56 - particle simulation / data

33:16 - other interests
34:53 - lecture and workshop series
35:24 - domains and technologies
36:37 - keywords
37:02 - thank you

ENG: <https://nj-namji.medium.com/data-design-c21457dc8dc>

KOR: <https://brunch.co.kr/@njnamji/88>

DESIGN & DATA

selected researches and projects

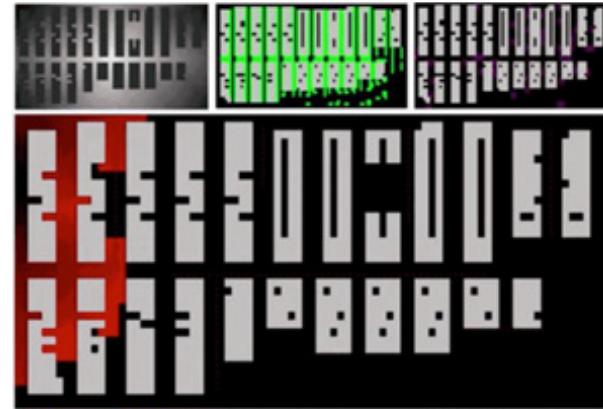
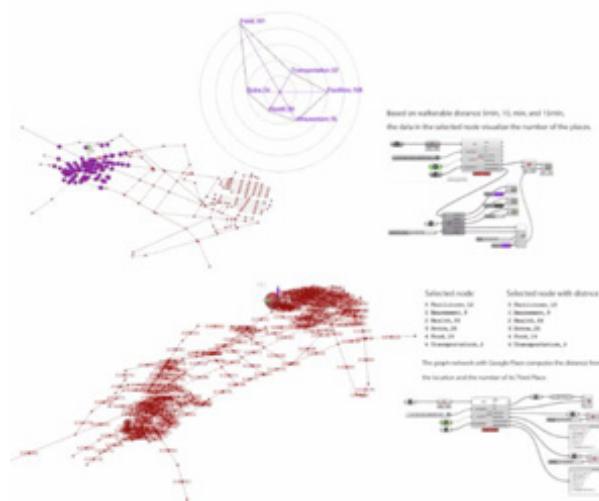
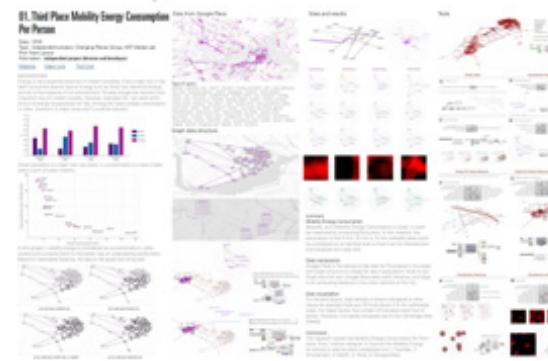
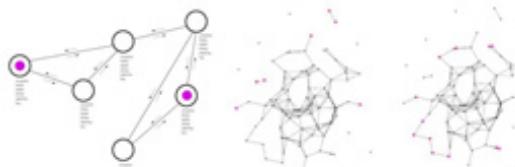
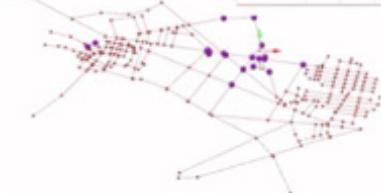
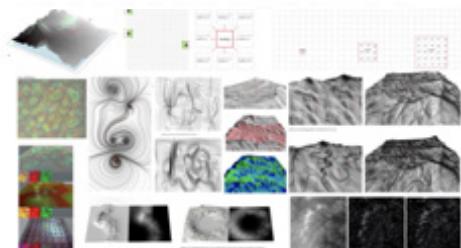
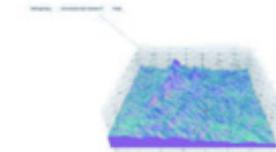
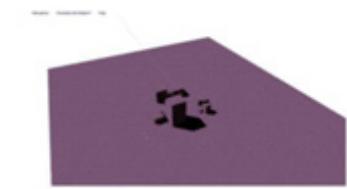
URBAN ANALYSIS & AI, ML

http://www.njstudio.co.kr/main/project/2016_MobilityEnergyConsumptionMITMe_dialab/index.html

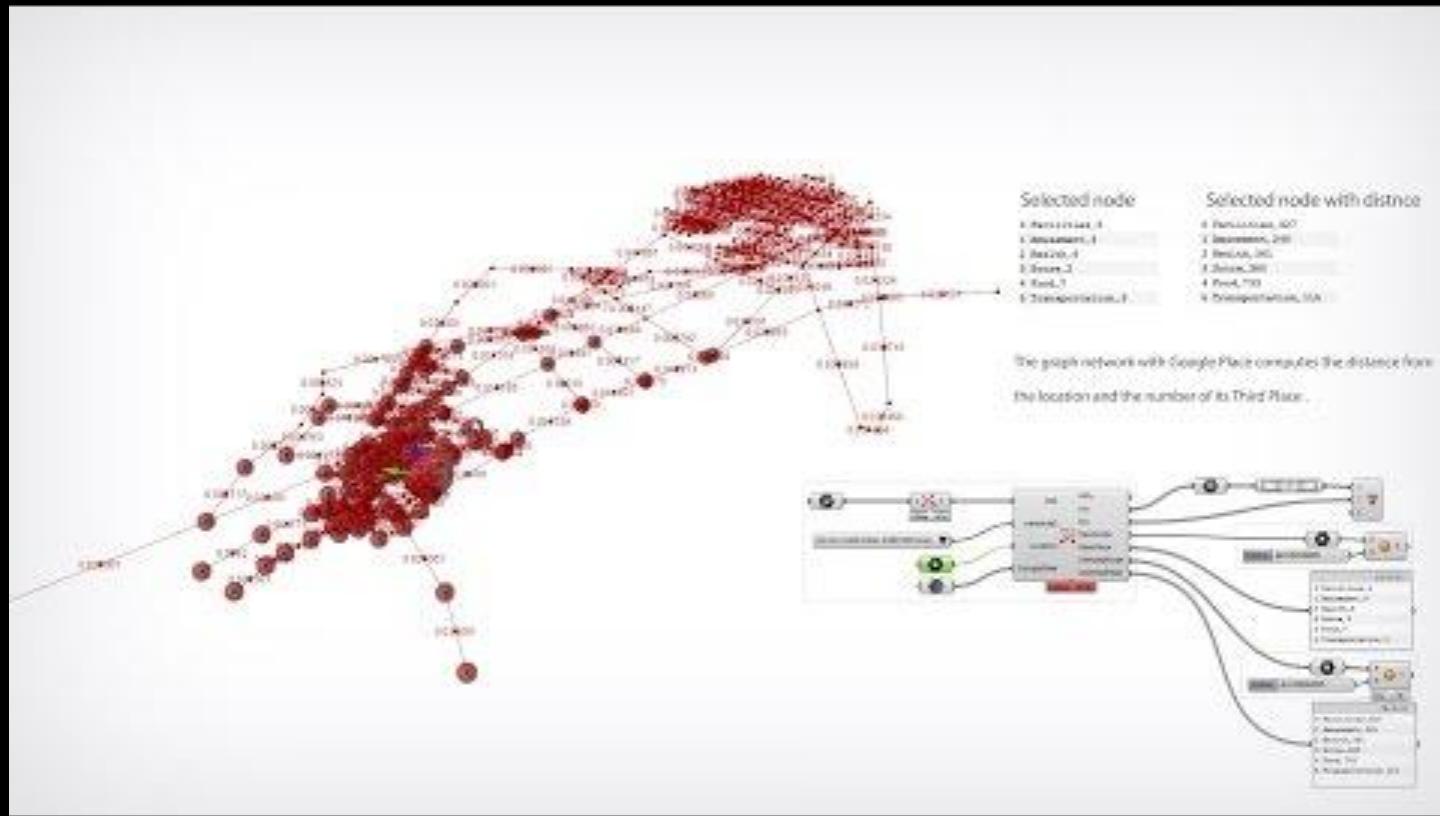
Addon for Grasshopper
<https://www.food4rhino.com/app/numerical-urban-utility>

Paper: <https://www.springer.com/gp/book/9789813343993>

https://link.springer.com/chapter/10.1007/978-981-33-4400-6_11



Properties
distance
slope
elevation
retail
tree(coverage)
park)
outdoor Thermal
Comfort
view



02. Built Environment Assessment for the Housing Value Prediction

Date : 2016 Feb
Type : Master Thesis
Title : Built Environment Science, John A.
Author : Peihao Zhou, Mingyu Chen, John A.

Role taken : research, design, drawing, modeling, visualization
Critic : Prof. Pavlos Protopapas, Kevin Rader, Weiwei Pan
Team : Jia Gu, Elle Jungmin Han

http://www.iustudio.co.kr/main/project/2016_HarvardCS109_DataScience/index.html

Is there any relationship between Built environment and housing price?
This question motivates us to investigate to emerge the relationship between social economic aspect (housing and rent price) and urban spatial data (Built environment data) in City of Boston.

Methodology

We define city infrastructural data such as the current housing price, energy consumption of the area, income of neighborhoods, transportation accessibility, green space in the neighborhoods, specific building features, and crime rates. We also use “Trulia” and “Zillow” to collect crowd-sourcing data such as, weather texts, Instagram tags, and yelp reviews as “bottom up data”. There is a third category of data that has not been widely deployed yet which we define as the “holistic visual data”. It is the general impression to your visual surroundings when it is a specific spot that we believe can be captured by google street views.

By testing on the data of visual surroundings as dependent variables, we hope to capture missing information from the top-down data and therefore tell if the data are enough to sign up a machine learning prediction analytical model. We use machine learning methodology to pre process Google street views to give certain attributes. To combine different data sets from top down to bottom up into one file for machine learning, we use graph to store data. In this project, we use graph to store data and merge them together in specific pre-posed grid based data points utilizing graph structure.

Step 1. Data Parsing

Parsing, cleaning, and data structure

Step 2. Data Exploration

Data Visualization and Exploration

Step 3. Learning Housing Price

Linear regression, Ridge, RandomForest, Regression, and ETC

Step 4. Learning Renting Price

KNN, Linear, ridge, RandomForest, Regressor, PCA for Logistic Regression, Decision Tree, Random Forest Classifier, and ETC

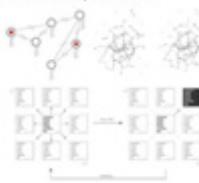
Step 5. Conclusion

the conclusion of the research

1. Data Parsing

There are two different data sets: 1) social economic data representing city of boston as a social aspect such as land price, crime, energy usage, and so on, 2) Urban spatial data representing city of boston as a urban.

Data Structure : Graph and Pixel Data



SOCIAL/ECONOMIC DATA

Housing Prices Data From Trulia
data type: numeric, string, and categorical
Features: geographic coordinates, rent, rent price, number of bedrooms, number of bathrooms, number of units, price, property size, city, tax assessor, address, bed and bath, lot area, new built, room_type, home_type, property

Housing Price Data From Zillow

data type: numeric, string, and categorical
Features: geographic coordinates, rent, rent price, number of bedrooms, number of bathrooms, number of units, price, property size, city, tax assessor, address, bed and bath, lot area, new built, room_type, home_type, property

Energy Data in Boston from Boston Data

data type: numeric, string, and categorical
Features: geographic coordinates, rent, rent price, number of bedrooms, number of bathrooms, number of units, price, property size, city, tax assessor, address, bed and bath, lot area, new built, room_type, home_type, property

Crime data in Boston from Boston Data

data type: numeric, string, and categorical
Features: geographic coordinates, rent, rent price, number of bedrooms, number of bathrooms, number of units, price, property size, city, tax assessor, address, bed and bath, lot area, new built, room_type, home_type, property

Properties Assessment in Boston from Boston Craigslist

data type: numeric, string, and categorical
Features: geographic coordinates, rent, rent price, number of bedrooms, number of bathrooms, number of units, price, property size, city, tax assessor, address, bed and bath, lot area, new built, room_type, home_type, property

House and Room post data in Boston from Boston Craigslist

data type: numeric, string, and categorical
Features: geographic coordinates, rent, rent price, number of bedrooms, number of bathrooms, number of units, price, property size, city, tax assessor, address, bed and bath, lot area, new built, room_type, home_type, property

URBAN SPATIAL DATA

google place from Google place API
data type: numeric, string, and categorical
Features: geographic coordinates, rent, rent price, number of bedrooms, number of bathrooms, number of units, price, property size, city, tax assessor, address, bed and bath, lot area, new built, room_type, home_type, property

google street view from Google street API

data type: numeric, string, and categorical
Features: geographic coordinates, rent, rent price, number of bedrooms, number of bathrooms, number of units, price, property size, city, tax assessor, address, bed and bath, lot area, new built, room_type, home_type, property

semantic segmentation

data type: numeric, string, and categorical
Features: geographic coordinates, rent, rent price, number of bedrooms, number of bathrooms, number of units, price, property size, city, tax assessor, address, bed and bath, lot area, new built, room_type, home_type, property

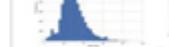
2. Data Exploration

On top of the top-down data (generated by the local government), the bottom-up data (post processing of Google Street Views, Google Places, and Craigslist dataset), and the top-down data (Boston's official Data), we can find that average housing price from Zillow can be mapped and displayed for boston and continue the analytical model of predicting housing price. To process the google street view data, there are two data structures: pixel data and graph data. When individual data are processed and calculated, Pixel data structure is a matrix, discretizing an urban or district into a finite setting for analysis, in which each pixel has its relationship with its neighbors, and each one computes its own data on the basis of its neighborhood settings, so that urban data can be naturally addressed and computed in spatial context.



3. Learning Housing Price

We explored housing prices statistics and the relationships between Boston's average housing price and our dataset features. Boston's average housing price is around \$850/m² and the most expensive area is Back Bay, whose price is around \$3,400/m², which ranks quite high nationally. According to Zillow home values report, the national average housing price is \$13,200. (<http://www.zillow.com/>)



Conclusion

Intrinsic urban matrix needs to be organized such an order, but there are multiple factors affecting urban matrix, including weather and crime rates, prices. From our project, it can be said that decision

4. Learning Renting Price

number of data used: 1000 houses

number of data used: 13049 rents

number of data used: 3,001 crimes

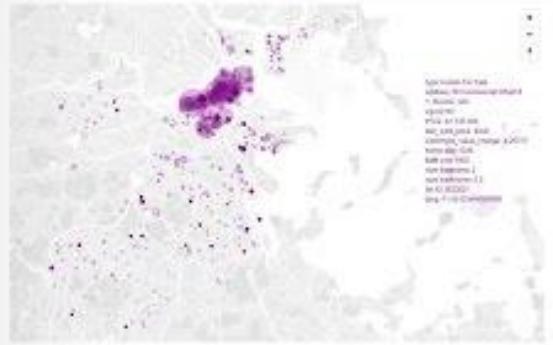
number of data used: 18,588 images



Data from Google street view + Deep Learning for semantic segmentation

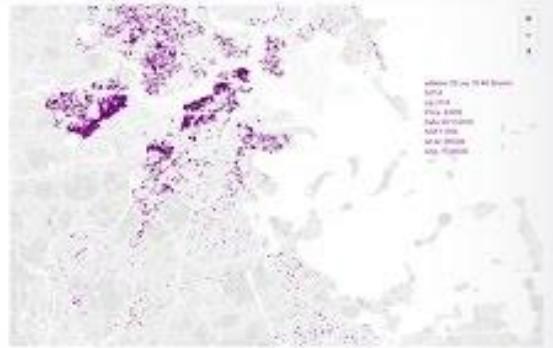
Image data used: 18,588 images





Housing Price data from Zillow

number of data used: 938 houses



Rent Price data from Trulia

number of data used: 13049 rents

Third Place Prediction model, Boston, LA, Redlands

Data process, Model A, Model B, Implementation

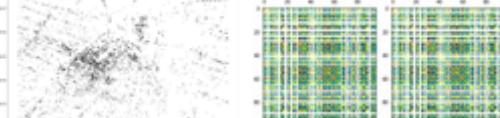
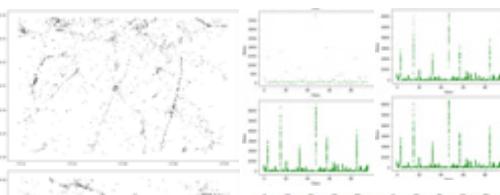
Medium(Eng): <https://lnkd.in/qEzKJxYu>

Brunch(Kor): <https://brunch.co.kr/@njinamju/148>

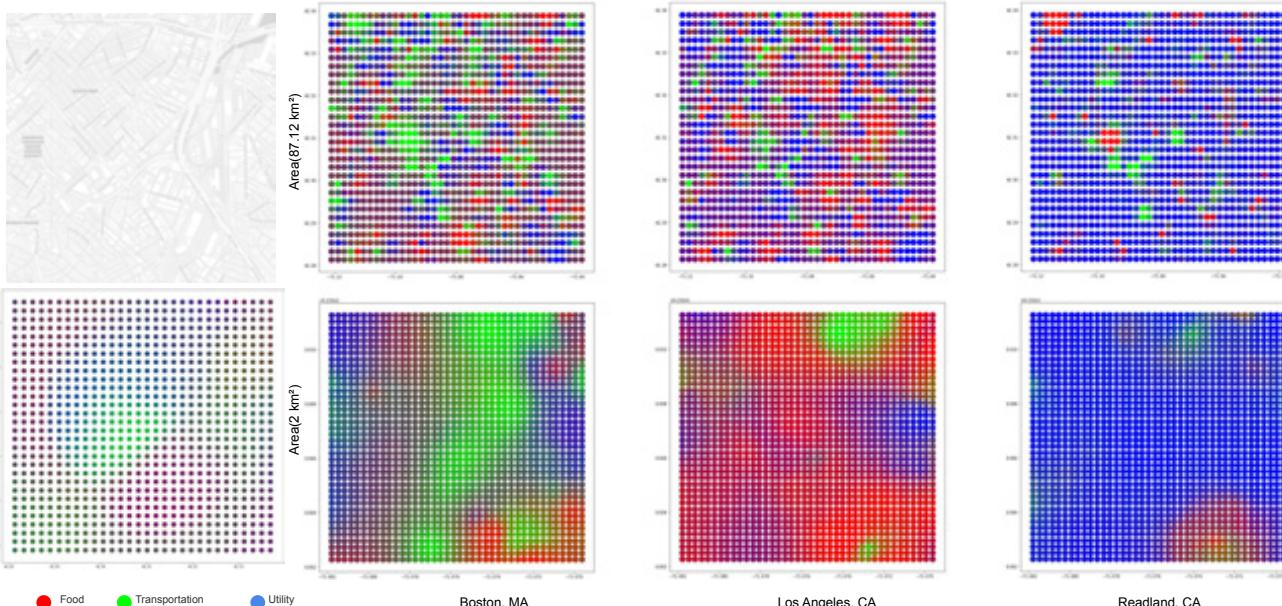
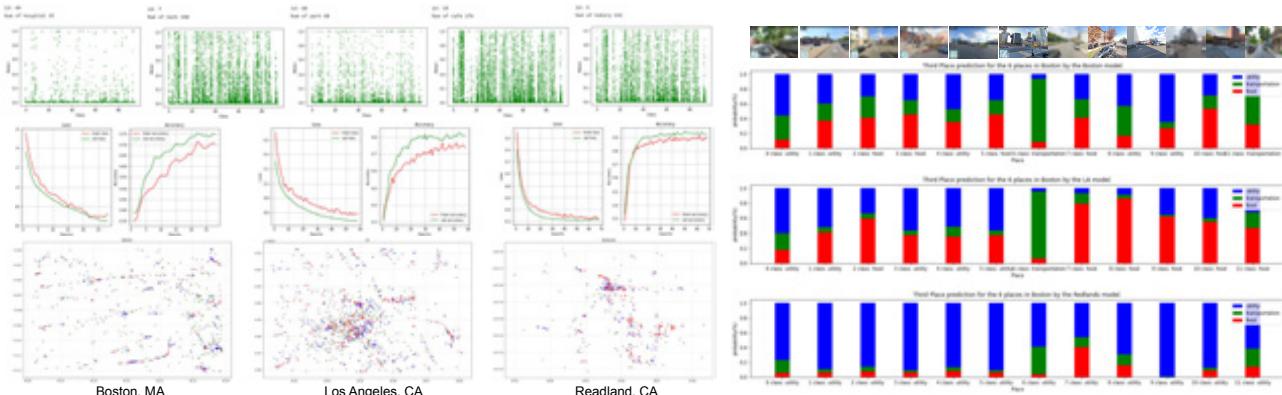
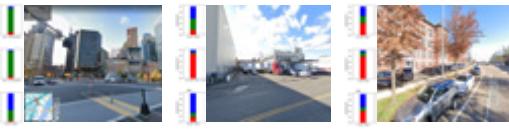
Source code: <https://lnkd.in/qdf6d8j7>



95 Class



Third Place prediction results in Boston



"Politics of Space and its Shadows" in the Seoul Biennale International Studios (SBIS):

Date : 2017

Type : architectural urban research exhibition
Role taken : Research and Visualization

Link:

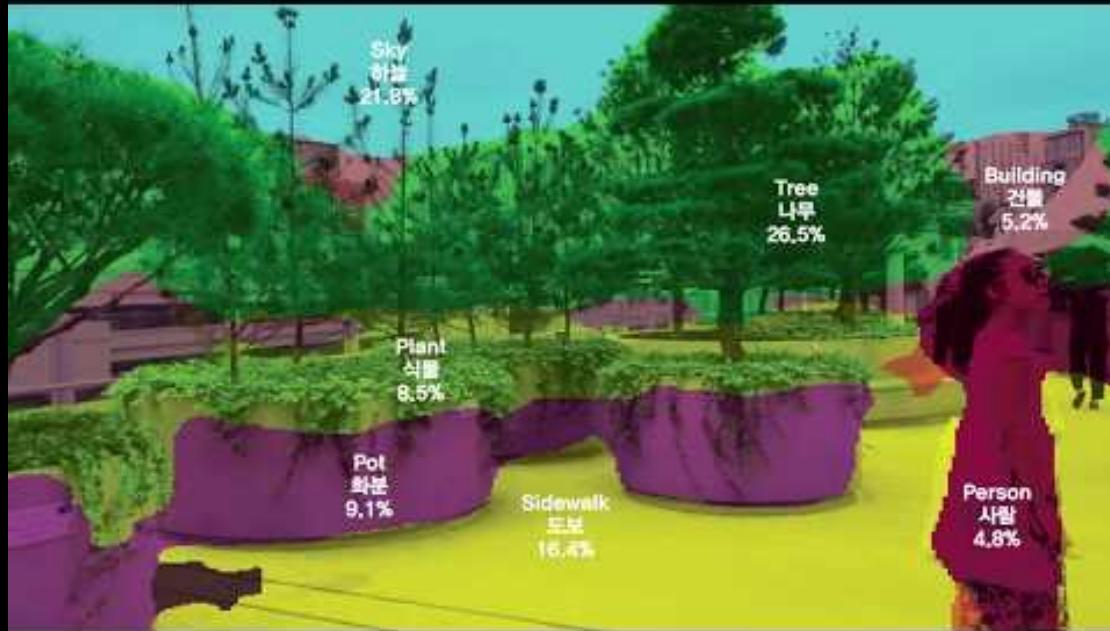
Overview of Project

This project examines how the changing urban environment is perceived by the public and how they are represented through new emerging technologies. I developed a design pipeline for the project that enabled analyzing and visualizing big-data available to the public.

There are an enormous amount of big data being produced by the public, images posted on Instagram is such example. In parallel, there are emerging computational algorithms that process such big-data. However, the urban design discipline has not been able to meaningfully bridge the gap between these emerging technologies and the accumulating big-data. This project attempts to bridge the gap by examining new methods to use big data to better understand public spaces.

The technical workflow is as follows: 1) parse data 2) process data 3) analyze emerging result from the raw data. In the first step, I developed a program to download all images that were tagged with "seoul" on Instagram. I used the Python library DeepLearner to extract image data and converted them into numerical data for processing. As the last step, I classified the results using important keywords associated with the images. The result of this research was invited and exhibited at the Seoul Biennale International Studios (SBIS) exhibition curated by Hyungmin Pa and Alejandro Zárate-Polo.





AERIAL SEMANTIC SEGMENTATION

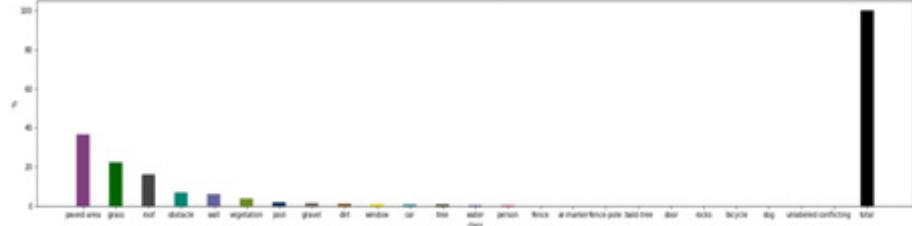
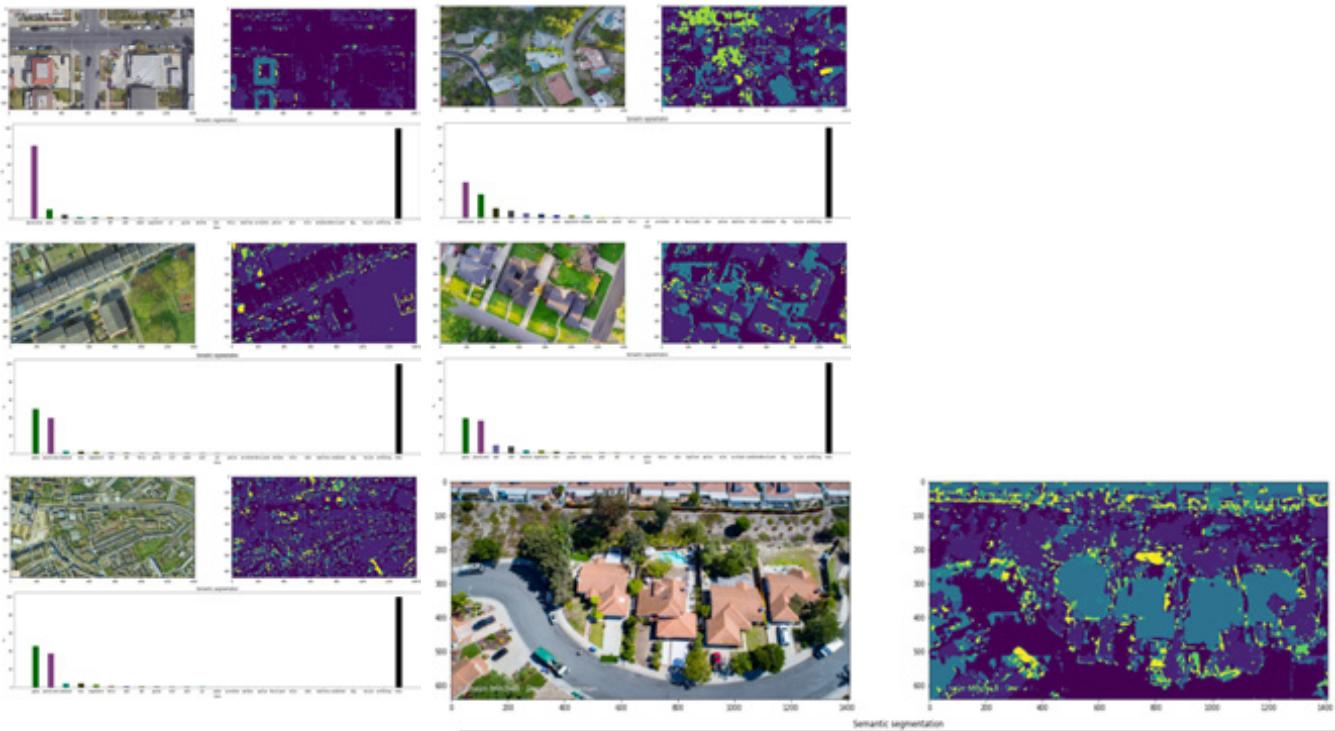
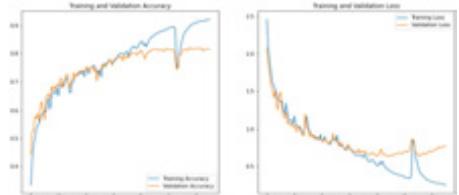
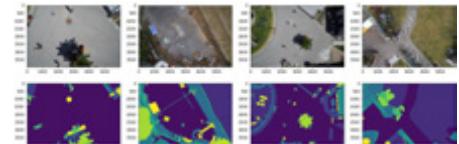
Machine Learning & Implementation

Link: <https://computationaldesign.tistory.com/29>

Reference: <https://www.kaggle.com/datasets/bulentsiyah/semantic-drone-dataset>

Classes

[unlabeled, paved-area, dirt, grass, gravel, water, rocks, pool, vegetation, roof, wall, window, door, fence, fence-pole, person, dog, car, bicycle, tree, bald-tree, ar-marker, obstacle, conflicting]



NNA, NUMERIC NETWORK ANALYSIS TOOLBOX

Medium:
<https://ji-namji.medium.com/numeric-network-analysis-post-covid-19-urbanism-6-ft-rule-de267886b028>

Addon For Grasshopper
<https://www.food4rhino.com/app/numeric-network-analysis-nna>

Lecture, NYIT
https://youtu.be/_9i7dp5q6A0

Accessibility Analysis
Reach, Gravity, Huff-model

Centrality Analysis
Betweenness, Closeness, Straightness,
Degree

SITE ANALYSIS: Betweenness

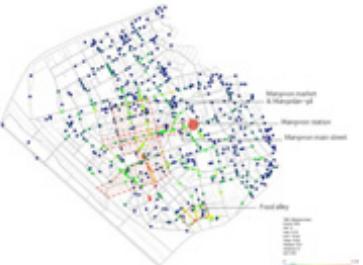
Definition of betweenness

$$\text{Betweenness}(A) = \sum_{i,j \in \text{nodes} \setminus A} \frac{N_{i,j}(A)}{N_{i,j}}$$

The Betweenness Index is the total number of shortest paths n_{ij} at the target location j divided by the total number of shortest paths that exist between two nodes i and j of a given radius R .

The target node j would have a high betweenness centrality if it appears in many shortest paths to the node that estimates realistic pedestrian flows in the network.

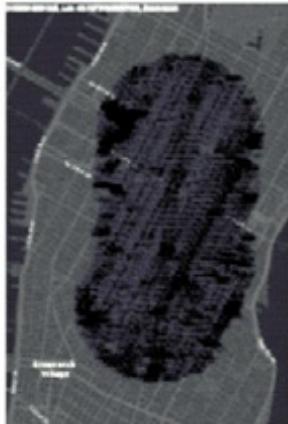
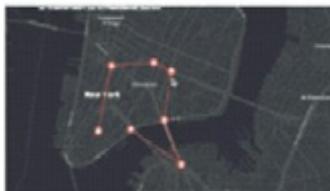
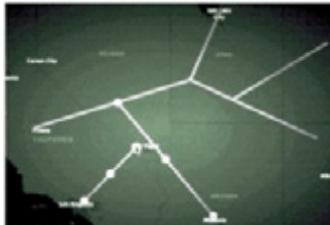
Title	Betweenness
Origin	retail
Destination	environment
Count	878
Min	0
Max	0.19
Sum	19.24
Mean	0.02
Median	0.01
Variance	0
Std	0.05



SITE CONTEXT betweenness - site



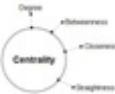
SITE SELECTION: comparison using the age weight of NNA



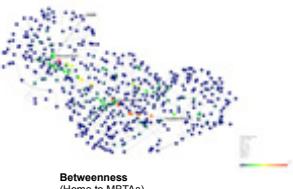
Graphic User Interface for the GH implementation



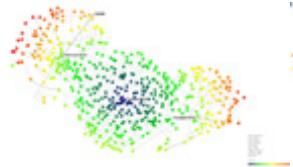
Degree
(No. connectivity at each node)



In graph theory, **Centrality** estimates to determine the hierarchy of **nodes** or **edge** within a network. The centrality analysis uses for diverse urban scales for local and global. A local centrality defines the distance between nodes within a given radius and a global centrality calculates the distance between nodes in a whole system. The Centrality Index is useful to understand the operational analysis of network flow tendency in transportation geographies, such as airline networks, road networks, and canal networks. As well as it measures to understand a node (location) importance in space.



Betweenness
(Home to MBTAs)



Closeness
(Home to MBTAs)



Straightness
(Home to MBTAs)



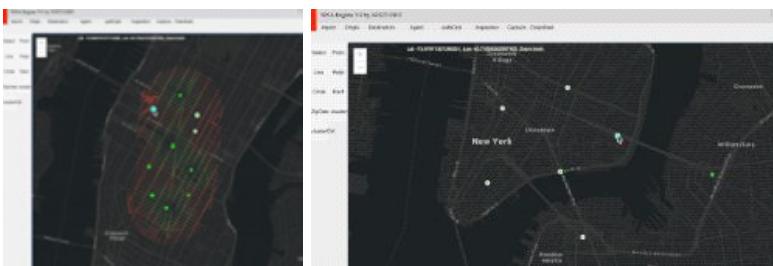
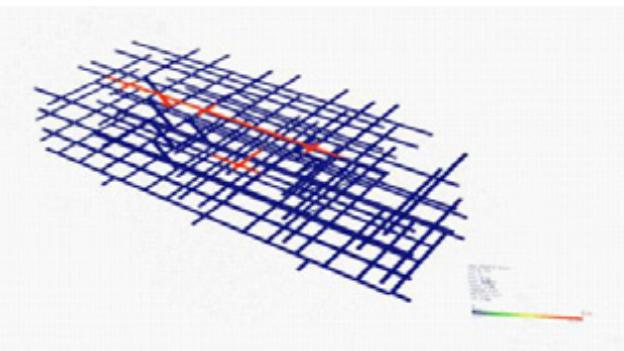
Huff
(Probability to visit locations)

Reach
(No. accessible homes from MBTAs in 1000M)

Gravity
(Discounted No. accessible homes from MBTAs in 1000M)



Accessibility analysis has been researched in the field of physical planning and spatial modeling for over 50 years. The concept of accessibility explains both **activity patterns in space** and the **connections between activities** linked to Newton's law of gravity. Hansen's "How Accessibility Shapes Land Use" (1959) was the first defined paper about accessibility as a potential of using urban planning.



PARAMETRIC & OPTIMIZATION

http://www.njstudio.co.kr/main/project/2016_FluxFactoryParkerator/2016_FluxFactoryParkerator.html

PARKERATOR in Flux Factory [Data Driven Design]

Date : 2016
position : Application Engineer intern (Computational Designer) in Flux Factory
Role taken : research, design, modeling, visualization

Web Link : [Parkerator 1 Link](#) [Parkerator 2 Link](#)

Rule-based design system

All first project at flux, I developed a multistory car (MSGP) configurator for SJ in Singapore. Among other request, the idea of a "Parkerator" (Parking + Configurator) it is a plugin running on Flux that can automatically generate parking layout based on the given site boundary conditions for the implementation of computational design workflow for the following reasons.

(1) it should be fully automated process before decision making phase.

(2) it should be able to generate multiple parking layout in the construction phase,

(3) it should provide the maximum usage capacity possible for an arbitrary site

Singapore being one of the densest city in the world, the whole objective of the project was to leverage computer intelligence to provide the most optimized parking design for space allocation.

Parkerator Phase 1

The aim of the initial phase is to give users a volumetric and numerical sense of what a basic rectangular parking building would based on the number of cars that can be parked and the number of floors. In this, we was input the number of car and the height of building, and the script automatically generated a 3D building model with an associated set of descriptive metrics.



Objectives and problems:

- Provide a volumetric sense of a basic rectangular parking building
- Reflect the generated circulation in the parking building
- Rapid prototyping for design spaces with the number of cars and the length of building
- Simple descriptive metrics about the building

Parameters:

- Number of Car
- Number of floor

Data hierarchy in the oil code

- Building
 - Build function related to create mesh and lines!
- * Lot class
 - isHiveLot (check for the status for building)
 - isCore (check for the status for building)
 - isAmp (check for the status for building)



Grid Optimizer

To achieve 1st objective, we continue a Grid Optimizer that shapes a grid system in which cell can be populated in arbitrary boundary conditions. Basically, using brute force algorithm, it creates a data set of all possible grid configurations in a given site boundary. Then, it finds the best configuration that provides the optimal solution in the given site context. In addition, it also provide users with a manual mode to explore the design space tracking individual set of parameters by shifting the parameter. Then, using optimization algorithm, it can find the optimal parameter in the data that user produce.

Data Usages for design space

For 2nd objective, we created C#s Listener which records parameters and visualize them as a graph. It draws a novel visualization which re-maps data to circular coordinate system to directly visualize data series without any dimensionality loss. To do this, design space is mapped to a 2D graph. In the Manual mode, the listener tracks every single range of parameter and maintains a 2D graph and circular graph so that designer create their own data visualization by play with the parameters.

Blue Print & Constructor

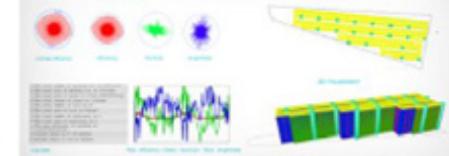
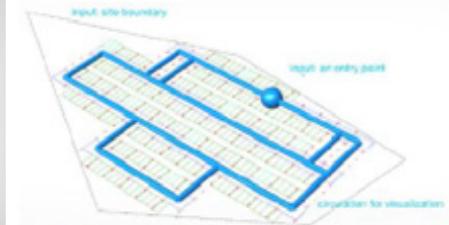
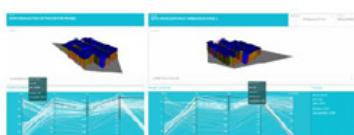
For 3rd goal, the holistic process is discretized as two parts (1) Blue Print part (2) Construction part. This is because the two phases have different requirements and different computation methods. In the Blue Print phase, the algorithms concentrate on mathematical computation to shape numerical data of a parking building as a blue print. In that period, the grid optimization also happen. Once you create a blue print, you can use it to generate a construction plan. In the construction phase, we draw them on viewport based on the API. For the implementation for different platform, we need to simply execute a function switching the API such as Flux Geometry API, RhinoCommon API, WebGL, or OpenGL, in the Construction phase.

Objectives and problems:
- Create a parking footprint based on an arbitrary site boundary conditions

- Includes an arbitrary entry point
- Manual mode for those who want to explore the design space
- Optimal mode for those who want to find the optimal option in a mouse click

Parameters:

- Site boundary condition (polyline)
- A entry point (point or vector)
- Auto mode / Manual Mode with degree (bool / number)



FLUX



Data distribution



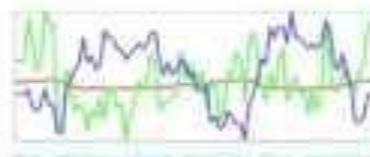
Intensity



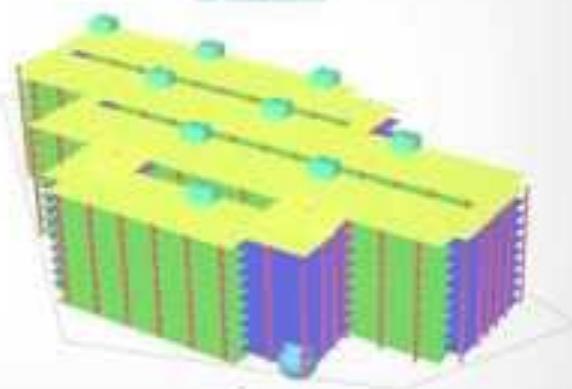
Depth



Velocity



3D visualization



STRUCTURE & OPTIMIZATION

http://www.njstudio.co.kr/main/project/2016_ColumnDistribution.html
on/2016_ColumnDistribution.html

01. COLUMN DISTRIBUTION AND THICKNESS OPTIMIZATION

Digital Structures and Material Distribution.

HARVARD GSD

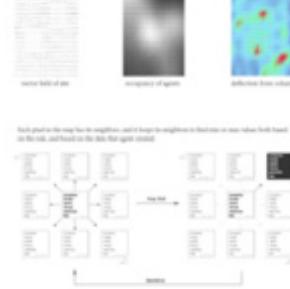
Date: Spring 2016
Type: Academic project
Prof: Pengfei Maofei
Role taken: design, research, computation and visualization

Website:

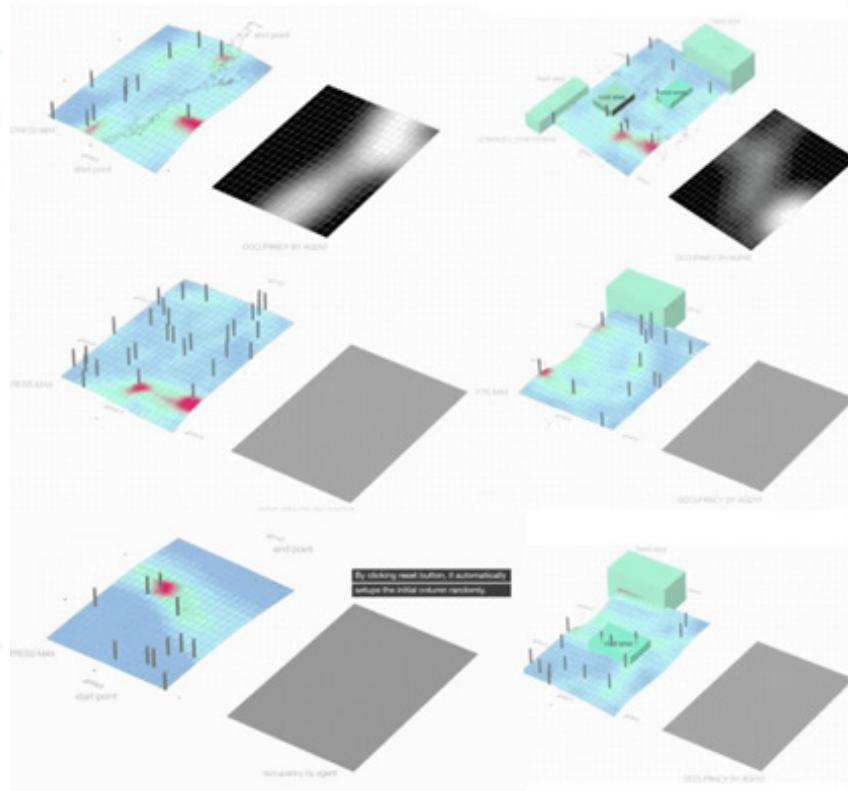
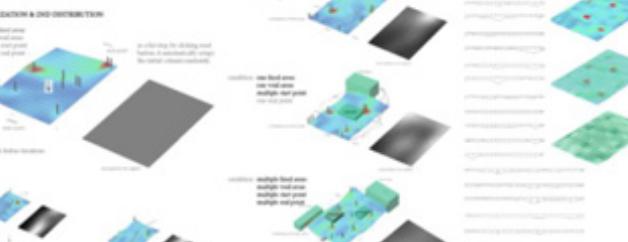
Pressure field and algorithm

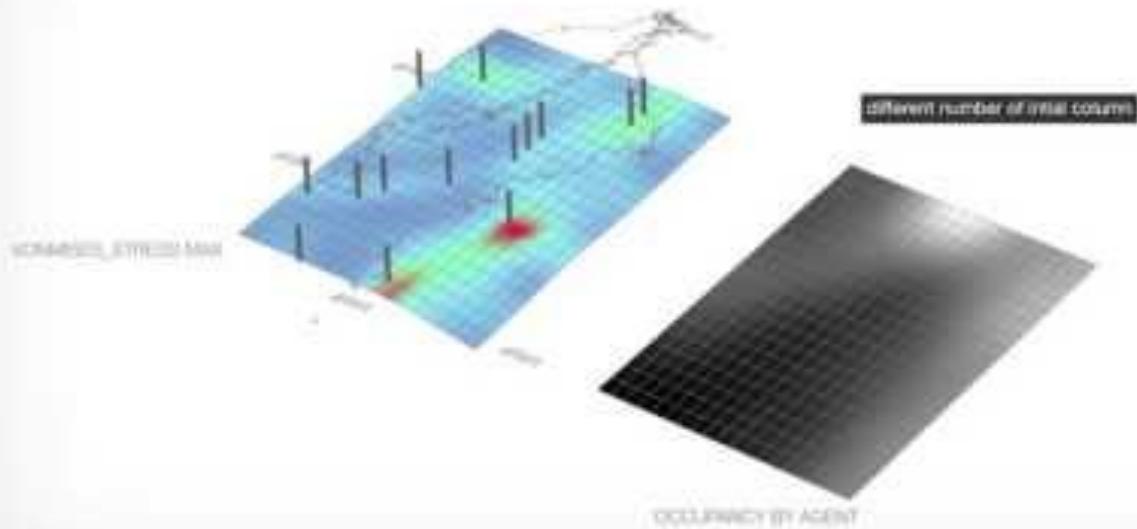
This column distribution algorithm uses vector field, and the movement of agents is also distributed on a grid scale. Only, the distance with the current position will be zero if the agent stay there.

Each plot in the ring has the neighbors, and it keeps the neighbors in the same row as mean values field based on the rule, and based on the rule that agent could.



Time	Method	Iteration	Agent	Empty	Wall	Fixed
0	Initial	0	0	100	0	0
1	Initial	1	0	99	0	0
2	Initial	2	0	98	0	0
3	Initial	3	0	97	0	0
4	Initial	4	0	96	0	0
5	Initial	5	0	95	0	0
6	Initial	6	0	94	0	0
7	Initial	7	0	93	0	0
8	Initial	8	0	92	0	0
9	Initial	9	0	91	0	0
10	Initial	10	0	90	0	0
11	Initial	11	0	89	0	0
12	Initial	12	0	88	0	0
13	Initial	13	0	87	0	0
14	Initial	14	0	86	0	0
15	Initial	15	0	85	0	0
16	Initial	16	0	84	0	0
17	Initial	17	0	83	0	0
18	Initial	18	0	82	0	0
19	Initial	19	0	81	0	0
20	Initial	20	0	80	0	0
21	Initial	21	0	79	0	0
22	Initial	22	0	78	0	0
23	Initial	23	0	77	0	0
24	Initial	24	0	76	0	0
25	Initial	25	0	75	0	0
26	Initial	26	0	74	0	0
27	Initial	27	0	73	0	0
28	Initial	28	0	72	0	0
29	Initial	29	0	71	0	0
30	Initial	30	0	70	0	0
31	Initial	31	0	69	0	0
32	Initial	32	0	68	0	0
33	Initial	33	0	67	0	0
34	Initial	34	0	66	0	0
35	Initial	35	0	65	0	0
36	Initial	36	0	64	0	0
37	Initial	37	0	63	0	0
38	Initial	38	0	62	0	0
39	Initial	39	0	61	0	0
40	Initial	40	0	60	0	0
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49	Initial	49	0	51	0	0
50	Initial	50	0	50	0	0
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54	Initial	54	0	46	0	0
55	Initial	55	0	45	0	0
56	Initial	56	0	44	0	0
57	Initial	57	0	43	0	0
58	Initial	58	0	42	0	0
59	Initial	59	0	41	0	0
60	Initial	60	0	40	0	0
61	Initial	61	0	39	0	0
62	Initial	62	0	38	0	0
63	Initial	63	0	37	0	0
64	Initial	64	0	36	0	0
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93	Initial	93	0	7	0	0
94	Initial	94	0	6	0	0
95	Initial	95	0	5	0	0
96	Initial	96	0	4	0	0
97	Initial	97	0	3	0	0
98	Initial	98	0	2	0	0
99	Initial	99	0	1	0	0
100	Initial	100	0	0	0	0





DESIGN SYSTEM & AI, ML VOXEL REPRESENTATION

http://www.njstudio.co.kr/main/project/2017_thesisVoxelHarvardGSD/public/

REMIXING & RESAMPLING THREE DIMENSIONAL OBJECTS Use of Volumetric Representations and Machine Learning in design

Date : 2006 - 2017
Type : Thesis project at Harvard GSD
Role taken : Independent project
Website

Digital Design Prize, class of 2012, Harvard GSD

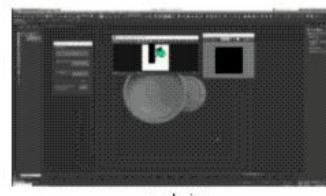
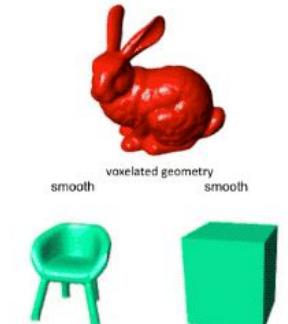
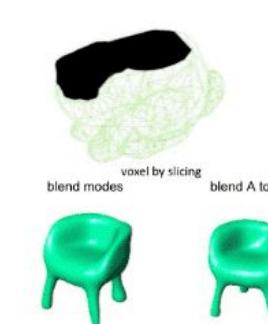
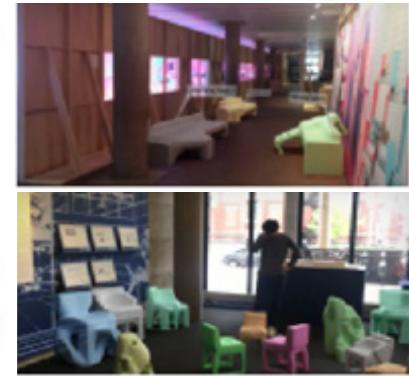
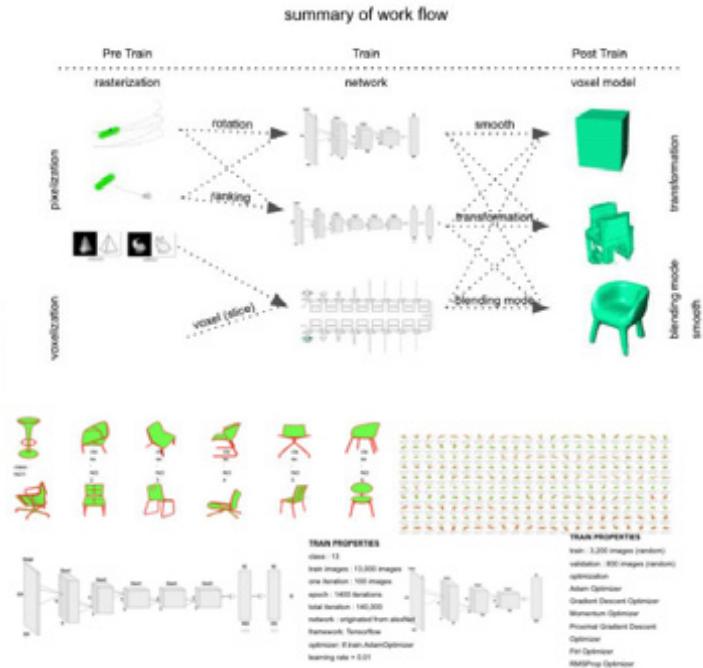


ABSTRACT

This thesis aims to explore the opportunities of remixing and resampling three-dimensional geometry data with the use of volumetric representations and machine learning in design. A voxel is a volumetric element representing a fragment of space. There are various types of implementations of voxel representations in different fields such as game design, simulations, architecture, fabrication, medical or computational design.

This thesis consists of the following parts. First, it introduces what voxel modeling is, compared to traditional modeling techniques. It looks at the advantages and disadvantages of a voxel representation, and how it compares to other representations such as point clouds and ray-tracing modeling paradigms. It also describes characteristics of voxel space covering as voxelized and voxelized space, as a dense representation (implicit) compared to sparse representation (voxelized). Second, it presents a novel framework for learning from images. The combination of similarities of voxel representations and two-dimensional images, enables us to leverage the developments of the past few years in the field of image analysis and machine learning and extend them to three-dimensional voxel representations. This is done by first introducing the basic concepts of machine learning with the opportunities for voxelized and voxelized representations of 3D machine learning by analytical inference, numerical modification, and blending multiple volumetric

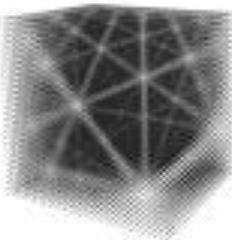
The thesis examines several prototypical implementations of proposed design systems or workflows, as a series of experiments based on the process from rasterization, (1) voxelized, (2) voxelized (3) depth, of 3D geometry with machine learning, (1) convolutional neural network(CNN) and Generative Adversarial Networks(GAN), in order to show new types of geometries by voxel blending.





Design workflows integrating Machine Learning and voxel representations

**Remixing & Resampling Three Dimensional Objects
Use of Volumetric Representations and Machine Learning in Design**



Adviser: Prof. Przemysław Misztak, Harvard GSD

Adviser: Prof. Takehiko Nagumo, MIT

Ph.D Namju Lee

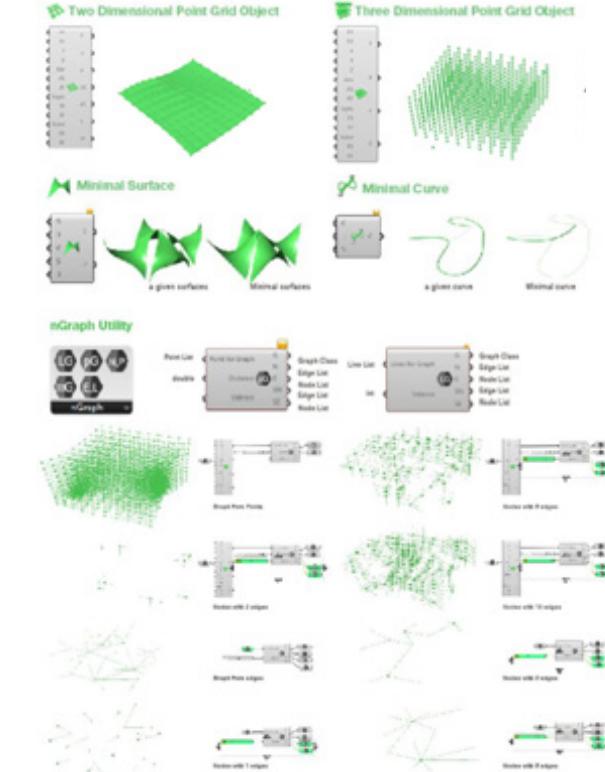
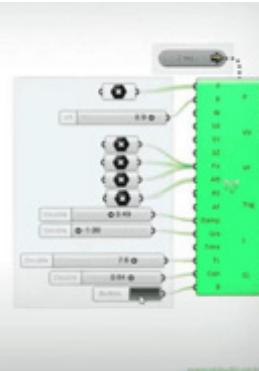
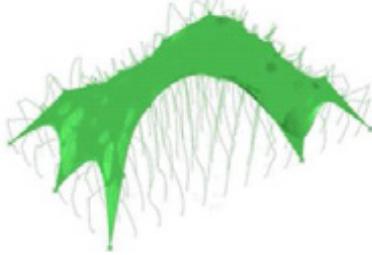
Thesis project, MDes

GEOMETRY & DYNAMICS

http://www.njstudio.co.kr/main/project/2015_NGU_Development/2015_NGU_Development.html

Geometry, Addon for Grasshopper
<https://www.food4rhino.com/app/numerical-geometry-utility>

Dynamics, Addon for Grasshopper
<https://www.food4rhino.com/app/numerical-mapping-utility>





Numerical Geomerty and Graph Utility

computational analysis, Version 2015

- Two-Dimensional Point Object
- Three-Dimensional Point (3D) Object
- NCone Class for geometry analysis
- NSurface Class for geometry analysis
- Box Object

www.ngjlab.com



Numerical Dynamic Utility

computational spring mode, Version 2015

- Dynamic Point
- Dynamic Fit Curve
- Dynamic Fit Point Grid
- Dynamic Fit Mesh

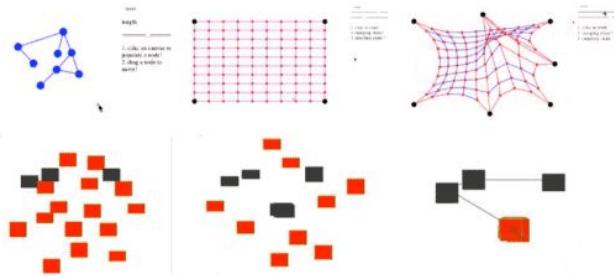
www.ngjlab.com

Geometry and Position Optimization

based on graph and spring model physics

Position Optimization

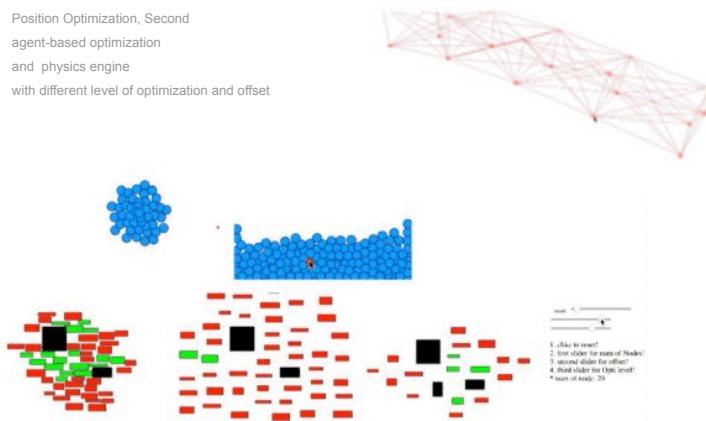
based on graph and spring model physics
Experimentation for overlapping text boxes
with constraints



Position Optimization, Second

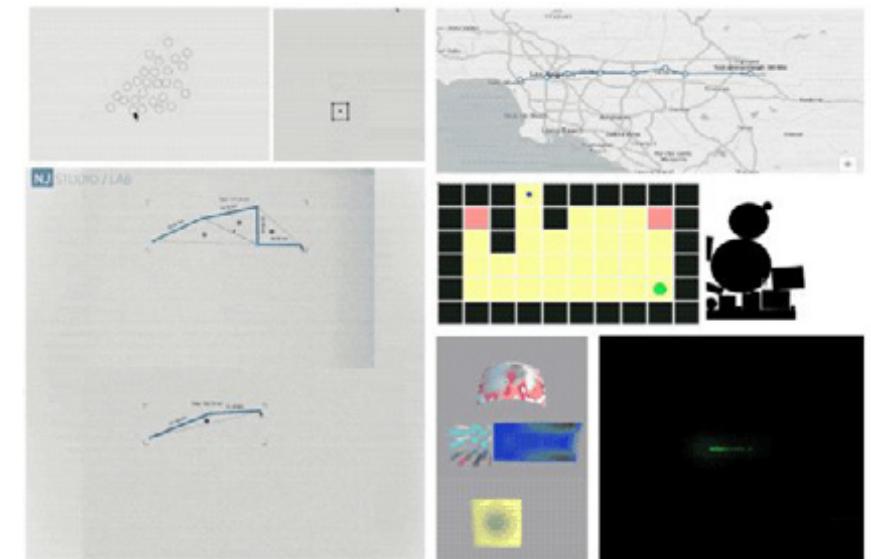
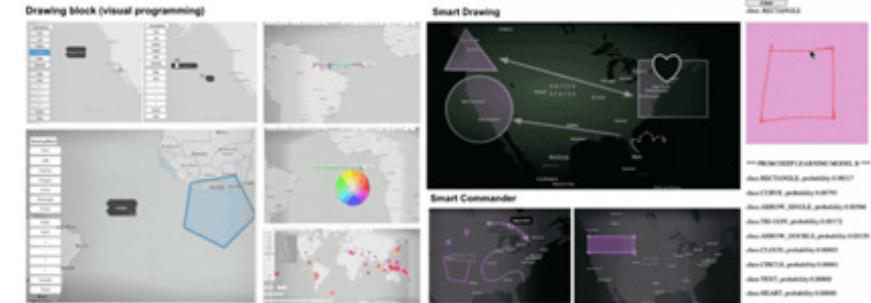
agent-based optimization
and physics engine

with different level of optimization and offset



Advanced Geometry manipulations

Dynamics, Spring, Voxel, Shader ...



LANDSCAPE & ENVIRONMENT

http://www.njstudio.co.kr/main/project/2015_NEU_Development/2015_NEU_Development.html

Addon for GH

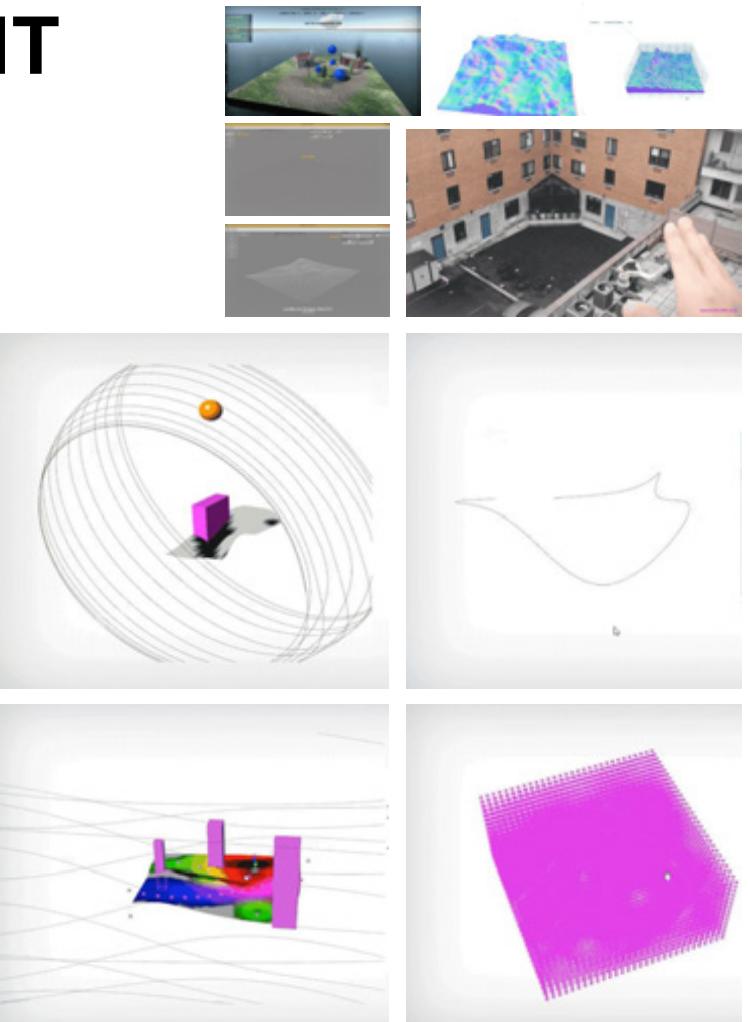
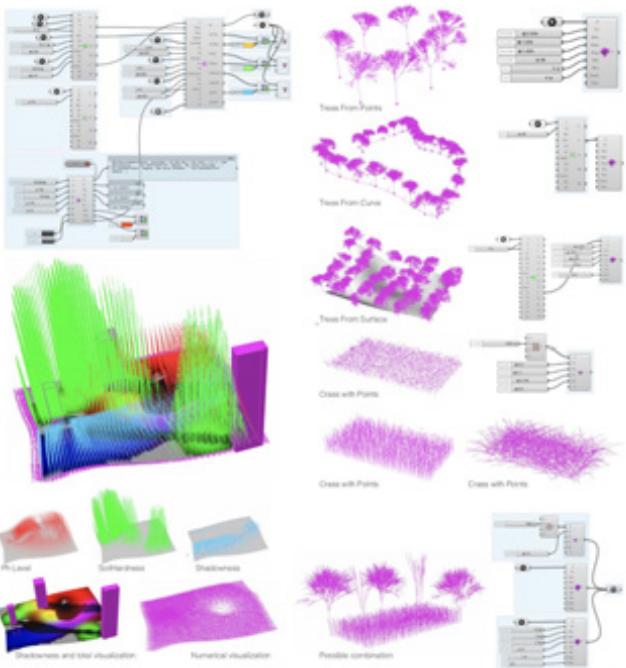
<https://www.food4rhino.com/app/numerical-landscape-utility>

NUMERICAL ENVIRONMENT UTILITY AN ADD ON FOR GRASSHOPPER FOR SIMULATION

Date - 2014 - present
Type - independent project
Role taken - independent project (director and developed)

Website

The screenshot shows the Grasshopper interface for the Numerical Environment Utility add-on. It includes a legend for components like Solar Class, Solar Evaluation with Surface, Solar Evaluation with Points, Land Evaluation with Points, Land Evaluation with Surface, Tree Class, and Grass Class. There are also sections for Reference, Declination, Sun path simulation, Solar Attitude, and Solar Azimuth. Numerous GH components are interconnected to create complex simulations. Visualizations include 3D point clouds, surface meshes, and color-coded numerical data. A note at the bottom left states: "Figure 1: Solar Radiation Resulting From Earth's Tilt
 $\theta = 23.45^\circ \sin(2\pi \cdot (\text{Time} + 280) / 365.25) + 23.45^\circ$ ".





Environment

Numerical Environment Utility

data in pixel and voxel, Version 2015

new class

New Classmate Sphere

New Classmate Plane

New Average with Surface

New Average with Plane

New Classmate Plane

New Classmate Surface

New Classmate Surface

Top-Grid

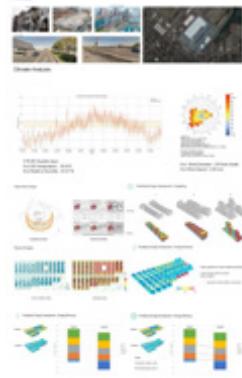
Smart Grid

Smooth Grid

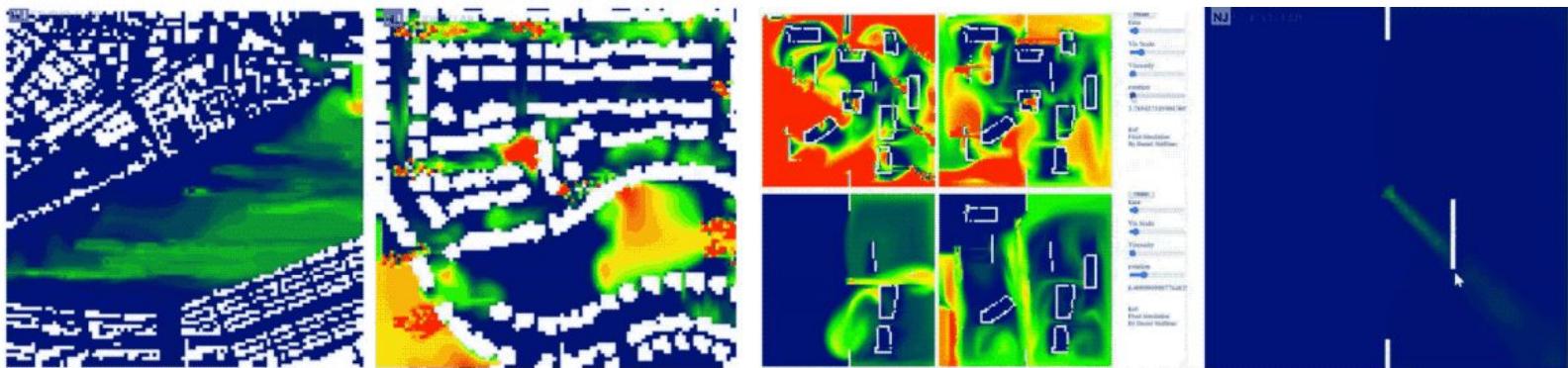
www.njstudio.co.kr

MODELING URBAN ENERGY FLOWS
Sustainable Design Lab, MIT

Dene, Spring 2011
 4-4554-408 Modeling Wind Energy/Poss
 Prior Crossbow decision
Post-takeover research, design, simulation, and visualization
 Collaboration: Edie Arochim-Han, Nathan Brown, Marc Diamond

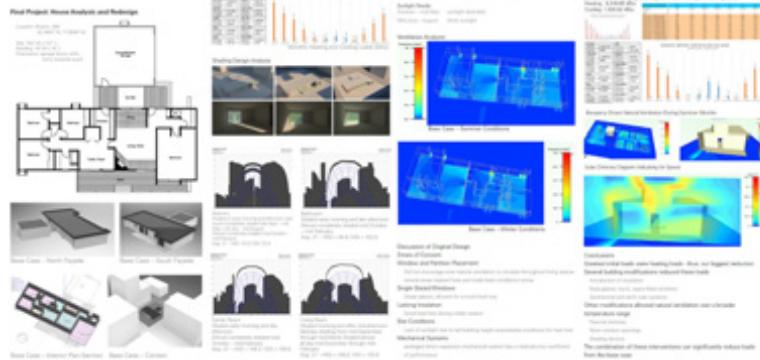


Fluid dynamics simulation

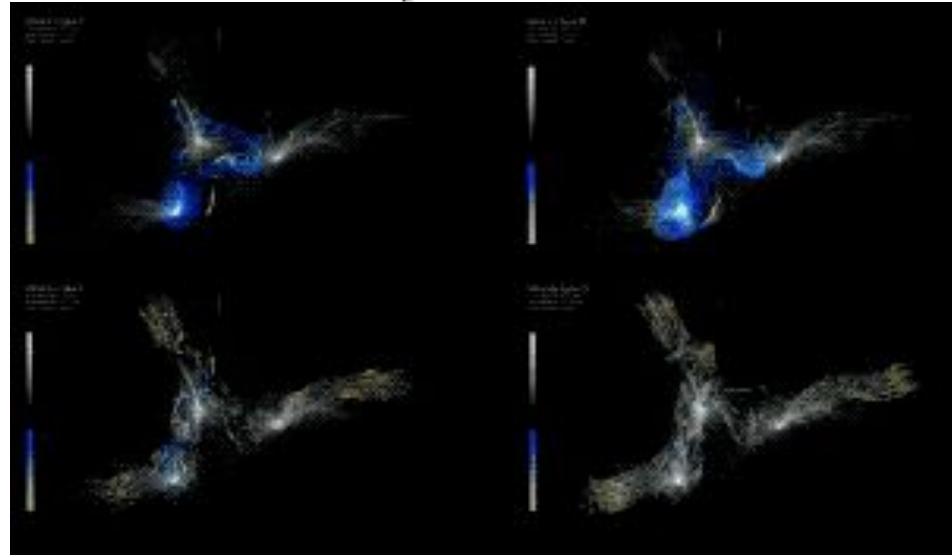
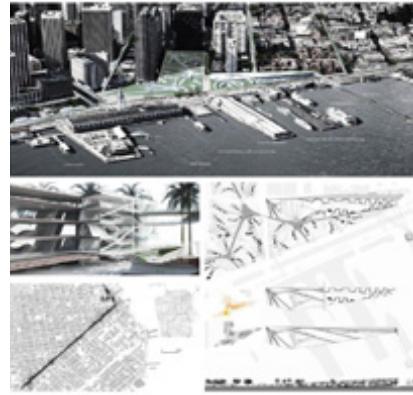
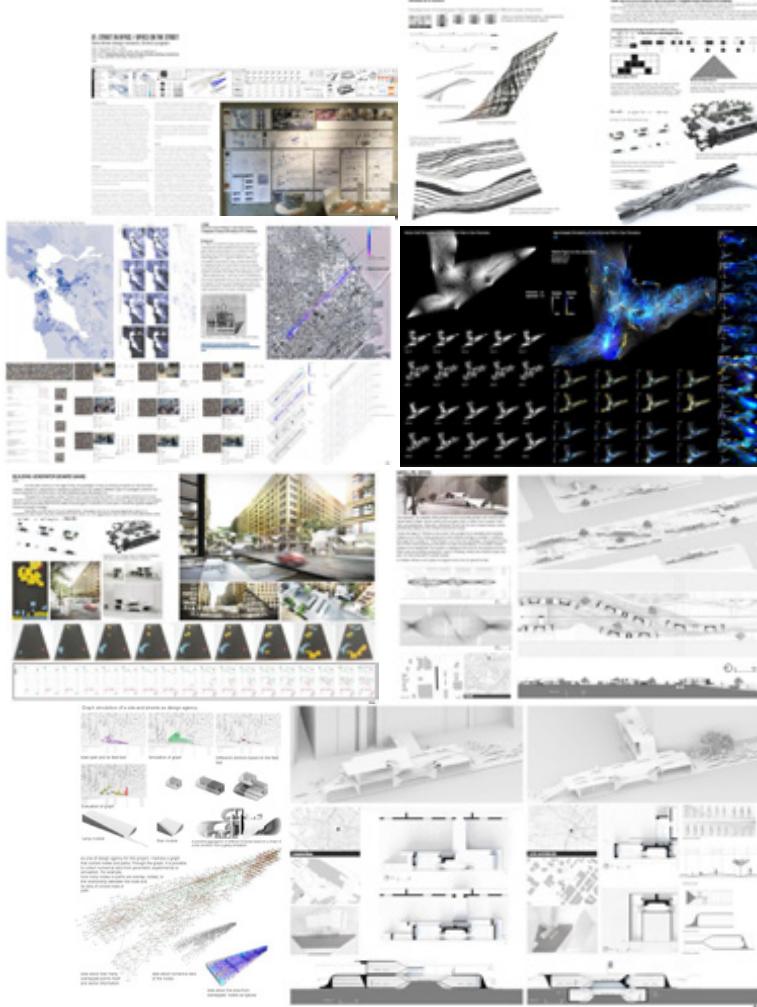


COMPUTATIONAL FLUID DYNAMICS
Experiment, Harvard GSD

Date: 2016
SCI-96402: Building Simulation
Prof. Dr. Barbara
Research: research, design, simulation, and visualization
Collaboration: Joachim Jahn, Christine Thiel
Lam



The combination of these interventions can significantly reduce fraud from the Rose issue.



DESIGN SYSTEM & COMPLEX SYSTEM

http://www.njstudio.co.kr/main/project/2016_SmallEnvironments.html

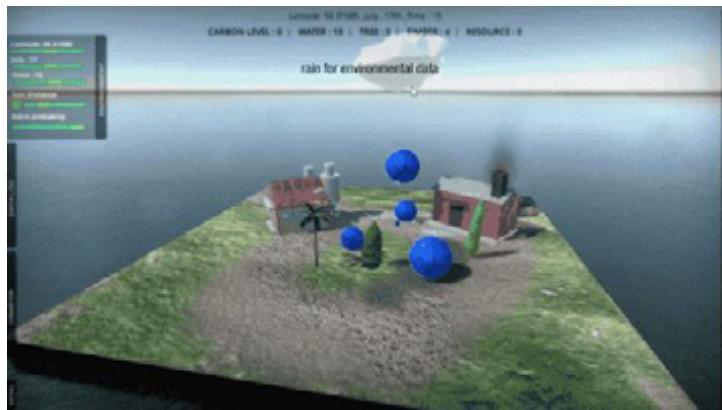




IMAGE PROCESSING

remote sensing / color processing

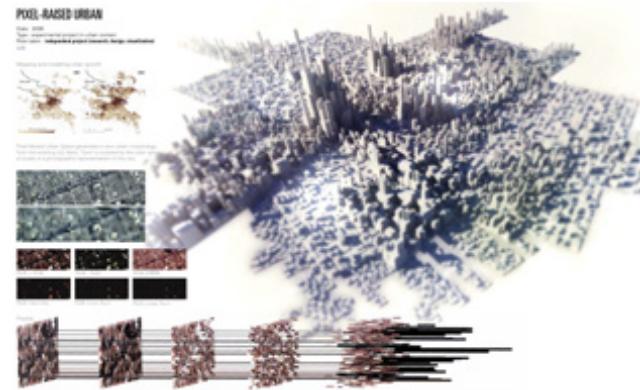
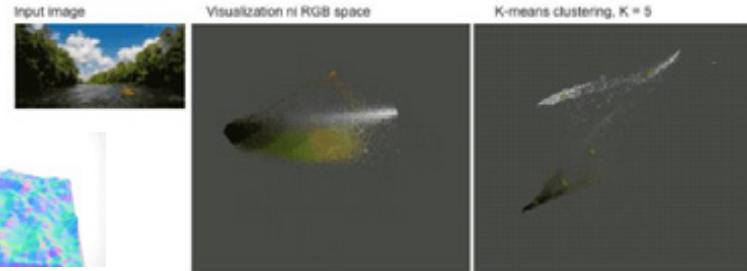
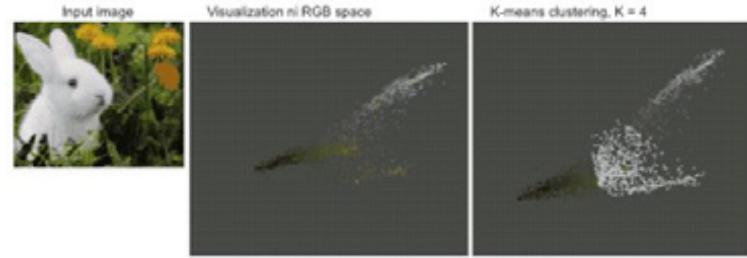
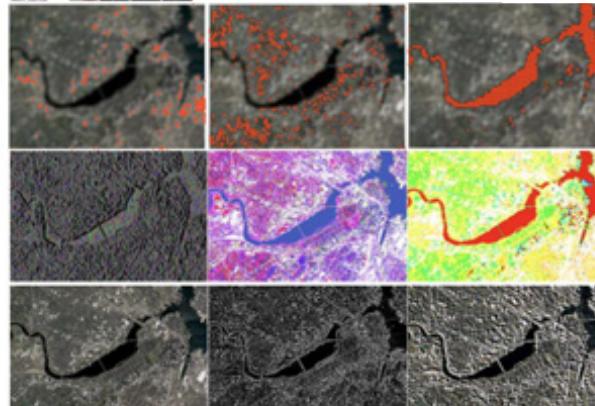
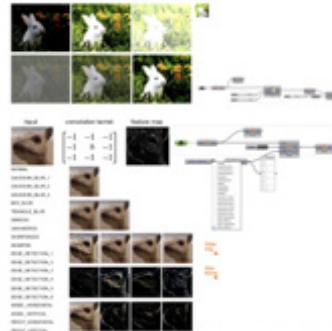
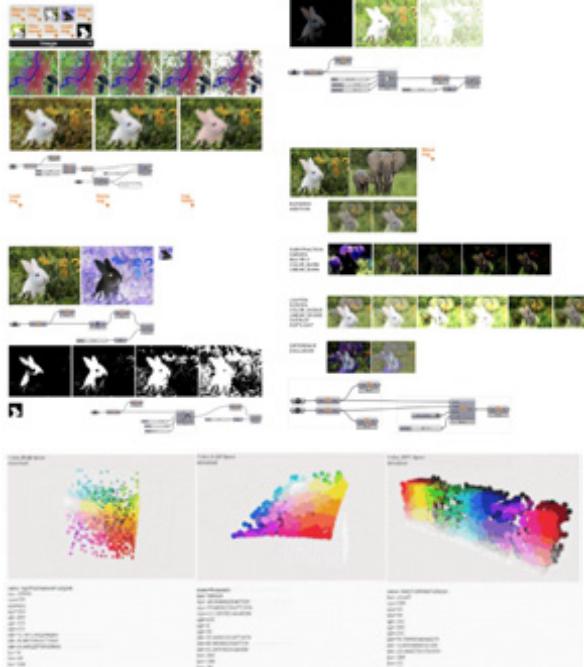
http://www.njstudio.co.kr/main/project/2018_NIU_Development/2018_NIU_Development.html

Addon for Grasshopper
<https://www.food4rhino.com/app/numerical-image-utility>

NUMERICAL IMAGE UTILITY ADDON FOR GRASSHOPPER IMAGE PROCESSING

Date: 2016 - present
Type: independent project
Role taken: independent project (director and developed)

Website:

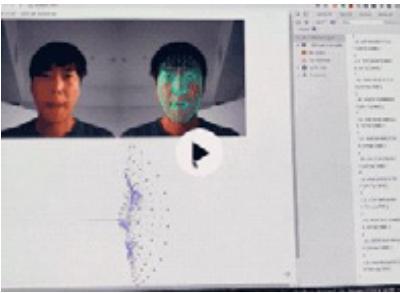


THE COLOR AI

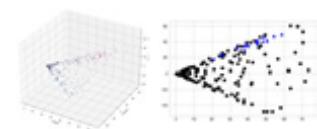
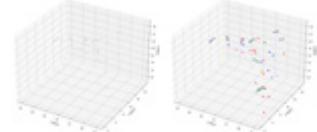
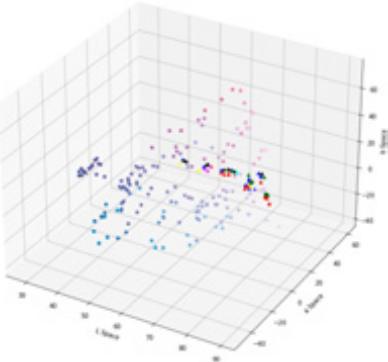
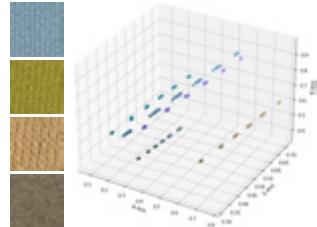
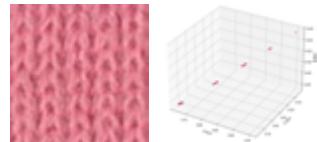
Machine Learning & Implementation

Link: <https://computationalalldesign.tistory.com/29>

Personal Color & prediction and implementation



Texture detection



SMTtracer

Sketch to Map Translator

ESRI Storymaps Hackathon

Link: <https://computationaldesignstory.com/23>

LANGUAGE

Python
TypeScript

LIBRARY

Tensorflow, 2.5.0
CV2, numpy, PIL, ...
HTML Canvas, NJSCoreLib

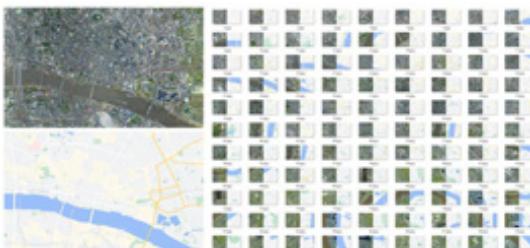
MODEL(NETWORK)

pix2pix: Image-to-image translation with a conditional GAN (a modified U-Net)

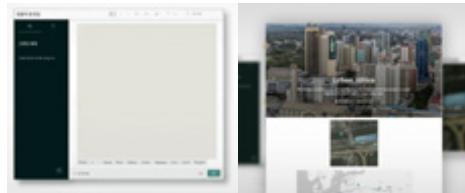
Sketch-to-Map Translator



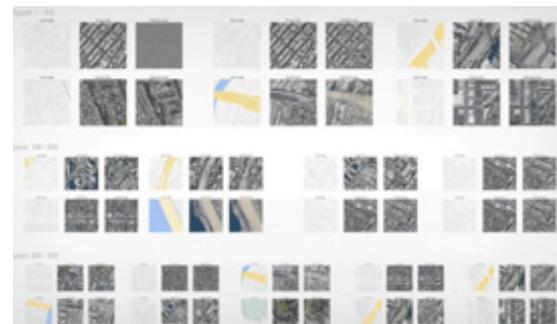
Data collection and preprocessing



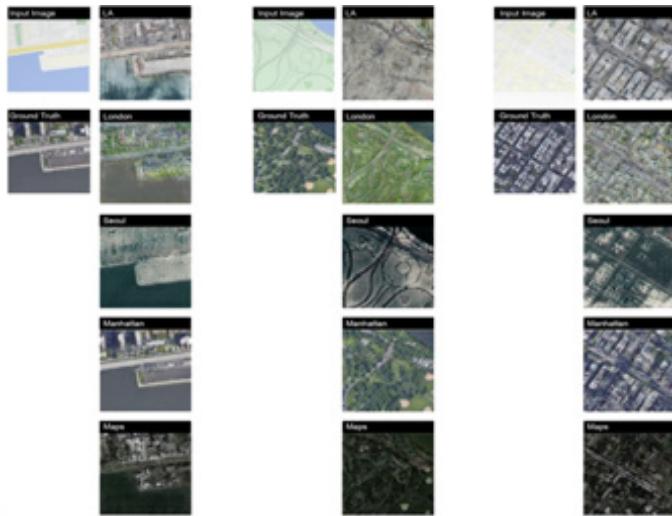
Sketch App



Training and Predictions



Generated maps by different city looks(Seoul, London, Manhattan, LA ...)



Generated maps by the machine



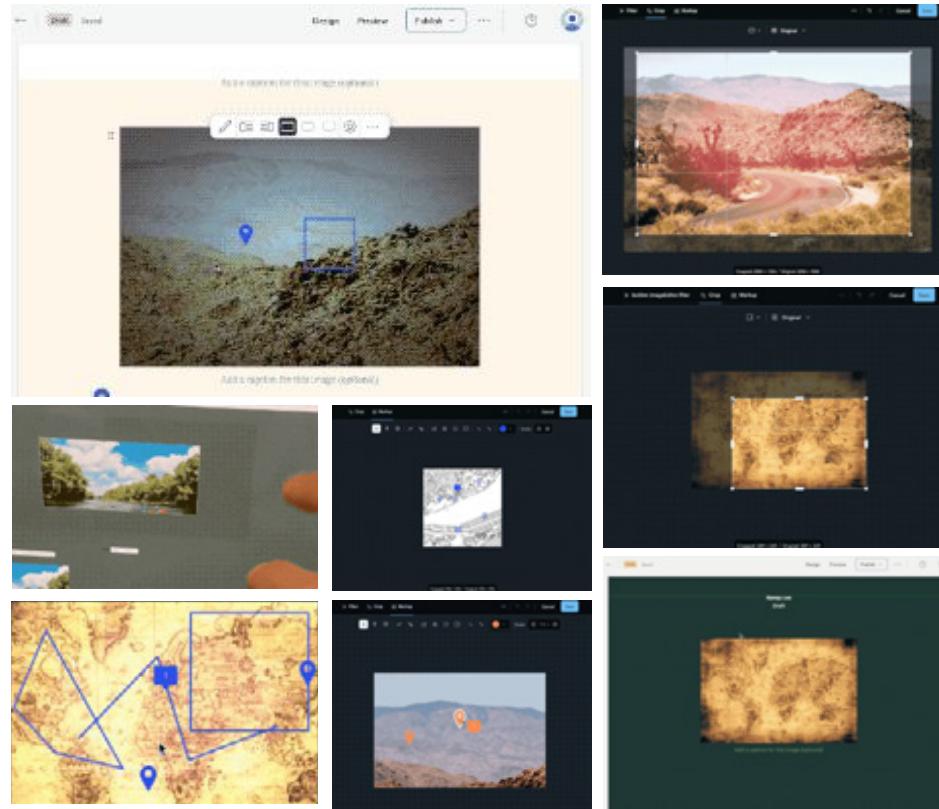


Generated maps by the machine



Express Image app

[ESRI StoryMaps](#) [Storymaps](#)



DATA / GEOMETRY / VISUALIZATION / MAPPING

selected researches and projects

DIGITAL MAPPING DATA VISUALIZATION

http://www.njstudio.co.kr/main/project/2018_NMU_Development/2018_NMU_Development.html

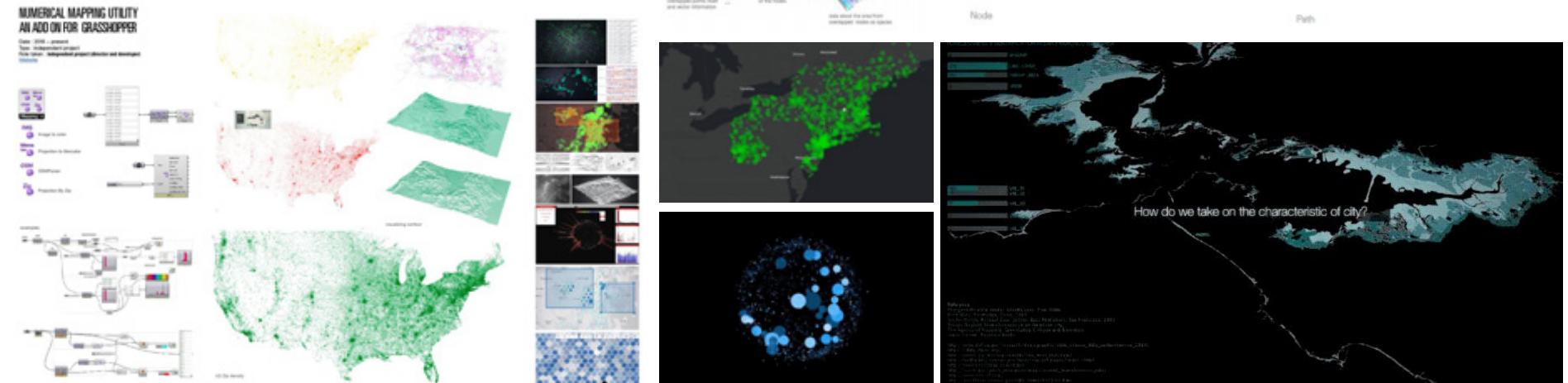
Addon for Grasshopper

<https://www.food4rhino.com/app/numerical-mapping-utility>



Node

Path



1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10
11	11	11	11
12	12	12	12
13	13	13	13
14	14	14	14
15	15	15	15
16	16	16	16
17	17	17	17
18	18	18	18
19	19	19	19
20	20	20	20
21	21	21	21
22	22	22	22
23	23	23	23
24	24	24	24
25	25	25	25
26	26	26	26
27	27	27	27
28	28	28	28
29	29	29	29
30	30	30	30
31	31	31	31
32	32	32	32
33	33	33	33
34	34	34	34
35	35	35	35
36	36	36	36
37	37	37	37
38	38	38	38
39	39	39	39
40	40	40	40
41	41	41	41
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87	87	87	87
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90	90	90	90
91	91	91	91
92	92	92	92
93	93	93	93
94	94	94	94
95	95	95	95
96	96	96	96
97	97	97	97
98	98	98	98
99	99	99	99
100	100	100	100



General
Analyze the network structure. The map shows a complex web of connections between various nodes, primarily concentrated in North America and Europe. The size of the nodes indicates their relative importance or density. The connections are represented by thin, glowing green lines, forming a dense network that highlights the interconnected nature of the system. The overall pattern suggests a highly centralized and interconnected global network, with major hubs in North America and Europe and smaller satellite nodes elsewhere.

MAPPING & CAD SYSTEM

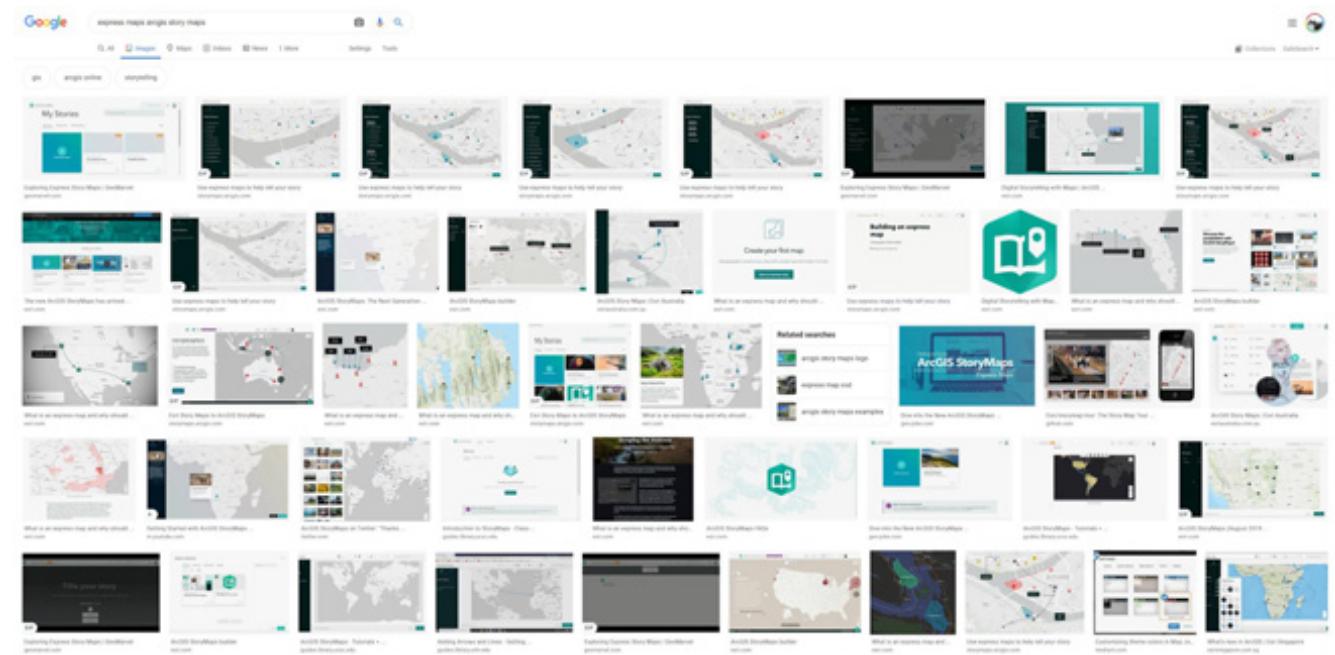
Storymaps, ESRI

<https://storymaps.arcgis.com/>



Google Image

https://www.google.com/search?q=express+maps+arcgis+story+maps&xsr=ALeKk03TMNsrw0iC_iqa5GjzWuwT6YUQ:1612574029256&source=nlrms&tbs=isch&sa=X&ved=2ahUKEwj-77-xitTuAhXhH0AKHSfC0V4Q_AU0Ax0ECBQBaW&biw=1556&bih=884



Youtube

https://www.youtube.com/results?search_query=express+maps+arcgis+story+maps+

Others

<https://www.youtube.com/watch?v=wwb5iLeex9M>

<https://www.youtube.com/watch?v=qdn05wkgYw0>



MAPPING & CAD SYSTEM

NGraphics Mapping suite

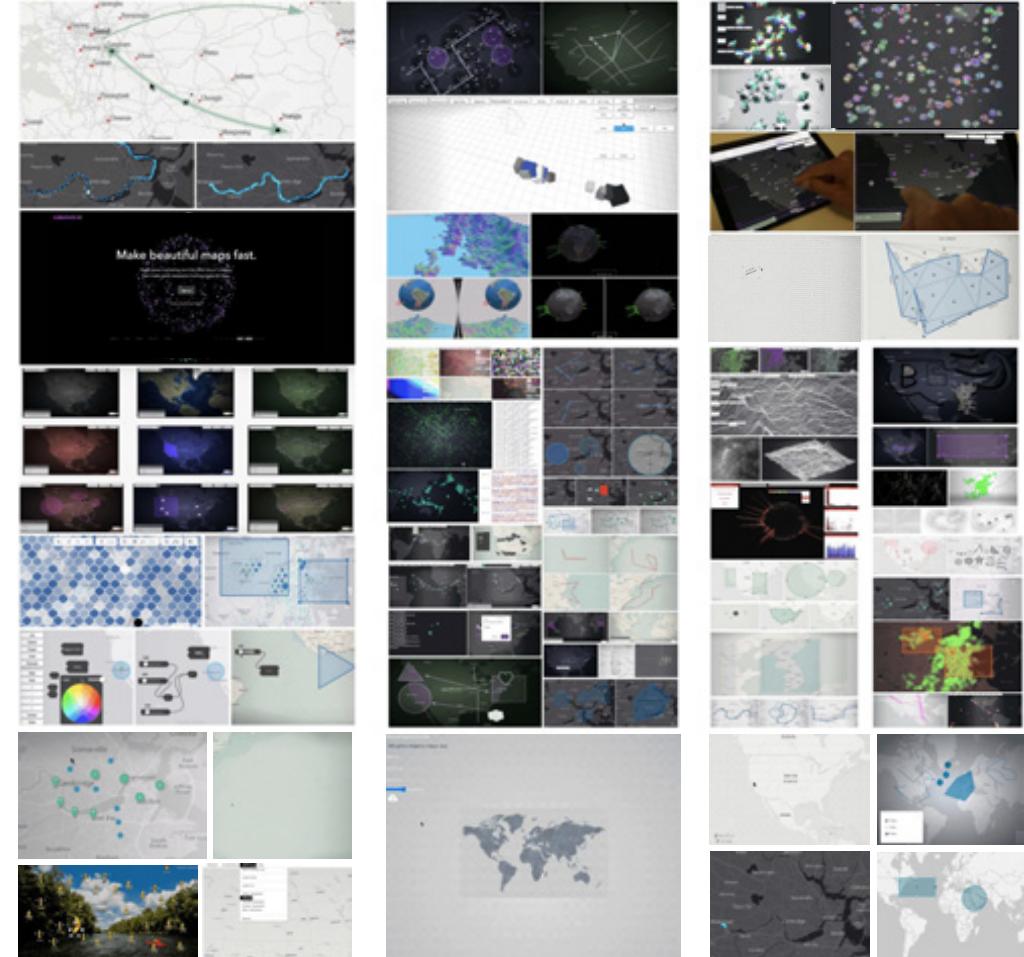
INGRAPHICS MAPPING SUITE V2 [Real-time Graphics products] in progress

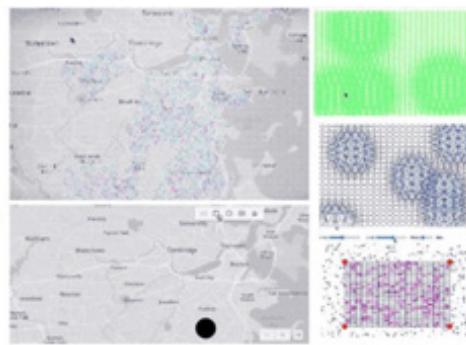
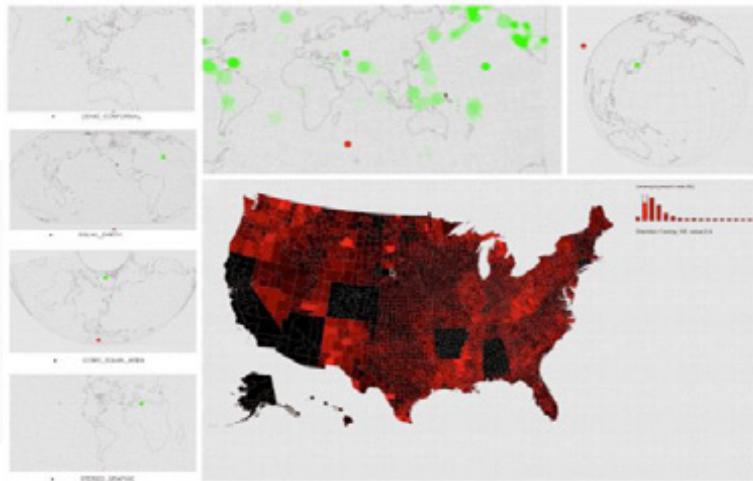
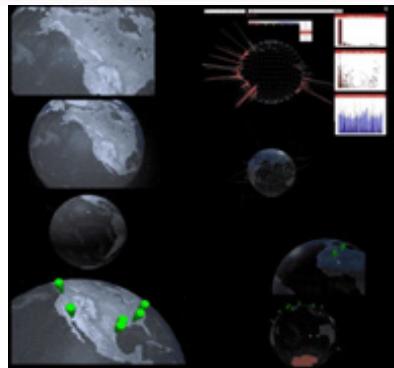
Date: 2017 - present in progress
Team: Product Manager, Product Designers, Product Engineers, Product Developers, Software Development Engineers

INGRAPHICS



- 00:03 - NGraphics Package / Mapping suite
- 00:05 - App: Drawing Tool
- 01:05 - Advanced Drawing
- 01:40 - App: Annotation Tool
- 02:21 - App: Annotation Globe 3D
- 03:10 - App: NGraphics XR(VR/AR)
- 03:24 - App: NSketch: bitmap drawings
- 03:35 - App: N3 WebGL Based Data and Geometry Vis
- 03:51 - App: NGlobe Vis
- 04:16 - App: NBrain Vis
- 04:42 - App: NMMap
- 05:16 - Addon: NWallpaper
- 05:39 - Addon: Smart Drawing
- 05:54 - Addon: Smart Commander
- 06:13 - Addon: Drawing Block
- 06:44 - Addon: MapIcon
- 07:19 - Addon: MapFilter
- 07:46 - App: NImageShop
- 08:08 - Environment: Creative Coding
- 08:23 - Addon: NMedia, Voice Controller, Camera and CV
- 08:39 - Addon: NLearning(ML)
- 08:43 - Framework: Dynamic Canvas
- 08:53 - Framework: WebGL / Three
- 08:58 - Overview / Diagrams of the architecture and pipeline





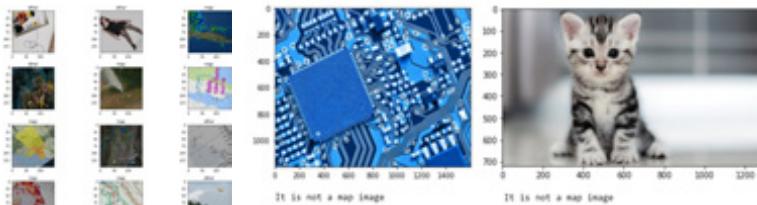
Map Classifier

Machine Learning & Implementation

Link: <https://computationaldesign.tistory.com/29>

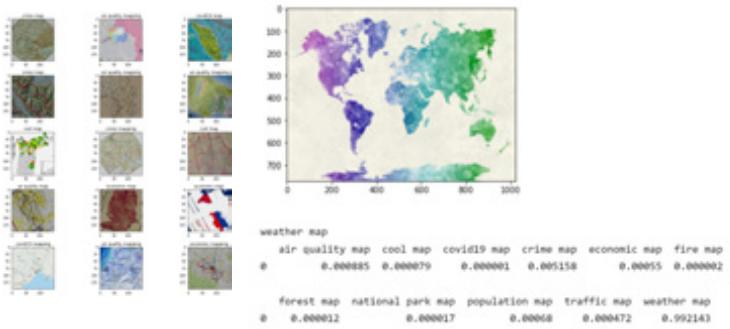
Classes

2 : [map, other]



Classes

22 : [air quality map, air quality mapping, cool map, cool mapping, covid19 map, covid19 mapping, crime map, crime mapping, economic map, economic mapping, fire map, fire mapping, forest map, forest mapping, national park map, national park mapping, population map, population mapping, traffic map, traffic mapping, weather map, weather mapping]

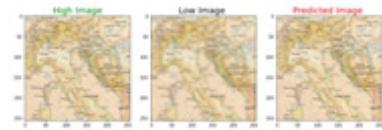
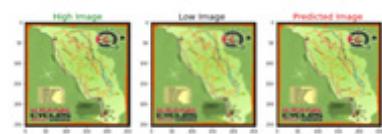
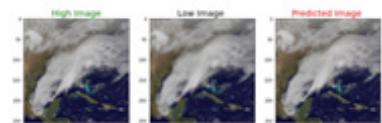
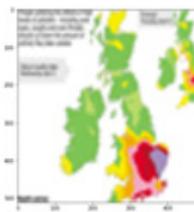
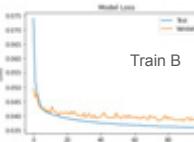
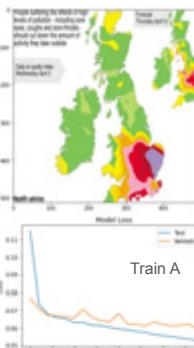


Map Super Sampling

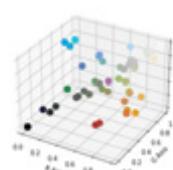
Machine Learning & Implementation

Link: <https://computationaldesign.tistory.com/29>

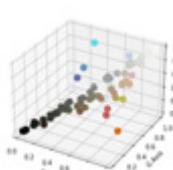
Train data : 3,000 (maps)



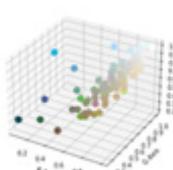
air quality map



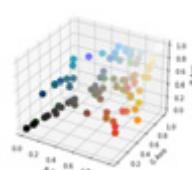
7 crime mapping



15 national park mapping



17 population mapping



FABRICATION & DIGITAL MOCKUP

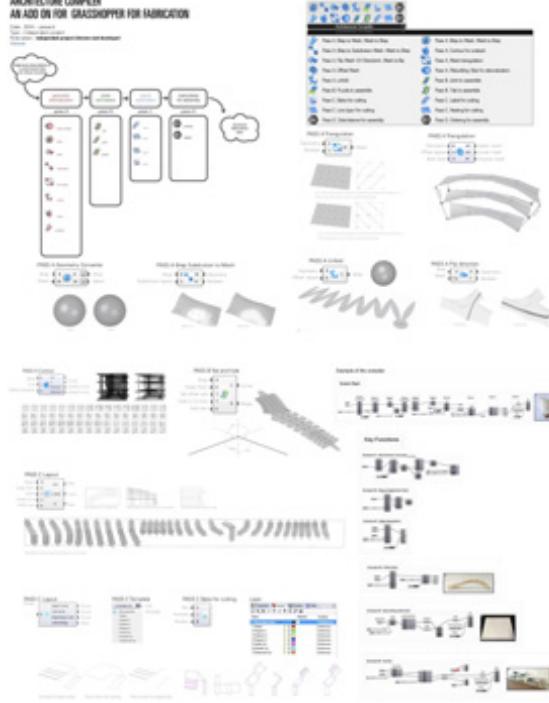
http://www.njstudio.co.kr/main/project/2015_AC_Development/2015_AC_Development.html

http://www.njstudio.co.kr/main/project/2015_STRIP-BASED_FABRICATION/RESEARCH/2015_STRIP-BASED_FABRICATION%20/RESEARCH.html

Addon for GH

<https://www.food4rhino.com/app/architectural-compiler-digital-fabrication>

ARCHITECTURE COMPLEX
AN ADD ON FOR GRASSHOPPER FOR FABRICATION



Double-layer Strip Chair

Arch 303, Bending & folding structure

Date: Spring 2015
Role taken: Researcher and digital method
Collaborators: Hyunsoo Kim, Seungmin Lee, Mengyu Peng, Mohammad Rezaei
Group: Prof. Seunghwan Cho, Type: Composed
URL: [\[Link\]](#)

Abstract:

Since two parallel strips of sheet material into

bending, stretching, and folding shapes.

These connections between the two strips can

be 2-dimensional or 3-dimensional.

Case Study: Chairs & Ways to Utilize

Project 1: Chair

Project 2: Chair

Project 3: Chair

Project 4: Chair

Project 5: Chair

Project 6: Chair

Project 7: Chair

Project 8: Chair

Project 9: Chair

Project 10: Chair

Project 11: Chair

Project 12: Chair

Project 13: Chair

Project 14: Chair

Project 15: Chair

Project 16: Chair

Project 17: Chair

Project 18: Chair

Project 19: Chair

Project 20: Chair

Project 21: Chair

Project 22: Chair

Project 23: Chair

Project 24: Chair

Project 25: Chair

Project 26: Chair

Project 27: Chair

Project 28: Chair

Project 29: Chair

Project 30: Chair

Project 31: Chair

Project 32: Chair

Project 33: Chair

Project 34: Chair

Project 35: Chair

Project 36: Chair

Project 37: Chair

Project 38: Chair

Project 39: Chair

Project 40: Chair

Project 41: Chair

Project 42: Chair

Project 43: Chair

Project 44: Chair

Project 45: Chair

Project 46: Chair

Project 47: Chair

Project 48: Chair

Project 49: Chair

Project 50: Chair

Project 51: Chair

Project 52: Chair

Project 53: Chair

Project 54: Chair

Project 55: Chair

Project 56: Chair

Project 57: Chair

Project 58: Chair

Project 59: Chair

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Project 103: Chair

Project 104: Chair

Project 105: Chair

Project 106: Chair

Project 107: Chair

Project 108: Chair

Project 109: Chair

Project 110: Chair

Project 111: Chair

Project 112: Chair

Project 113: Chair

Project 114: Chair

Project 115: Chair

Project 116: Chair

Project 117: Chair

Project 118: Chair

Project 119: Chair

Project 120: Chair

Project 121: Chair

Project 122: Chair

Project 123: Chair

Project 124: Chair

Project 125: Chair

Project 126: Chair

Project 127: Chair

Project 128: Chair

Project 129: Chair

Project 130: Chair

Project 131: Chair

Project 132: Chair

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Project 141: Chair

Project 142: Chair

Project 143: Chair

Project 144: Chair

Project 145: Chair

Project 146: Chair

Project 147: Chair

Project 148: Chair

Project 149: Chair

Project 150: Chair

Project 151: Chair

Project 152: Chair

Project 153: Chair

Project 154: Chair

Project 155: Chair

Project 156: Chair

Project 157: Chair

Project 158: Chair

Project 159: Chair

Project 160: Chair

Project 161: Chair

Project 162: Chair

Project 163: Chair

Project 164: Chair

Project 165: Chair

Project 166: Chair

Project 167: Chair

Project 168: Chair

Project 169: Chair

Project 170: Chair

Project 171: Chair

Project 172: Chair

Project 173: Chair

Project 174: Chair

Project 175: Chair

Project 176: Chair

Project 177: Chair

Project 178: Chair

Project 179: Chair

Project 180: Chair

Project 181: Chair

Project 182: Chair

Project 183: Chair

Project 184: Chair

Project 185: Chair

Project 186: Chair

Project 187: Chair

Project 188: Chair

Project 189: Chair

Project 190: Chair

Project 191: Chair

Project 192: Chair

Project 193: Chair

Project 194: Chair

Project 195: Chair

Project 196: Chair

Project 197: Chair

Project 198: Chair

Project 199: Chair

Project 200: Chair

Project 201: Chair

Project 202: Chair

Project 203: Chair

Project 204: Chair

Project 205: Chair

Project 206: Chair

Project 207: Chair

Project 208: Chair

Project 209: Chair

Project 210: Chair

Project 211: Chair

Project 212: Chair

Project 213: Chair

Project 214: Chair

Project 215: Chair

Project 216: Chair

Project 217: Chair

Project 218: Chair

Project 219: Chair

Project 220: Chair

Project 221: Chair

Project 222: Chair

Project 223: Chair

Project 224: Chair

Project 225: Chair

Project 226: Chair

Project 227: Chair

Project 228: Chair

Project 229: Chair

Project 230: Chair

Project 231: Chair

Project 232: Chair

Project 233: Chair

Project 234: Chair

Project 235: Chair

Project 236: Chair

Project 237: Chair

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Project 242: Chair

Project 243: Chair

Project 244: Chair

Project 245: Chair

Project 246: Chair

Project 247: Chair

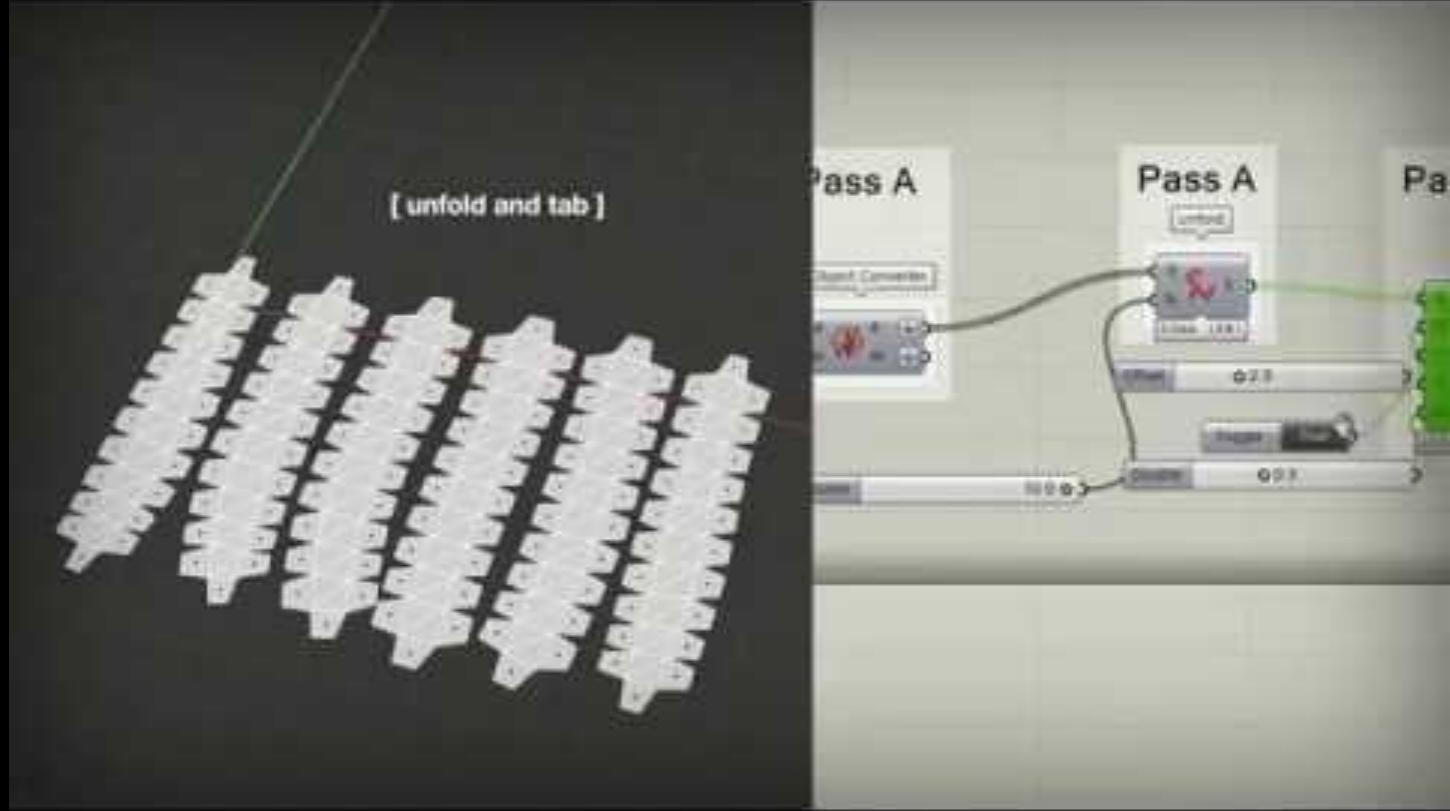
Project 248: Chair

Project 249: Chair

Project 250: Chair

Project 251: Chair

Project 252: Chair



NJSTUDIO 2015 DIGITAL MOCKUP DEMO REEL

FIFTH EDITION, SELECTED WORKS SINCE 2004

njstudio@gmail.com
www.njstudiocn.it

MATERIAL & COMPUTATION

http://www.njstudio.co.kr/main/project/2015_NanoMicroMacro/2015_NanoMicroMacro.html

TRMORESPONSIVE FABRIC AND BLIND

Nano Micro Macro: Adaptive Material Laboratory,
HARVARD GSD

Date : Fall 2015
Type : Academic project
Prof. Martin Bechthold, James Villaseur
Role taken : design, research, computation and visualization
Collaboration : Ji Hyuk Choi, Taehyun Jeon

Website [Link](#)



Concept

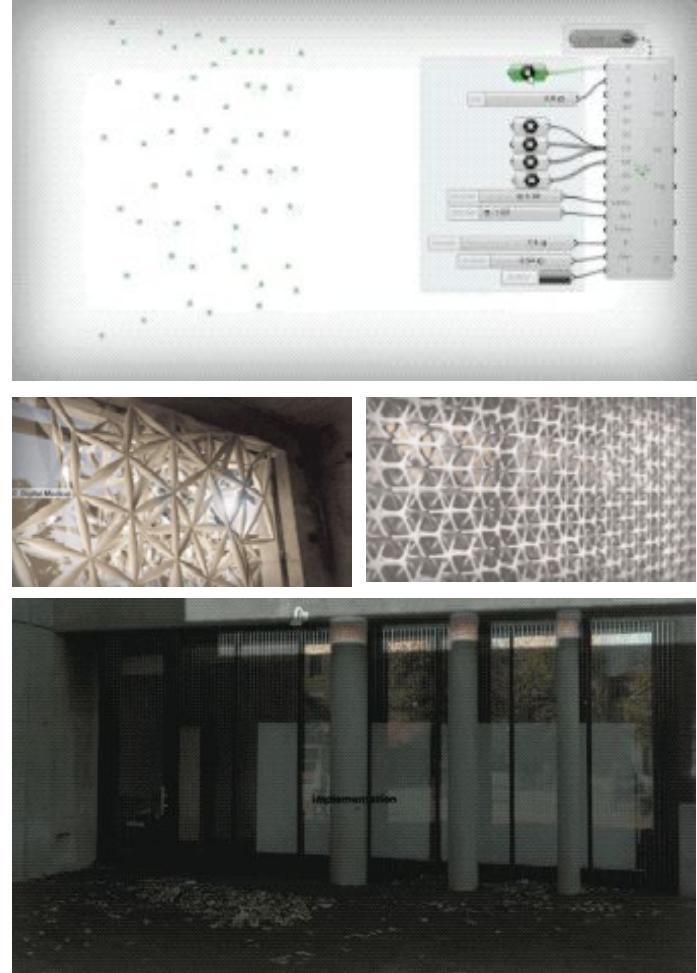
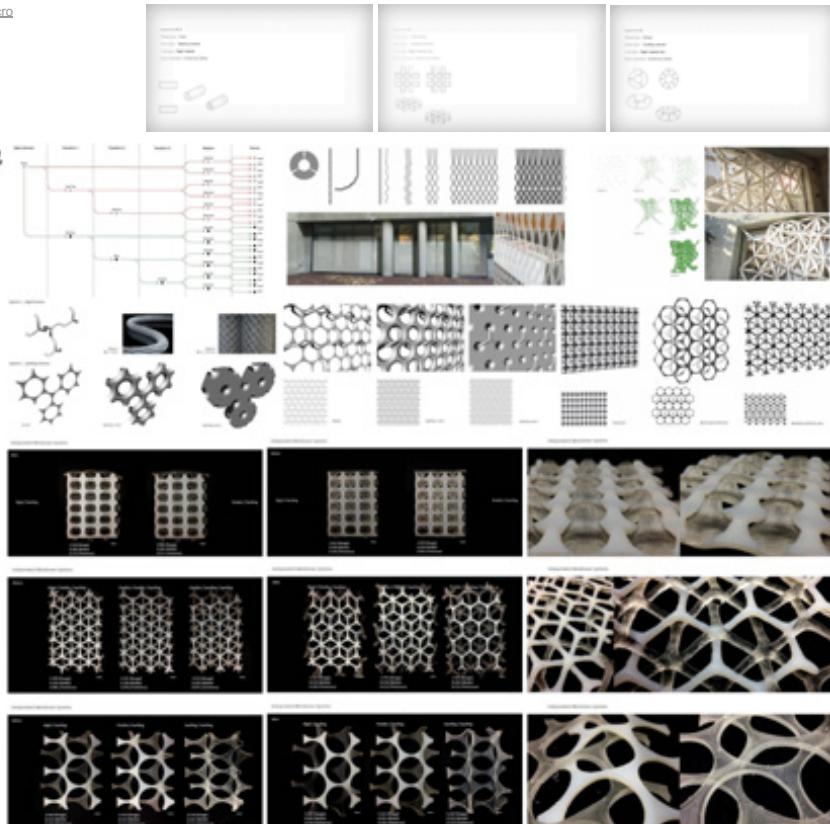
This design responds to thermal changes by varying the scale of porosities. The system consists of two separate membranes: one is rigid and the other is flexible. When the temperature rises, the second membrane swells, causing within the surface gets smaller to respond to outside thermal conditions.

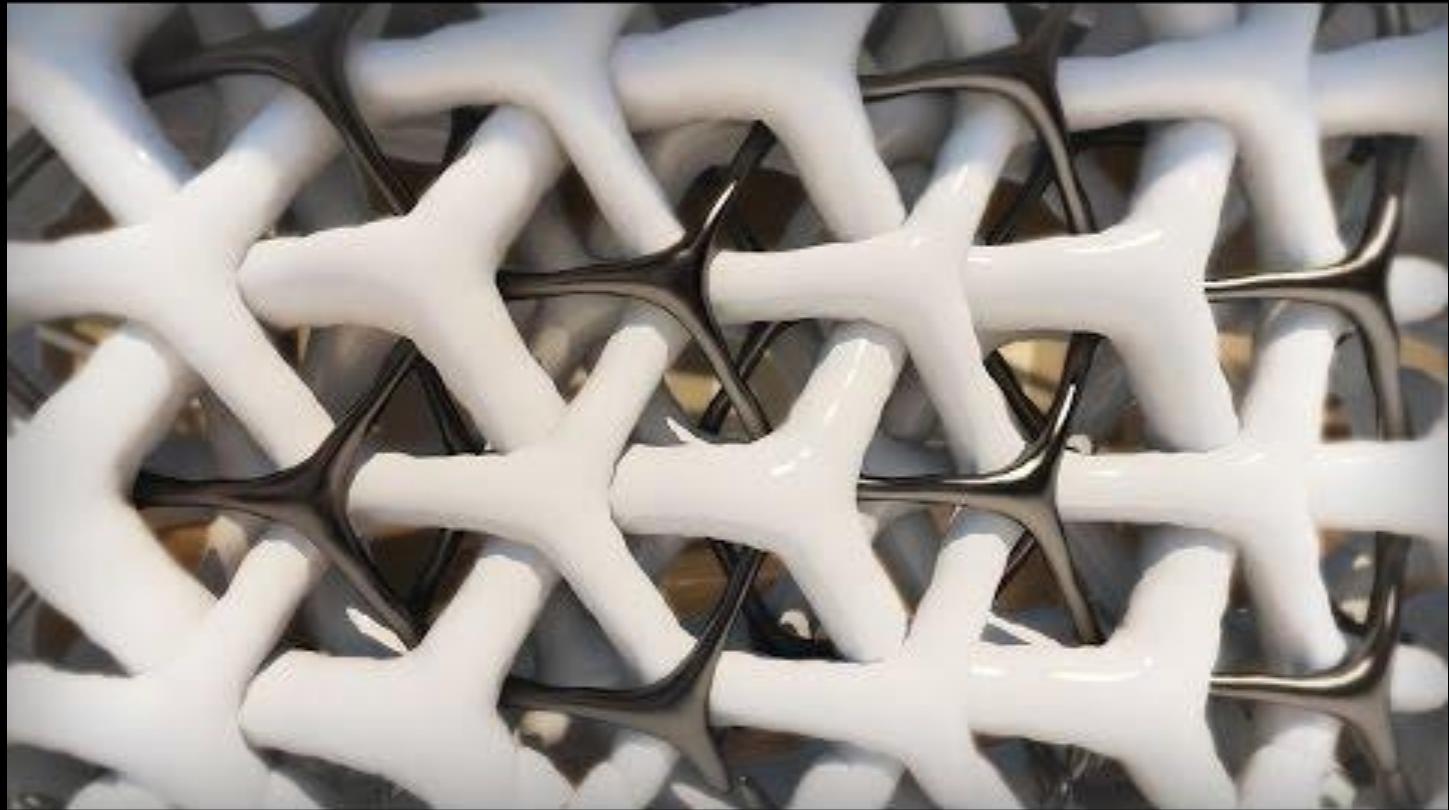
Core Technology

Thermo-responsive Swelling

Material & Process

This experimentation is mainly done by 3d printing with the swelling materials. It was extracted from a 3d shape for the capacity of swelling toward more complex structures to maximize transformation by catalysis. Then, the computational analysis was conducted based on the measured data, and it was simulated in the digital setting.





PATTERN & SURFACES

3D Printing & trajectories of motions



02.

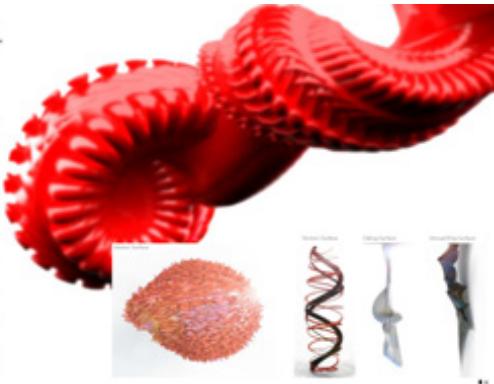
TIME-COLLER SURFACE

Date: 2008

Type: experimental project for parametric process

Role: Author, independent project research, design, realization

Link:



Facade design & panelization

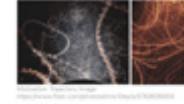
SWARM TRAJECTORY

Date: 2008

Type: experimental project for parametric process

Role: Author, independent project research, design, realization

Link:



Swarm Trajectory

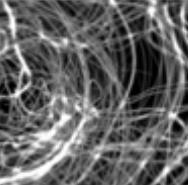
Date: 2008

Author: ETH Zurich

The complex motion paths made by a colony of... In order to find the best solution for a specific problem, many possible ways. This leads to the available unconventionality and innovation. The movement of the colony is based on the collective decision making of the individuals.

Swarm/Cross Mesh Walking Function

Link:



LAYERED MOVEMENT

Date: 2009

Type: experimental project for parametric process

Role: Author, independent project research, design, realization

Link:



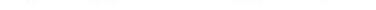
Layered Movement (Data Visualized)

Movement: Service robot

Size: 211 120 x 480

2 Months

Movement of surfaces made by layers can be optimized resulting in a moving wave without any obstacles. As moving the robot in every unnecessary corner of a surface like this.



03. PATTERN AND STRUCTURE

Date: 2008

Type: experimental project for parametric process

Role: Author, independent project research, design, realization

Link:



Pattern Structure

Author: ETH Zurich

Link:

FABRICATION & COMPUTATION

<https://research.gsd.harvard.edu/maps/portfolio/cewisama-2017/>

CERAMIC MORPHOLOGIES Cevisama Installation 2017 HARVARD GSD

Project Team: Professor Martin Bedrichold, Director; Salman Craig, Lecturer in Environmental Technology; Nono Martínez Alonso; José Luis García Del Castillo; Tiffany Cheng; Kevin Hirz; Nanyu Lee; Zhiven Liao; Matan Mayer; Saurabh Mhatre; Zach Seboldt; Santiago Serra Gonzalez; Juan Pablo Ugarte.

Role taken : computation design and visualization

Sponsor: ASCERtile de Spain & Cevisama

Coordinator: ITC, Javier Mira Pedro

Production: Instituto de Tecnología Cerámica, Pilar Gómez Tena, Carmen Segura Fernando, Aroa García Cobos

Installation: Grupo on Market

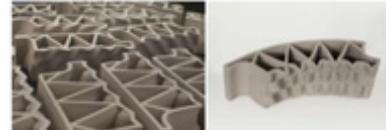
Documentation: Fernando García del Castillo López

Link:

Ceramic Morphologies explores the design opportunities of a novel ceramic 3d printing strategy. The project was developed by researchers and students from the Material Processes and Systems (MaP+S) Group at the Harvard University Graduate School of Design. Supplemented with production and material research by the Instituto de Tecnología Cerámica in Castellón, Spain, the project is a prototype for the additive manufacturing of ceramic building components at the industrial scale.

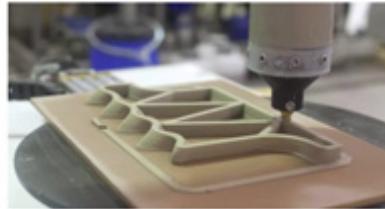


The pavilion is meant to showcase the expressive potential of ceramic 3d printing, and test the adaptation of principles of thermodynamic heat transfer to 3d printed geometry. The shape and design are products of current research related to the thermal performance of naturally ventilated spaces - the result of our collaboration with our colleagues Salman Craig and Matan Mayer from the Harvard Center for Green Buildings and Cities. While the exterior surface of the pavilion is smooth and uniform, the interior surface is heavily textured and 3d textured. In addition to creating a unique relationship between interior and exterior, the pavilion is also a testing surface related to research on the optimal dimensions for thermodynamic heat transfer.

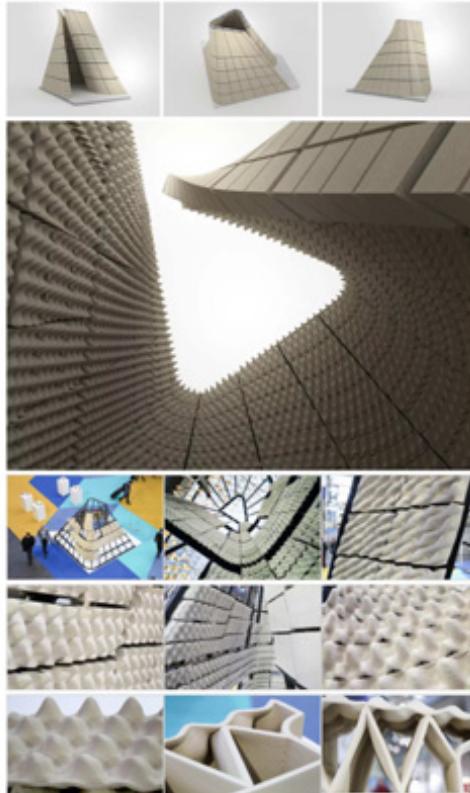


The thermal agenda is embedded in the logic of both the pavilion's interior surface geometry and the configuration of its overall form. Its pyramidal shape facilitates upward air movement, and the interior geometry impacts the thermal exchange between ambient air and the interior microclimate. The configuration of the pavilion's form and of the interior surface is designed to optimize the ratio of exposed area to thermal mass, and maximize the potential for cooling through natural ventilation and buoyancy effects. The project team has created mathematical models to predict the thermal behavior of the system.

The project utilizes a proprietary clay extrusion system and 3-axis turrets to produce each of the pavilion's 352 unique ceramic elements. Each element is sized according to its position within the structure, the dimensional constraints of the printing bed, and a maximum allowable toolpath length. The team developed a novel computational approach to generate the surface geometry of the pavilion, discretize the form into individual bricks, and accommodate for the structural metal frame. Meshed geometry and machine code is also generated directly within the parametric model. The digital workflow enabled the research team to account for shrinkage during the drying and firing process, reduce overall printing time and material consumption, and tune the stability of individual bricks.

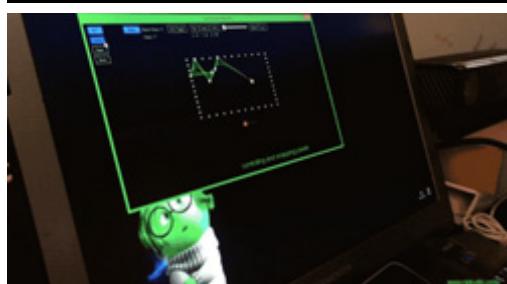
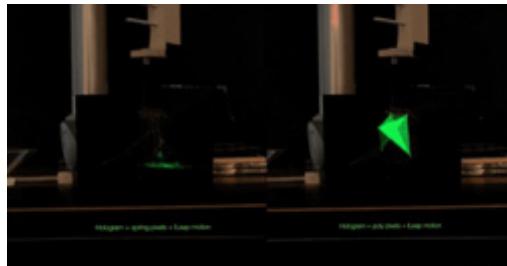


Measuring 3 m tall, with a footprint of 3.2m x 3.6m, the pavilion consists of 352 unique elements, ranging from 260-545 mm in length, and 70-150 mm in height. 184 elements, representing 1/3 of the entire structure, are displayed in the current configuration shown at the 2017 Cevisama Fair in Valencia, Spain. Gaps between pieces allow for tolerances in the production. The modules can be bonded with mortar for permanent installations or, for temporary applications such as Cevisama 2017, can be dry-stacked and secured to a support frame. In total, the 184 printed elements displayed required 358 hours of printing time, and include 19.8 kilos (12.33 miles) of extruded clay head.



INTERACTION & ROBOTICS

http://www.nistudio.co.kr/main/project/2015_M_Optic/2015_SktechHand_Development.html

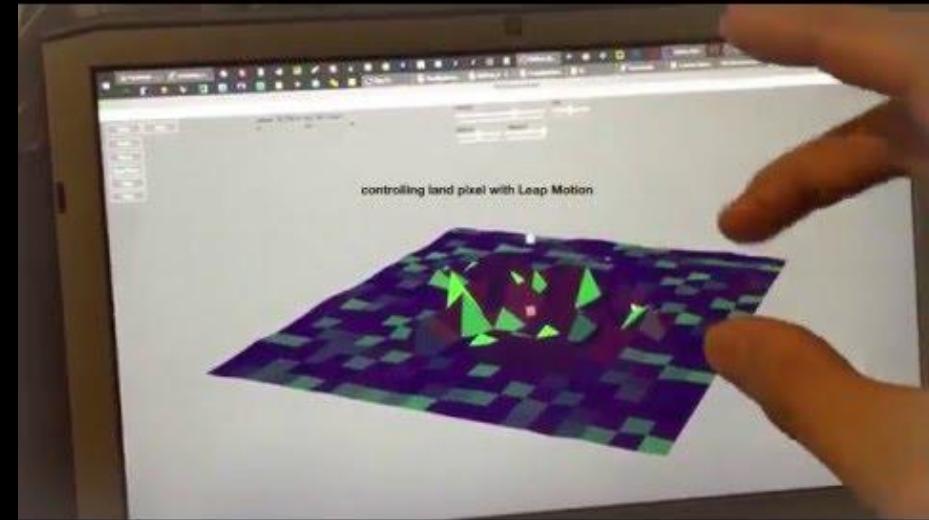


Harvard University GS0
Mechatronic Optics (SCI 0045000)

SKETCHHAND

SKETCHHAND

beta 0.0.5 , version for hologram





Lumion 8 For AR, experiment

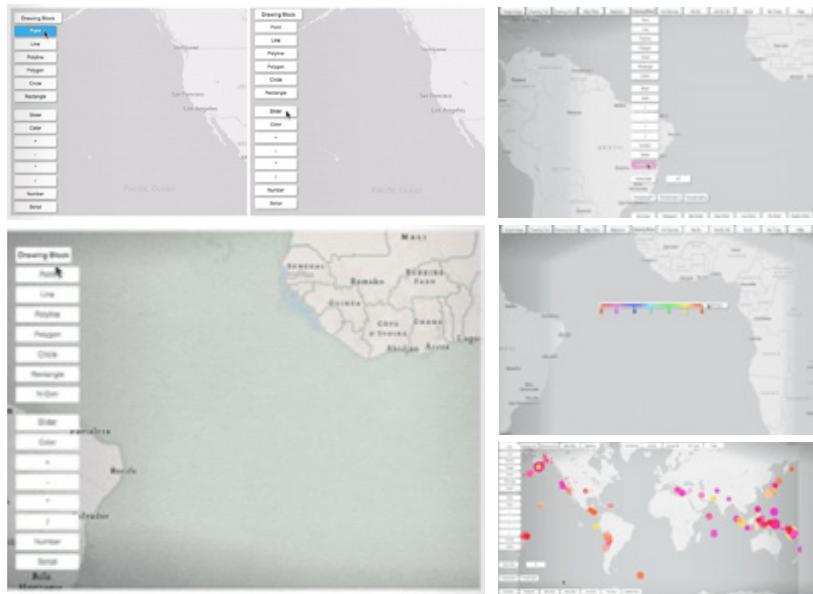
www.ARSTUDIO.com.au

DEVELOPMENT

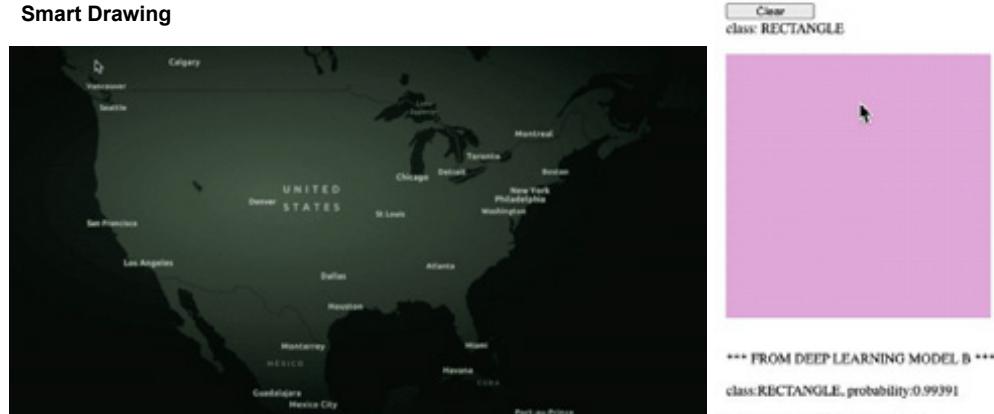
selected researches and projects

INTERFACE DEVELOPMENT

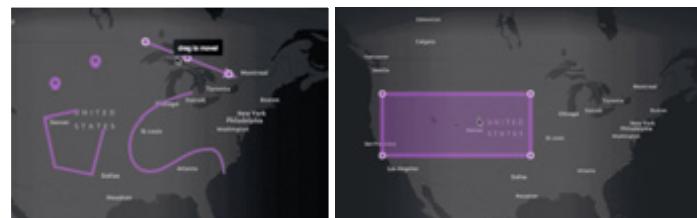
Drawing block (visual programming)



Smart Drawing



Smart Commander



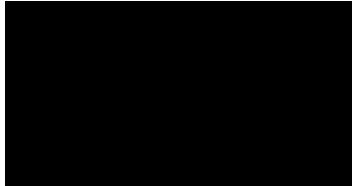
ENGINEERING

Software developments

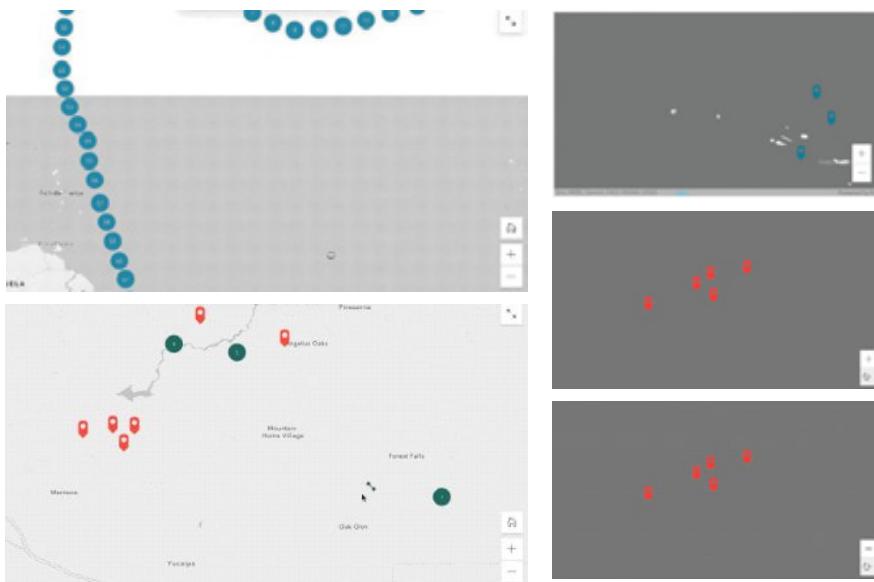
Clustering Points: Collision-Based Dynamic Graph method



<https://nj-namju.medium.com/clustering-points-collision-based-dynamic-grid-graph-method-f602d0152cd2>



- (1) Collision-based Clustering
- (2) Cluster graphs
- (3) recursive update of graphs
- (4) Hierarchical sub-graphs and
- (5) Merged graphs



HTML Canvas Optimization of Rendering Loop with JSAPI for Drawing on Map



<https://medium.com/analytics-vidhya/html-canvas-optimization-of-rendering-loop-with-jsapi-for-drawing-on-map-71cb0500a213>



Level 0: just render when new shape is created or extent ends. Most effective one in terms of performance.

Level 1: additional rendering loop is executed while extent changes

Level 2: when mouse is moving, it does additional render loop for mouse detection

Level 3: after detecting change(move or click), it render for certain time with given frame rates (e.g. 30fps)

Level 4: when animation happens, it tries to render by 60 frame/s in normal situation, it can render by 15 or 30 frame per sec

Level 5: it tries to maintain 60 frame per sec using requestAnimationFrame function



STATIC ← T T T T T → REAL-TIME

Level 0 Level 1 Level 2 Level 3 Level 4 Level 5

NJSTUDIO 2016 STAND-ALONE DEVELOPMENT DEMO REEL

SIXTH EDITION, SELECTED WORKS SINCE 2009

nj_studio@gmail.com
www.njstudio.us

NJSTUDIO 2016 DESIGN SCRIPT DEVELOPMENT DEMO REEL

SIXTH EDITION, SELECTED WORKS SINCE 2009

BY
www.njstudio.com
www.njscript.com

NJSTUDIO 2015 DEVELOPMENT PROJECT DEMO REEL

FIFTH EDITION, SELECTED WORKS SINCE 2009

nj.nanjis@gmail.com
www.tjstudio.co.kf

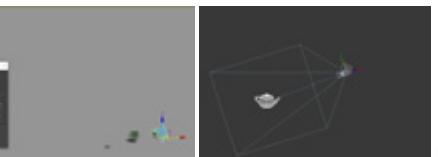
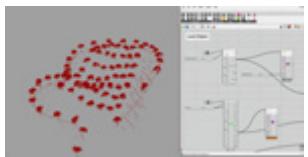
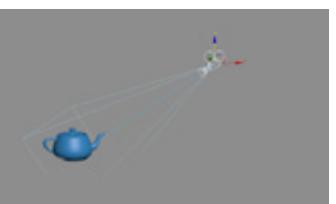
DESIGN VISUALIZATION

as a director, selected researches and projects

ANIMATION & VISUALIZATION

http://www.njstudio.co.kr/main/project/2015_Demo_Vis/2015_Demo_Vis.html

[http://www.njstudio.co.kr/main/project/2013_Ants/Development/2013_Ants\[Development\].html](http://www.njstudio.co.kr/main/project/2013_Ants/Development/2013_Ants[Development].html)



ANT : 3ds max PLUG-IN FOR BUILDING ANIMATION

Work flow, alpha version 0.5.1

Flow step: 1>>> 2>>> 3>>> 4>>> 5>>>

First step: SUB-DIVISION
SUB-DIVISION
DETACH
CHOKING

Second step: SELECTION
SELECTION
CURRENT_SEL
RANDOM
LAYER

Third step: ORDER
ORDER
X,Y,Z
RANDOM
LINE
LINE
REF PLN

Fourth step: ANT ENGINE
ANT ENGINE
TIME PARAMETER
ANIMATION PARAMETER
EXTRA PARAMETERS
EXTRA PARAMETERS
REF PLN

Fifth step: PREVIEW
PREVIEW
FORMAT
QUALITY

Interface

- About ANT plugin
- On-line support and help
- Animation preview
- Object selection
- Sub-division and detach
- Advanced option panel
- Event trigger
- Auto animation button
- Animation ordering key
- Advanced option panel
- Nodebase Animation
- Advanced option panel

The concept of Key Base animation
With parameter of objects can be controlled on the basis of previous movement.

The concept of Node Base animation
With parameter of objects can be triggered if the conditions of events are satisfied.

Mapping

Animation example

Advanced option panel

Advanced option panel

Quick Rendering panel

Selection Set panel

Object Subdivision panel

Animation Ordering panel

ANT : 3ds max PLUG-IN FOR BUILDING ANIMATION

Work flow, alpha version 0.5.1

Flow step: 1>>> 2>>> 3>>>

1. Object Subdivision panel
2. Selection Set panel
3. Animation Ordering panel

ANT : 3ds max PLUG-IN FOR BUILDING ANIMATION

Work flow, alpha version 0.5.1

Flow step: 1>>> 2>>> 3>>> 4>>> 5>>>

1. Object Subdivision panel
2. Selection Set panel
3. Animation Ordering panel

NJSTUDIO 2015 3D VISUALIZATION DEMO REEL

FIFTH EDITION, SELECTED WORKS SINCE 2004

Visualization Demo reels playlist:

<https://www.youtube.com/playlist?list=PLIyZNoxG7nmn8G9DGZh76WEYkqEahrvoK>

ri.namyu@gmail.com

www.njstudio.co.kr

DIGITAL MATERIAL

Machine Learning & Implementation

Link: <https://computationaldesign.tistory.com/29>

06. DIGITAL MATERIAL IN 3D RENDERING(VRAY)

DATA SCIENCE

Date : 2018

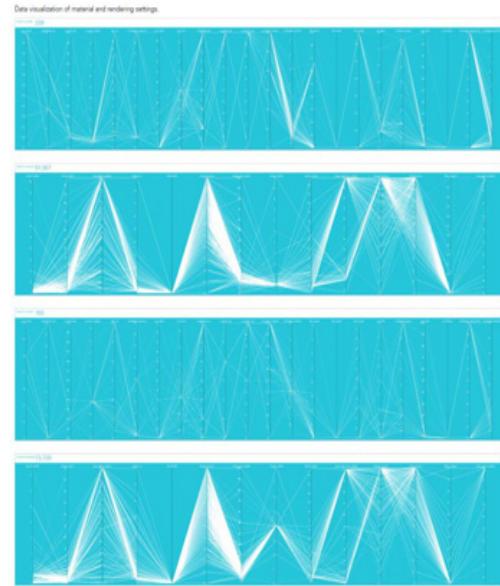
Type : Independent project in progress

Role taken : research, design, modeling, visualization



This is a Machine Learning project for 3D rendering and material. There are 91,967 materials for interior, and 73,726 materials for exterior for training.

This is in progress.



TEXTURE & MATERIAL

Machine Learning & Implementation

Link: <https://computationaldesign.tistory.com/29>

Classes

[Brick, Concrete, Floor, Grass, Roof, SideWalk, Wall]



DESIGN VISUALIZATION

Bronze Award at Taipei International Design Awards

Hsinta Ecological Power Plant 2018

Hsinta Ecological Power Plant, Kaohsiung, Taiwan

200,000 ~ 10,000,000 / +

200,000 colored transparent solar panels on the roof
15 millions and per month as added financial value
Programmatic organization having landscape characteristics;
and
Infinite unforgettable qualitative memories and experiences to the people

Local consultant: 麥林公司 (Hengyan Lin)

Animation: NJ Studio

one of 5 results (including Morphosis, Andrea Lavin)
result: Merit Award, Bronze Award at Taipei International Design Awards

Previous Next Image (1 of 10)



3rd Prize, RTF Sustainability

Nodeul 2016

Nodeul Dream Island

program: performance hall, lecture hall, shops

plot area: 53,000m²

square area: 10,000m²

height: 9.78m

coverage: 52.4%

Roof: 10.15%

size: ground 4 stories

structure: RC, steel

Completion: 2016

animation by AJ Studio

3rd Prize, RTF Sustainability Awards (2016)

D distinction Award, Taipei International Design Awards (2016)

Previous Next Image (1 of 1)



Badel Block Redevelopment 2012

There are several features to be preserved inside the site. They are the characteristics of the context around, the value of the Ziegler's block as well as to be preserved buildings. Essential feature of the Badel block is the spatial quality created from its shape and configures and the urban connectivity with the context through the pathways. The figure-ground which generates the concept to most important feature to be preserved, or creating the connectivity throughout the figure as well as meeting the required area of the programme would be the key issue of this project.

Unhappy result came out after putting a generic mass of the required volume on the site. There would be necessary to decreasing the generic image of the volume, to choose to make whole the block to be removed. Putting of the volume on the site has some of good usage of ground area, however the height can kill the beautiful scenery of the city. The

International competition entry
rendering by NJ Studio

Previous Next Image (1 of 7)



ARCHITECTURAL DESIGN

as a architectural designer, selected researches and projects

01. STREET IN OFFICE / OFFICE ON THE STREET

Data-driven design research, M.Arch program

Date December 2014 – 2015

[View Acquisitions](#) [View Sales](#) [View Returns](#)

Chris Rutz, Jennifer Lai, Sean, Shanna Rogers

5

www.ijerpi.org

七



ALLEGATIONS
In the late twentieth century, American scholars became disenchanted with their own country, going far to argue under their roofs, publicly, anonymously, that the United States was a deeply racist, sexist, imperialist, and otherwise terrible place. And they did so without assistance, and that brought along with it a new social identity: *Americanists*. And Americans began to see the source of

This pattern is also the case for the areas of urbanization in the United States. The growth of metropolitan regions has little to do with the need of additional space, and creates it instead as a means of convenience. Recent theories have seen this process moving geographically while maintaining a certain socio-economic segregation. The 'New Urbanists' believe that the solution lies in the creation of a more balanced urban environment.

It is important to note that the survey was conducted in an office setting, which may have influenced responses. Future research should explore the same questions in a more naturalistic setting, such as a community center or a public space, to gain a more representative sample of the general population. In addition, the survey was conducted in English, which may have excluded non-English speakers from participating. Future research should consider using a multilingual approach to reach a wider audience.

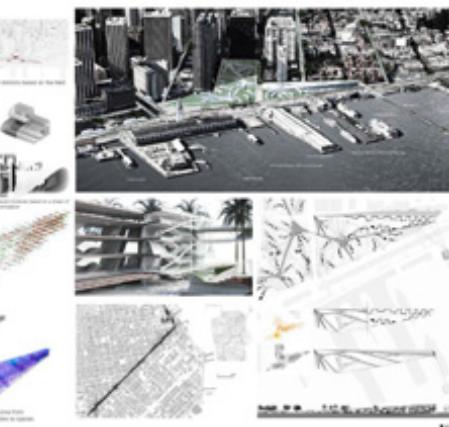
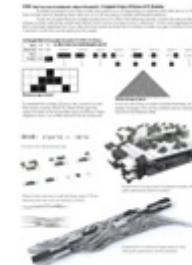
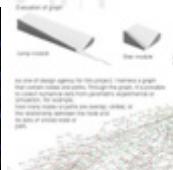
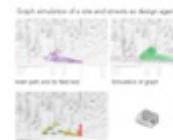
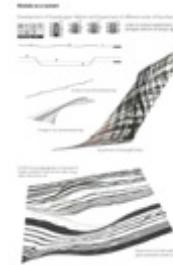
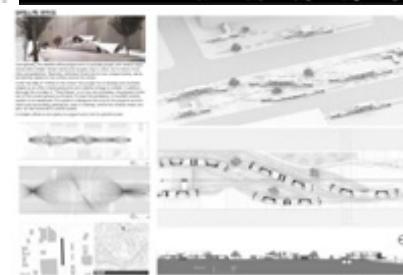
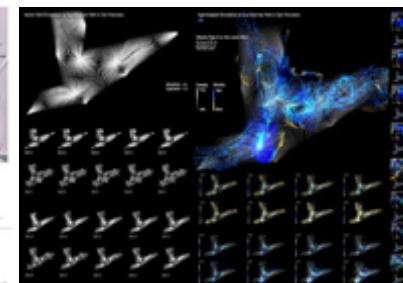
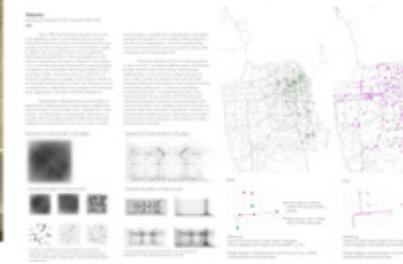
on this issue, The Sheriff in Office can reinforce the steps the designer has taken in the environment through the following three points:

(1) **Use space as a social mirror**, where the interior is a changing space to interact with people. For example, areas need to be open, however the best way to do this is to have a **flexible space**.

(2) **Use light as a social mirror**, where the interior is a changing space to interact with people. For example, areas need to be open, however the best way to do this is to have a **flexible space**.

(3) **Use colour as a social mirror**, where the interior is a changing space to interact with people. For example, areas need to be open, however the best way to do this is to have a **flexible space**.

to use the broad vagueness of social-space-making to problematize who are inside them. Thus, mapping interaction spaces, acceptance or rejection of certain sets are different as areas of communication and identity.



Time lapse for February, 2015

Quantity: Illuminance
Style: colored
Scale: logarithmic



Min Max
5000 lx 10000 lx
Physical Scale: 10- μ m

Shadow simulation

MAPPING

DESIGN AGENCY

MODULE / DETAIL

IMPLEMENTATION
OPTICAL ENGINEERING
STRUCTURE OF SYSTEM

ARCHITECTURAL DESIGN

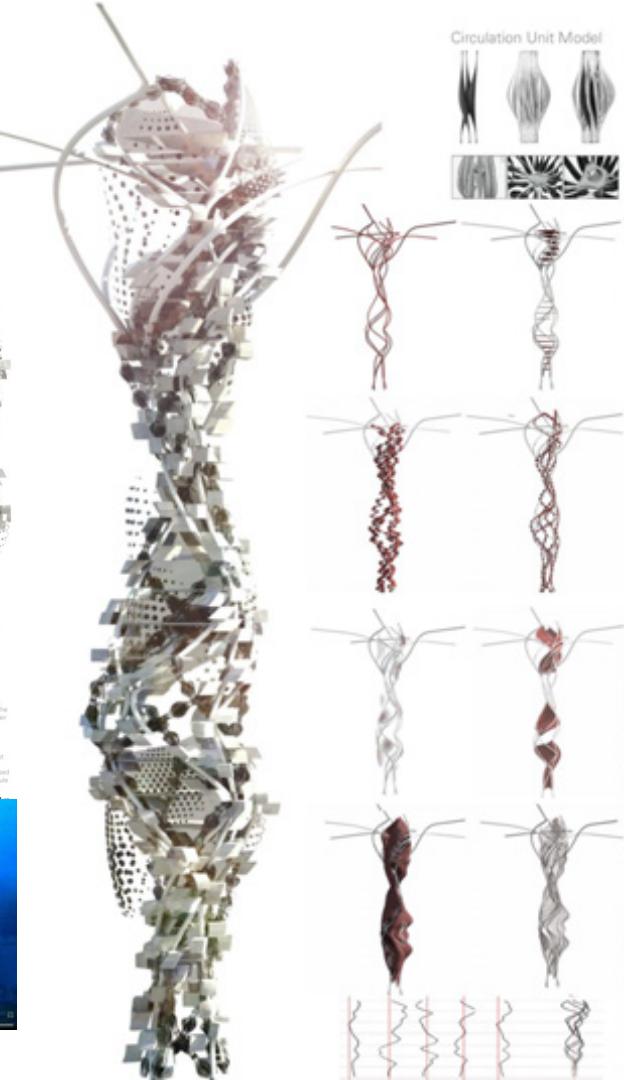
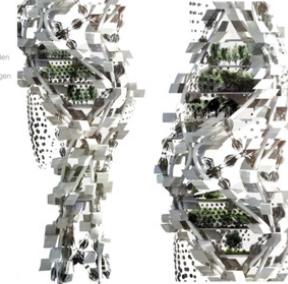
collaborative works



Air Farms



A garden group



* PLAN

* Energy Strategy

There will be a lot of different types of energy and need, needs of human and green.

Sea Level

In the future of cities, the electric power will be generated by solar, wind and tidal power. Also, as that different types of farming like hydroponic farming, floating agriculture, etc., will be possible for us to have sustainable underwater living space.



In the Ocean

Under ocean, there will be a serious research like thermal difference generation using the temperature differences of upper and lower parts of the ocean. Not only was that, swirling water caused by the temperature differences was used for the movement of boat, the movement of aquaculture, entertainment, and also for the natural source of food, the sustainable fish farming will be conducted around the structures that are stretched out under water.



Under the Ocean Floor

Geothermal energy and fossil fuel were extracted from the ocean floor and were used for generating the energy we need. The unique moving space, that can be transformed and multiply, will be used as a link between the underground ground that will be sinks under the ocean.



* Sustainable Interaction

We, human beings are one of the leading beings (like animals, plants, micro-organisms, etc.) that have a role to change the future. The change can be done by environmental learning and teaching, and also by the education system that can supply our society.

The people's speech will definitely grow, and we need to use the natural resources from the ocean properly. Rather than using our natural resources for our daily needs, we need to teach the next generation how to use them.

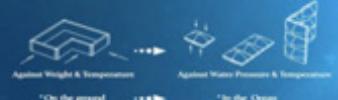
* The Reverse Evolution of Walls

While the walls standing on the firm ground separated the people, separated them strong wind, and separated the space, the walls that will be making them dynamic facilities under the ocean shall be examined in different aspects.

Role of the wall module:

- a) Each of air-bladder like soft wall modules will minimize the impact from outer forces which will eventually reduce the possibility of structures getting inundated.

- b) These wall modules will also be able to protect the structures from extreme temperatures and direct sunlight coming down from surface of the water.



* The Reverse Evolution of Columns

Columns are very important supporting components of a building. The formation and roles of these columns will have to be changed as they go deep inside the ocean. After all, the main reason against the increase of ocean extremes, the columns will be linking each other and pathways like chains.



* The Reverse Evolution of Paths

Our movements on the general have limits, since we only move in two-dimensional pathways affected by gravity. However, in water, with the forces of gravity and buoyancy, we will be able to move in three-dimensional. For an example, we will not be moving our bodies to up and down, but be expanding its movement in many different directions.



* The Reverse Evolution of Units

Usually we stack up the units on the ground, but in water, we can hang. Some units are jetties, piers, etc., but some are floating, mobile, flexible, etc., and also we can take the units apart. Each unit will only be able to move around as a single unit, but to maintain itself by taking old modules out and putting new modules in.



ARCHITECTURAL DESIGN

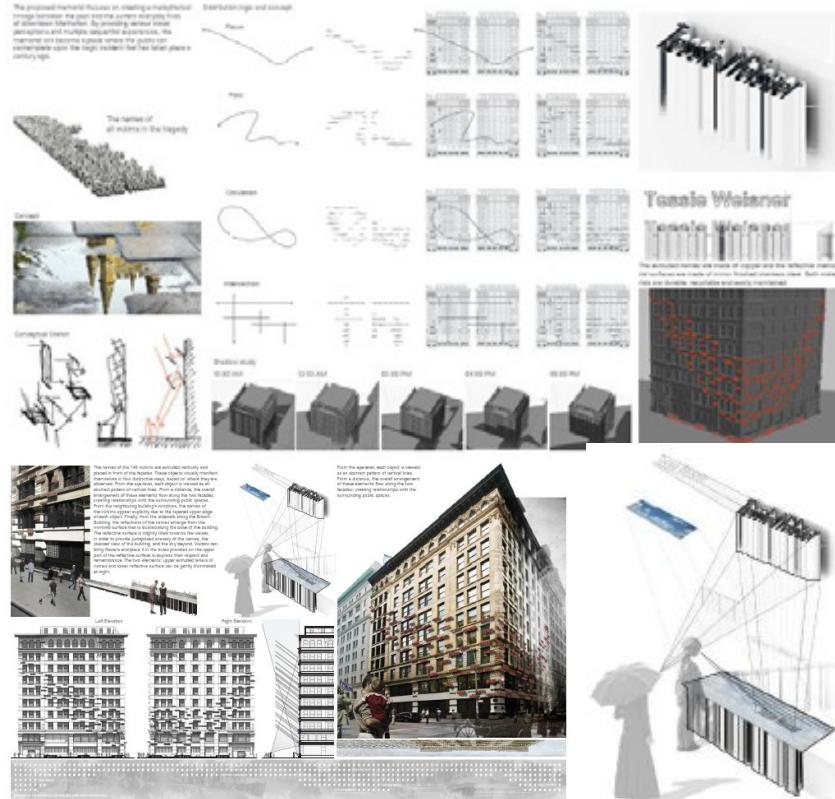
collaborative works



07. REFLECT AND RESONATE

Issue 2014
Topic: Information compression
Keywords: Design for Additive Manufacturing, Feature-Based, and Volume-Based
Hyper-elastic, Design processes, design, engineering, manufacturing

The proposed framework focuses on creating a linkage between the past extreme events emerging from different historical periods. By providing extensive historical perspectives and multiple sequential experiences, the framework can become a guide where the public can comprehend even the tragic incidents that have taken place centuries ago.



ARCHITECTURAL DESIGN

collaborative works

06. HELSINKI GUGGENHEIM MUSEUM

Date: 2014
Type: Architectural competition
Collaboration: Tegnér Arkitekter
Part: Revol Kungs Åbo Rörs
Photo taken: Revol Arkitekter, via revol.se

CONCEPT DESCRIPTION, GH 686507032

Based on the rich cultural and geographical context in the area, the project strives to answer the following question throughout the design process: "How can the building be designed to be a catalyst for the city and symbiotically expand its cultural presence beyond the boundary of the building itself towards the city and public realm?" In response to this key question, the design has been developed around three main themes.

The unique urban context of the site demands a well-integrated response to integrate both the waterfront and the cityscape. As part of the urban node, the proposed building will be a catalyst for the area and adjacent to the Olympic Terminus, the site acts as the urban node between the port and the city. The building will be a catalyst for the area. Situated between the port and park, the proposed museum frames the viewer toward the major city landmarks and the bay public spaces. The proposed building will be a catalyst for the area by creating a new and strengthen the density of the vibrant cityscape of Helsinki. In order to make the building a catalyst for the area, the following principles are implemented: To question the privacy and enclosure of a typical museum by proposing a public park located around the exhibition space; to propose a building that is open to the public and takes advantage of the local climatic conditions for an optimal sustainable approach.

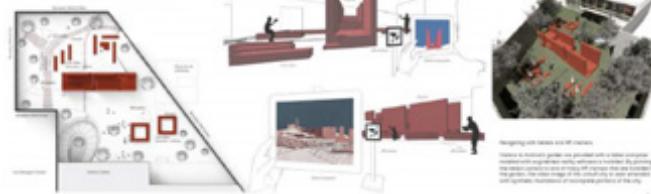
The ascending public part is conceived as a linear path spiraling around the exhibition gallery volumes, expanding and contracting to generate levels and views. The path is designed to be a catalyst for the area, drawing from the key features of the main areas in plan and volumes in visual path. The path will be a catalyst for the area by connecting the two volumes. This vertical green promenade will not only provide a glimpse into the galleries but also great dramatic views towards the cityscape. As a result, the building will be a catalyst for the area by creating a new public places will expand beyond the confined interior spaces and the public walls.

The extraction concept arises from a pragmatic geometry that integrates thermal energy storage. The building's increased solar exposure to the south accomplished by rotating the main volume while the north volume is rotated to the west. This is achieved through local products and strategies to reduce carbon footprint, minimizes life cycle costs, and increases building mass inertia to reduce the energy required to heat and cool the building. The building's increased solar exposure to the south is accomplished by the rotation of the main volume of the building, which maximizes the solar access to the thermal mass. This is a promenade that spirals up between the concrete base and the glass volumes. The spiral path is a catalyst for the area. The base zone maintains a long distance between the interior and exterior surfaces, which creates a large thermal mass and a large thermal exposed core. The angle and the position of the solar light shelves on the building envelope are defined by the needed sun angle during the winter months. The thermal mass of the building envelope, these elements reflect radiant heat deep into the 80 m thick interior space. In summer, the building envelope reflects the solar radiation and allows precipitation harvesting by using mulching and dry soil to renew in the landscape and gray water structures, and the coastal area of the project encourages the application of ocean thermal energy for seawater cooling/heating.



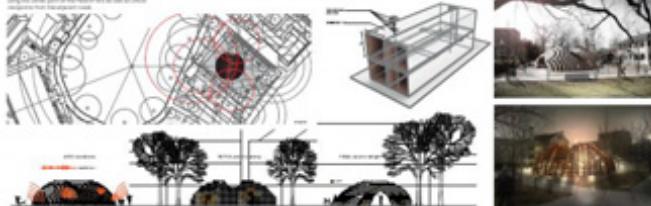
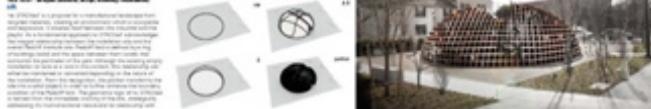
10. BARAGAN'S DAYDREAM

Year: 2013
Type: Architectural competition
Collaboration: Baragan, Baragan Architects
Part: Baragan, Baragan Architects
Photo taken: Baragan, Baragan Architects



09. RE-STACKED, THE RADCLIFFE INSTITUTE FOR ADVANCED STUDY AT HARVARD UNIVERSITY

Type: Architectural competition
Collaboration: Angen, van Vliet, Heijnen, Radcliffe Institute for Advanced Study
Part: Angen, van Vliet, Heijnen, Radcliffe Institute for Advanced Study



NJSTUDIO 2015 DESIGN PROJECT DEMO REEL

FIFTH EDITION, SELECTED WORKS SINCE 2004

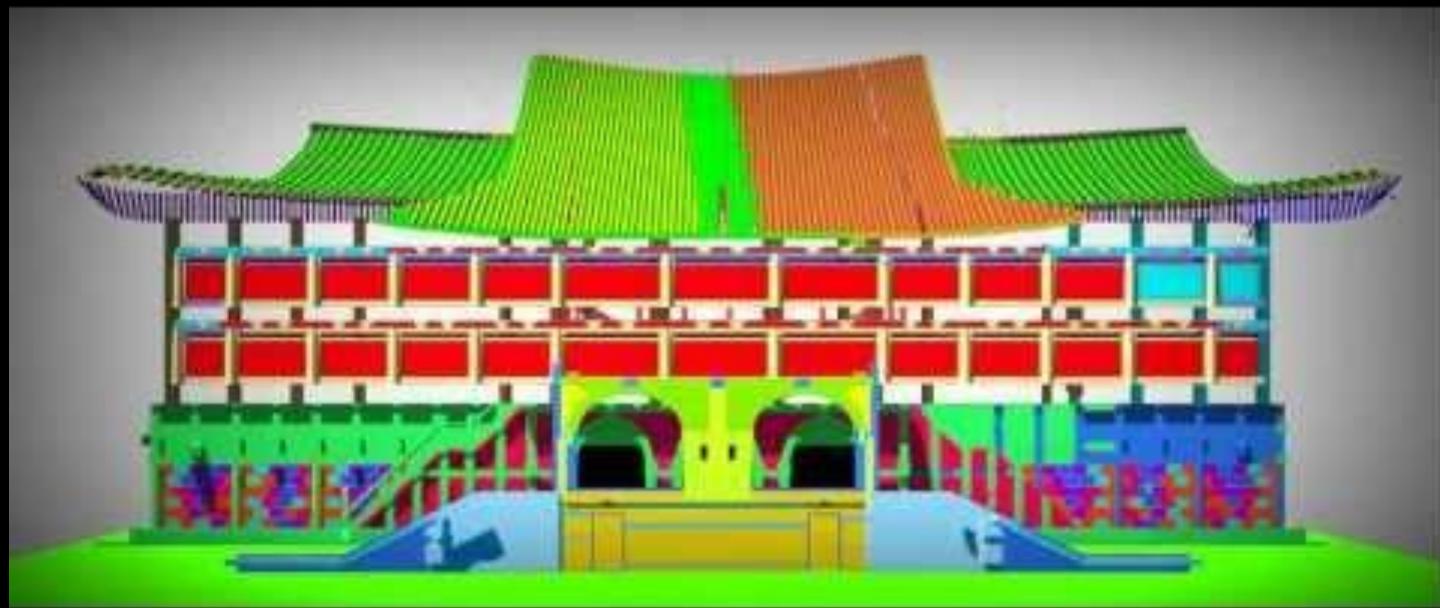
nj_studio@gmail.com

www.njstudio.co.il

EXHIBITION

as a design or director, selected researches and projects





LAB

as a research fellow, selected researches and projects

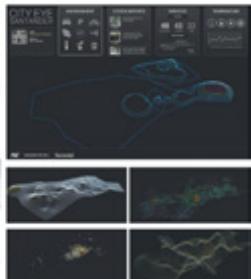
MIT SENSEable City Lab

as a 3D and Data Visualization specialist

<http://senseable.mit.edu/>



A network diagram titled "BOSTON CITY EYE SANDBUNKER" showing nodes and connections between various entities.



05. TWEETURBANTS. SENSABLE CITY LAB, MIT USA

Role taken: research fellow & visualization specialist (research, design, visualization)

Lah

The visualization displays a map of Boston with a color-coded heatmap representing Twitter activity. A legend on the left indicates activity levels from 0 to 1000 tweets per hour. The map shows higher activity in central business districts and lower activity in residential areas. A timeline at the bottom tracks the progression of the visualization over time.

Exploring digital collective responses to

Social media has transformed our lives. With increased connectivity, we are more connected to each other than ever before. This project explores how social media can be used to understand and improve our cities. By visualizing the collective responses to various events and trends, we can gain insights into the dynamics of urban life and how they evolve over time.

The team consists of researchers, designers, and developers who work together to create innovative visualizations that reveal hidden patterns and stories in large datasets. We use a variety of tools and techniques, including machine learning, data mining, and data visualization, to analyze and interpret complex data sets. Our goal is to make data accessible and understandable to everyone, so that it can be used to inform decision-making and drive positive change in our communities.



IRL DRIVE WAVE, SENSABLE CITY LAB, MIT USA, 2014

Role taken: research fellow & visualization specialist (research, design, visualization)



A screenshot of a computer interface titled "IRL DRIVE WAVE". The main window displays a 3D perspective view of a city's street grid, rendered in a wireframe style. A small camera icon with a play button is positioned in the center of the grid. Below the main window, there is a horizontal toolbar with several icons. At the very bottom of the screen, there is a thin horizontal bar containing text.

Team:
[Bartek](#)
[Johanna](#)
[Krisztian](#)
[Peter](#)
[Sergio](#)
[Sofia](#)
[Tobias](#)

IRL Unique Visualization by MIT Sensable City Lab

At the top of the interface, there is a navigation bar with links for Home, About, Contact, Help, Log In, and Log Out. On the far left, there is a vertical sidebar with the text "DRIVE SENSABLE" and a small "MIT" logo.



7. HUBCAB, SENSITIVE CITY LAB, MIT USA, 2014

Location : research fellow & visualization specialist (research, design, visualization)



The screenshot shows a map of New York City with various taxi routes plotted as green lines. A specific route is highlighted with a yellow circle and a green arrow. A callout box labeled "hubcab" points to this route. The interface includes a search bar at the top and a legend on the right side.

hubcab get started →

Exploring New York City taxi trails and sharing our urban torso: more sustainable urban future

Using our ever increasing pool of real time urban data streams, we are able to see potential opportunities for more sustainable urban mobility. By using these principles, reimagining and "tuning" urban mobility, we can make our cities more sustainable and liveable. We believe that by making the social and economic aspects of mobility in our transportation system, in particular large modal shifts, as easy to access as individual car trips, we could reduce our travel habits and

Team
Christopher Stachowiak, Michael Littman, Daniel Gitterman
Awards
MIT Media Lab
Powered By
Microsoft



URBANAID, UTS

as a researcher

DIGITAL MEDIA PAVILION PILOT

URBANAID LAB, UNIVERSITY OF TECHNOLOGY SYDNEY, AUSTRALIA

Date: 2012
Type: research work at University of Technology, Sydney
Directors: Prof. Timo Rauti
Researcher: [svenja research assistant](#) (design, fabrication, visualization)
Coll:

The proposes for a vibrant and dignified visual "Urban-Digital Media" pavilion, located right at the heart of UTS in the heart of our home.

Why a public pavilion?

This proposal is a development of the Urban-Digital Media project which year. It offers a permanent space for the university to showcase its research and teaching activities in a public venue - initially and specifically for the digital spaces of the Broadway building. This would UG plan argued for the university to take the lead in producing a digital campus, an idea which has yet to be embraced seriously by universities around the world.



POLYMEDIA PIXEL

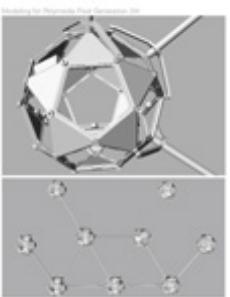
URBANAID LAB, UNIVERSITY OF TECHNOLOGY SYDNEY, AUSTRALIA

Date: 2012
Type: research work at University of Technology, Sydney
Directors: Dr. Horst Reiter
Researcher: [svenja research assistant](#) (design, fabrication, visualization)
Coll:

The PolyMedia Pixel investigates the potential for computer-augmented architectural materials to observe, respond and interact with their environment. The research aims to develop a system that can collect and process information about the building's environment and utilize information. The primary aim is to allow buildings to detect, analyse and exchange information.

This research is first stage intend to provide evidence, develop the PolyMedia Pixel as a complete system of augmented architectural materials, design and evaluate the system. Then it will be used to support further research and design and evaluate building information systems.

Using a systematic prototyping and evaluation approach, the research will prove findings and applications for improved information exchange between buildings that enhances sustainable building performance.



HARVARD GSD

as a researcher

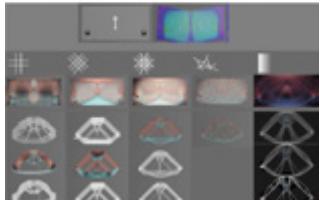
Prof. Martin Bechthold

MaP+S Group(Material Processes and Systems)

Prof. Panagiotis Michalatos

Introduction to Computational Design

Digital Structures and Material Distribution



GSD-6338 Computational design

[Numerical descriptions as design tools]
Fall 2015 syllabus



MaP+S Group
[About](#)

The MaP+S Group is a research group at the Harvard Graduate School of Design (GSD) focused on the intersection of material processes and systems. Our work explores how new technologies and materials can be used to create more sustainable and efficient built environments. We believe that by understanding the fundamental principles of material behavior, we can develop new ways of designing and constructing buildings.

Sponsors

Autodesk, TUM, AECbev, KITAS, DYNAMIK, AECBEV, ETH Zurich, THOMAS, Linova, Boston Children's Hospital, Harvard School of Design, Center for Civic Innovation.

UC Berkeley CED

as a researcher (GSR)

Prof. Kyle Steinfield



Projects

Urban Morphology, Architectural Materials, Computational Design, Sustainable Construction, Geometric Patterns, Structural Analysis, Material Properties, Design Tools, Research Methods.

Publications

Steinfield, K., & M. Bechthold. (2015). *Material Processes and Systems*. Cambridge, MA: Harvard University Press.

Software

Autodesk, TUM, AECbev, KITAS, DYNAMIK, AECBEV, ETH Zurich, THOMAS, Linova, Boston Children's Hospital, Harvard School of Design, Center for Civic Innovation.

EXTRA

Information

CLASS & WORKSHOP & MATERIAL

WORKSHOP & LECTURE & TALK

Design Visualization,
JTerm, Harvard Graduate School of Design, MA, USA
Independent Activities Period (IAP), Massachusetts Institute of
Technology(MIT), USA

"Design and computation", Seoul National University
of Science and technology, and Hongik University(Master and PhD students),
South Korea

3D Visualization and Computation, 4th
Semester Arch Core Studio, workshop, Harvard Graduate School of Design,
MA, USA

Post-Effect in AfterEffect, Digital Media Workshop,
Harvard Graduate School of Design, MA, USA

Architectural Visualization, Digital Media Workshop,
Harvard Graduate School of Design, MA, USA

Data and design computation, "Data-driven design
methodology", Seoul National University of Science and technology, South
Korea

...

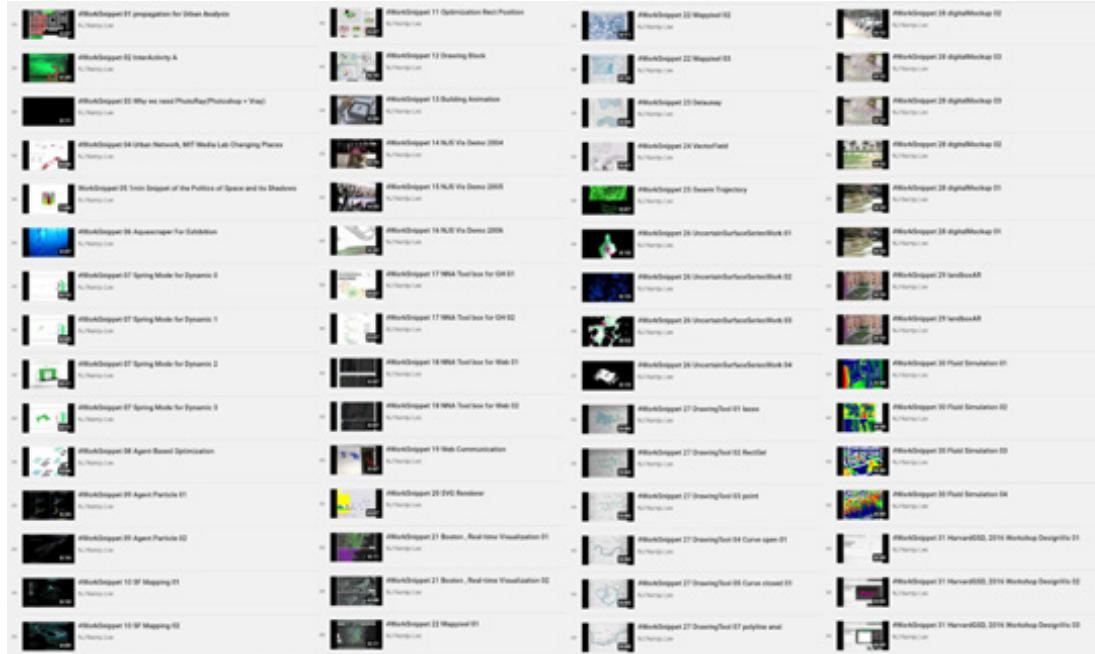


WORK SNIPPET

Snippet - [Playlist](#) - Instagram

Development Project - [Playlist](#)

Design Project - [Playlist](#)



WRITING & WORKSHOP

EDUCATION

Medium

<https://n-namju.medium.com/>

<https://medium.com/me/stories/public>

Codepen:

<https://codepen.io/NJStudio/collections/>

Daum Brunch (Korean)

<https://brunch.co.kr/@nnamju>

Tistory (Korean)

<https://computationaldesign.tistory.com/>

Data & Design



Introduction to Computational Design: Data, Geometry, and Visualization Using Digital Media

<https://n-namju.medium.com/introduction-to-computational-design-data-geometry-and-visualization-using-digital-media-141616d029>



Short Description:

This is a hands-on workshop and lecture series about the introduction to Computational Design for Data and Geometry Visualization for Digital Mapping on Web. For those who are interested in developing both the idea and skills of data and geometry visualization to understand the data in architectural or urban contexts, this workshop is for you. The workshop consists of three key parts: (1) presenting and visualizing data (2) connecting geometries (3) developing a pipeline for an interactive

<https://n-namju.medium.com/introduction-to-computational-design-data-geometry-and-visualization-140fdeaf3851>

Computational Design Thinking for Designers



Computational Design

The keywords could help designers to start thinking like a computational design specialist. Computational thinking in design uses a top-down approach to resolve a small design problem while also adding you an extremely isolated process to fit a comprehensive design outcome. These different tools of the approach enables to understand computational design processes for designers.

The keywords could guide you, who have no computer science backgrounds, to deal with the dilemma, and you would be able to gain a sense of understanding of developing computational design process in manifold circumstances in your design practices.

THE QUESTION / IMAGINATION / HYPOTHESIS

Understanding Problem, Concern & Issue
Declaring Initials & Outlines
Writing Assumptions

THE METHODOLOGY & APPROACH

From Whole to Parts & from Part to Whole
From Simple to Complex & from Complex to Simple
<https://n-namju.medium.com/computational-design-thinking-for-designers-6029a21717e>

Geometry as Data Structure and Visualization



Introduction to Geometry as Data Structure and Visualization

Keywords:
Class, Computational Geometry, Data Structure, Projection, Bimap, Interpolation, Generalization, Geometric Principles, Principles of Graphical Integrity, Berlin's Visualization design space

Keywords:
1) File formats (SHP, GeoJSON, Image)
2) Geometry as Data Structure
3) Bimap, Interpolation, Generalization
4) Object-oriented programming(OOP) pattern
4) Visualization

DATA STRUCTURE

Structured data (SHP)
Non-structured data (GeoJSON) --> Bimap
Image (Raster, Vector) --> Bimap

Generalization / Projection Class
Software design patterns (map, GoF, Design Patterns)
Inheritance (object oriented programming) -->

<https://n-namju.medium.com/geometry-as-data-structure-and-visualization-140fdeaf3851>

6 Digital Mapping using ArcGIS JS API



Digital FUTURES WORLD : ARCHITECTS UNITE Workshops

Day 6: Digital Mapping using ArcGIS JS API

Introduction to JS API and the Development of a Mapping App

Keyword

Projection, Bimap, Interpolation, Generalization, ArcGIS JS API, Geostack Principles, Principles of Graphical Integrity, Berlin's Visualization design space

Research Overview:

* [Digital Map Mobility Patterns Consumption](#)

LECTURE:

1) Projection, remap, interpolation
2) Generalization
3) Understand model Object-oriented programming(OOP) pattern

Workshop: Codigos, GitHub

1) Develop a mapping app with JS API based on the boilerplate code

Additional note:

2) date resolution using d3
2) date resolution using d3date

<https://n-namju.medium.com/6-digital-mapping-using-arcgis-js-api-626e108d624b>

Discrete Urban Space and Connectivity



My Social Algorithms | 2020, Computational Design

Subtitle: Partition & Relationship

Keywords:
Data Structure, Graph, Matrix, Pixel, Visual, Discretization, Partition, Connection, Search

Workshop Reference:

1. Computational Design Thinking for Designers —>[\[link\]](#)
2. Data & Design —>[\[link\]](#) —>[\[link\]](#)



We are able to answer these questions below.

how to capture and process spatial data in design

<https://n-namju.medium.com/discrete-urban-space-and-connectivity-activity-492b3dbd0a81>

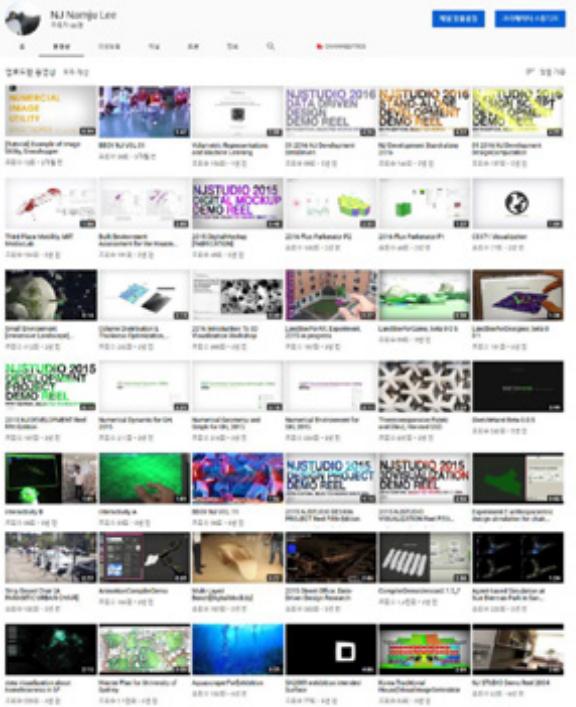
APPENDIX

EDUCATION

<http://www.njstudio.co.kr>

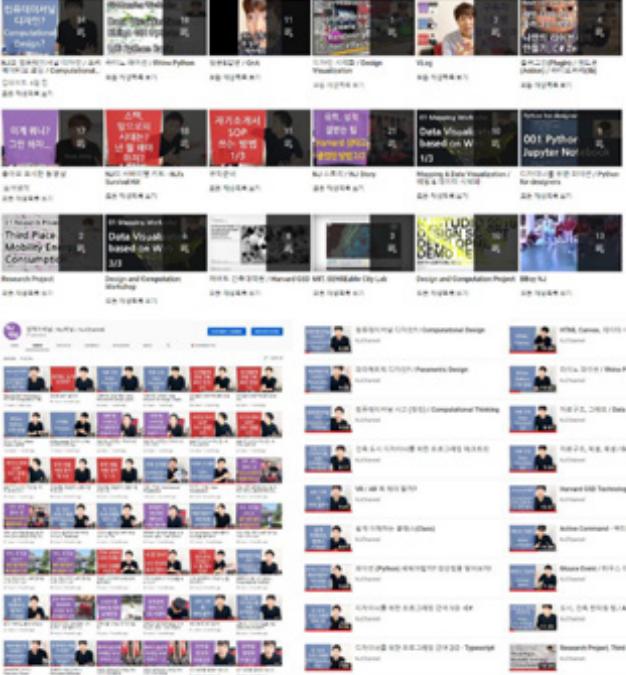
NJSTUDIO project and portfolio channel

Date : 2011 ~ present
Type : independent project
Role taken : **director**
[link](#)



Education Channel

Date : 2011 ~ present
Type : independent project
Role taken : **director**
[link](#)



NJCHANNEL PROJECT

Education

NJCHANNEL PROJECT

EDUCATION

처음 코딩을 접하는 디자이너에게 - [link](#)

NJ Channel Project, 콘텐츠 & 학습 자료 인덱스 - [link](#)

Daum Brunch - [link](#)

NJ's Computational Design Series

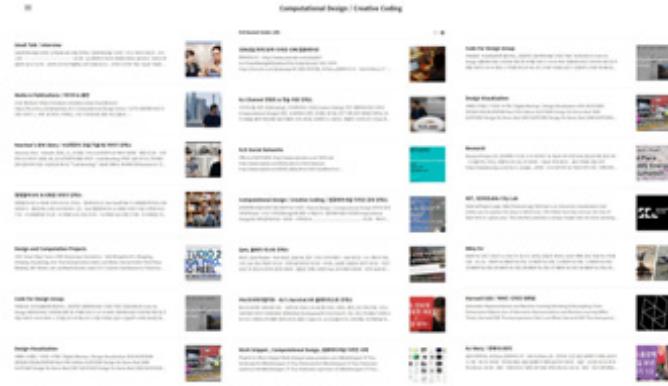
초급: 읽으면서 입문하는, 모두의 디자인 코딩

중급: 따라 하며 입문하는, 모두의 디자인 코딩

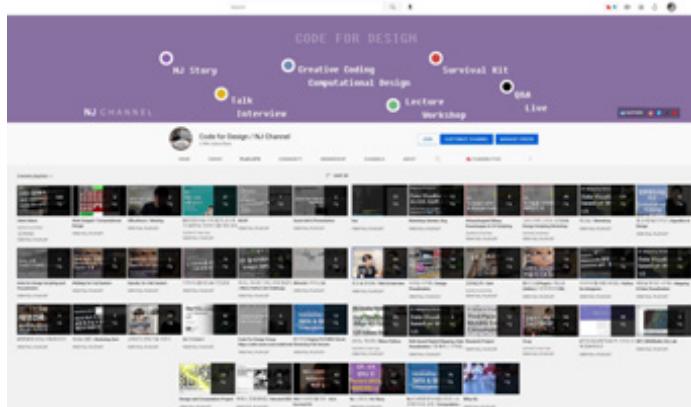
고급: 데이터 & 디자인 컴퓨테이션 네 디자인



Tistory - [link](#)



[Youtube - link](#)



Computational Design

Lecture Series:

Tistory Search - <https://computationaldesign.tistory.com/3?category=937138>

NJ's Computational Design Lecture series - <http://bit.ly/2SqBRq0>

- 37. 우리는 무엇을 배우면서 사는가 **feat. 언어와 컴퓨터이서널 사고, 그리고 사고의 도약** - [link](#)
 - 36. 코딩공부와 수학 그리고 공부할것 **Feat. 4차 산업혁명 그리고 디자인** - [link](#)
 - 35. 함수호출 **By Reference, By Value** - [link](#)
 - 34. 소프트웨어 어떻게 공부할까? 변할것 변하지 않을것, **Feat VR AR AI** - [link](#)
 - 33. 디자인 엔지니어링 / **Design Engineering** - [link](#)
 - 32. 궁극의 키트리! 컴퓨터이서널디자이너로 살아 남기!! - [link](#)
 - 31. SA 7.0 Lecture 5. 데이터 구조로서의 지오메트리 그리고 시각화 - [link](#)
 - 30. SA 7.0 Lecture 4. 이산 도시공간과 연결성 (그래프) **Discrete Urban Space and Connectivity (Graph)** - [link](#)
 - 29. SA 7.0 Lecture 3. 캐드, 디이트의 흐름 / CAD data pipeline - [link](#)
 - 28. SA 7.0 Lecture 2. 디자이너를 위한 컴퓨터이서널 퀘팅 / Computational Thinking For Designer - [link](#)
 - 27. SA 7.0 Lecture 1. 데이터 & 디자인 / Data & Design - [link](#)
 - 26. 금하기 어떻게 봄까? 추상을 통한 상상? 컴퓨터이서널크리에이티브 코딩 - [link](#)
 - 25. 힙합문화로 보는 새로운 패러다임 그리고 컴퓨터이서널 디자인의 운영 - [link](#)
 - 24. 정규화 & 보간 & 이상치 / normalization & interpolation & outlier - [link](#)
 - 23. 프로젝션 & 리맵 / Projection & Remap - [link](#)
- 서버이별키트 11. 디자이너에게 코딩이란 / 나에게 코딩이란 / 코딩을 하는 이유 - [link](#)
- 22. 코딩공부 어떻게? (잔소리포함) / 제발 타이핑해보자!! - [link](#)
 - 21. 내가 생각하는 컴퓨터이서널 디자인 / 워크숍 강좌를 만드는 배경 / 디자인 데이터 / Design & Data - [link](#)
 - 20. 컴퓨터이서널디자인을 바라보는 시각과 오해 - [link](#)
 - 19. 건축 3D 웹더링에 관한, 어느 건축가의 질문들... / 건축 시각화 - [link](#)
 - 18. 애플리케이션 / 도시 / Mapping for Urban and Architecture - [link](#)
 - 17. 도시, 건축 웹더링 팀 / Architectural & Urban Rendering tips / 건축 시각화 - [link](#)
 - 16. Mouse Event / 마우스 이벤트, CAD System - 캐드시스템 - [link](#)
 - 15. Active Command - 엑티브 커맨드, CAD System - 캐드시스템 - [link](#)
 - 14. Harvard GSD Technology 그리고 MIT Computation 지원준비, 프로그램 비교, 및 컴퓨터이션 공부 준비 방법 - [link](#)
 - 13. 자료구조, 퍽셀, 복셀 / Data Structure for design , pixel and voxel data structure 2/2 - [link](#)
 - 13. 자료구조, 그래프 / Data Structure for design , Graph 1/2 - [link](#)
 - 12. 라이노 파이썬 / Rhino Python, 공부법 - [link](#)
 - 11. HTML Canvas, 데이터 시각화, 크리에이티브 코딩 - [link](#)
 - 10. 건축 시각화 / Architectural Visualization - [link](#)
 - 09. 데이터 시각화 / Data Visualization - [link](#)
 - 08. 디자이너를 위한 프로그래밍 언어 2/2 - Typescript(Javascript) - [link](#)
 - 08. 디자이너를 위한 프로그래밍 언어 1/2 - C# - [link](#)
 - 07. 파이썬 (Python) 배워야 할까? 잠단점을 알아보자! - [link](#)
 - 06. 쉽게 이해하는 클래스(Class) - [link](#)
 - 05. VR / AR 꼭 해야 할까? 2019 버전 - [link](#)
 - 04. 건축 도시 디자이너를 위한 프로그래밍 테크트리 - [link](#)
 - 03. 컴퓨터이서널 사고 (평가) / Computational Thinking - [link](#)
 - 02. 파라메트릭 디자인? / Parametric Design - [link](#)
 - 01. 컴퓨터이서널 디자인? / Computational Design - [link](#)

QnA

Tistory Search - <https://computationaldesign.tistory.com/2>

Video Playlist - <https://www.youtube.com/playlist?list=PLweNVwGgDKEYzuT2sezSsQCP-me-1Tb7e>

3.1 디자인 그리고 컴퓨터이션

- QnA 01. 어느 고등학생의 질문 / 건축 파라메트릭 디자인 예제
- QnA 02. 건축가의 일반적인 질문 2차 (건축컴퓨팅실무)
- QnA 04. 건축컴퓨팅을 공부하고 싶으신 건축가형님과의 대화
- QnA 05. 코딩과 건축컴퓨팅에 관심이 많으신 건축가형님과의 대화
- QnA 06. 건축가의 일반적인 질문 (건축컴퓨팅실무용용)
- QnA 11. 어떤 절은 건축 디자이너의 질문
- QnA 15. 볼록(Voxel)과 컴퓨터이서널 디자인 그리고 건축 디자인
- QnA 16. 파라메트릭(Parametric Design)과 미적분
- QnA 17. 내가 생각하는 그래스하퍼(Grasshopper)의 단점과 개인적인 생각
- QnA 19. 파라메트릭 디자인 배우려면 어디서부터 어떻게 시작해야 하나요?
- QnA 21. 5G기술과 건축산업(설계 협업 및 시각화 VR), 정말 유용 하나?
- QnA 22. 내가 생각하는 그래스하퍼(Rhino Grasshopper)의 장점
- QnA 23. 디자인 소프트웨어 어떻게 공부할까? / 그 많은 것 언제 다 해요?
- QnA 24. 디자인 소프트웨어 어떻게 공부할까? 두 번째, NURBS, Mesh(Polygon)
- QnA 25. 디자인 소프트웨어 어떻게 공부할까? - 알고리즘 공부 방법 / 그리고 브런치!
- QnA 31. 대학생의 질문, 대학교, 대학원, 파라메트릭 디자인 스튜디오 어떻게 접근 할까?
- QnA 36. 파이썬 그리고 그래픽 플랫폼, 마아, 라이노...
- QnA 37. 프로젝트디자인 위한 코딩 그리고 3D 소프트웨어 공부 질문, 그리고 개인적인 생각
- QnA 43. SA 7.0 Unit 2 관련 질문 / 스스로 공부하는 방법

3.2 코딩

- QnA 33. 코딩 시작 시에, 필요한 수학? 과연 뭐가 필요할까?
- QnA 38. 너는 어떤 프로그래밍 언어를 쓰니?
- QnA 39. 데크나컬 아티스트 공부 방법? 책? 학원?
- QnA 44. 네이버 카페, 그래서 호퍼 웹페이지 질문 / 코딩을 공부하는 자세

3.3 인공지능, 데이터 그리고 시각화

- QnA 07. 데이터 시각화 도구(tools) 그리고 개인적인 생각
- QnA 12. 데이터시각화가 꿈인 카이스트 학생의 질문
- QnA 14. 디자인(건축), 빅 데이터, 그리고 인공지능(머신러닝)에 대한 질문
- QnA 42. 시각디자인 전공, 학생의 질문, 데이터 시각화 어떻게 공부할 것인가?
- QnA 46. 저도위에 데이터 시각화, 어떤 제품으로 개발을 하면 좋을까?
- QnA 47. AI, ML(머신러닝), GL(그래픽), CV(비전), 컴퓨터이서널 전공을 시작하는 학생 질문
- QnA 08. 컴퓨터이션 직업군 및 준비 자세
- QnA 09. 작성상사가 내 미래에 도움이 될 때, 회사를 떠나야 하나? 촌에서 배울점
- QnA 13. 미국, 호주, 유학준비와 그에 따른 생각들...
- QnA 20. SOP 작성 유의사항 (취직 커버레터 / 자기소개서)
- QnA 26. 대학원 진학, 유학에 대한 질문, 그리고 개인적인 생각, feat MIT Media Lab
- QnA 28. 건축과 학생의 질문, 건축, 디자인 유학 준비 그리고 주관적 생각
- QnA 29. 건축 & 디자인, 포트폴리오 그리고 취직, 유학
- QnA 30. 건축 유학 & 학비 그리고 개인적인 생각
- QnA 32. 건축/컴퓨테이션/뉴미디어디자인 직업군, 어떻게 준비하면 좋을까요?
- QnA 34. 유학 고민 많을 때, 실내건축학과 전공자의 MArch 유학에 대한 고민
- QnA 35. 컴퓨터이서널 디자인 유학을 준비하는 학생의 질문
- QnA 40. 건축/컴퓨테이션 유학 그리고 파이썬 코딩 공부
- QnA 41. 데이터를 활용한 도시 설계? 공부 전략? 그리고 (MIT SENSEable City Lab 연구소)
- QnA 45. 컴퓨터이서널 직장 구하기? 마음가짐?
- QnA 48. 유학? 얻는 이익이 있나?
- QnA 49. 스페셜리스트가 되기 위한 어느 학부생의 전공고민

Rhino3d, Concept, Basic Workshop

Tistory index - <https://computationaldesign.tistory.com/35>

Video Playlist - <https://www.youtube.com/playlist?list=PLweNvqGdKEYZVn4kRbmcQNgwMK2uH>

- 라이노 문법 이해

1. 라이노(Rhino3d) 기초 워크숍 / 소개 영상

2. 라이노 개념 잡기

3. 시작하기 그리고 Curve / 커브

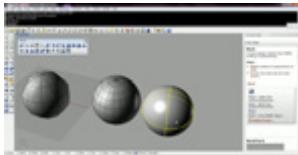
4 Curve Tool / 커브 수정하기

5. Surface / 서피스 만들기

6. Surface tool / 서피스 수정하기

7. Curve from Object Tool 오브젝트에서의 커브

8. 그拉斯하퍼(GH) 시작하기 / 개념 이해



Python For Designers

Tistory Search: <https://computationaldesign.tistory.com/20>

Video Playlist - <https://www.youtube.com/playlist?list=PLweNvqGdKEYzIl0Bee04kPhsUT9eSQd>

Python For Designers 미니콘다(Miniconda) 설치(2020)

디자이너를 위한 파이썬 가상환경 설치법 - [link](#)

01 Jupyter notebook / 디자이너를 위한 파이썬 01 주피터 노트북 - [link](#)

02 Python Basic / 디자이너를 위한 파이썬 02 파이썬 기초 1/2 - [link](#)

03 Python Basic / 디자이너를 위한 파이썬 03 파이썬 기초 2/2 - [link](#)

04 Class / 디자이너를 위한 파이썬 04 파이썬 클래스 - [link](#)

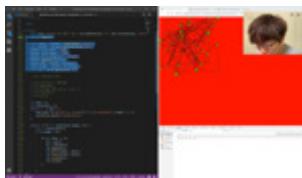
05 Graph / 디자이너를 위한 파이썬 05 파이썬 그래프 - [link](#)

06 Graph Visualization / 디자이너를 위한 파이썬 06 파이썬 그래프 시각화 - [link](#)

07 Graph to JSON/ 디자이너를 위한 파이썬 07 파이썬 그래프 JSON - [link](#)

08 Graph to CSV / 디자이너를 위한 파이썬 08 파이썬 그래프 CSV - [link](#)

09 Graph HTML Canvas Vis / 09 파이썬 그래프 HTML Canvas 시각화 - [link](#)



Rhino3d Python Workshop

Tistory - <https://computationaldesign.tistory.com/21>

Video, Playlist - <https://www.youtube.com/playlist?list=PLweNvqGdKEYzUe4kPhsUT9eSQd>

1. 라이노 파이썬 워크숍 / Rhino Python, Rhinoscriptsyntax workshop

2. Point Grid Basic (rhinoscriptsyntax) -

3. Help File & Tutorials / 헬프 파일 & 온라인 튜토리얼

4. Function 1D / 라이노 파이썬 04 1차원 함수 2/2

5. Point Grid 2D / 2D포인트 그리드

6. Point Grid Pattern / 2D, 3D 포인트 그리드 패턴

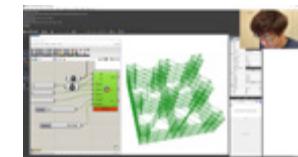
7. Point Cloud - Random / 포인트 클라우드 - 랜덤

8. Point Cloud - Random Normal Distribution / 포인트 클라우드 - 정규분포

9. Point Cloud - Linear Regression / 포인트 클라우드 - 선형 회귀

10. Point, Line, Polyline / 포인트, 라인, 폴리라인

11. Line, Intersection, Length / 라인, 라인 교차, 라인의 길이



Rhino C# Scripting

라이노(Rhino) 그拉斯하퍼(Grasshopper)와 c#코딩(coding) 동시에 공부하자

Tistory Search/

Video Playlist - <http://bit.ly/2u4kh7d>

Episode A - <https://computationaldesign.tistory.com/14?category=937139>

Episode B - <https://computationaldesign.tistory.com/15?category=937139>

01. 워크숍을 시작하면서

02. 라이노의 문법 그리고 그拉斯하퍼

03. 그라스하퍼 기본으로 & 리파인먼트

04. Point & Line 그리고 Curve

05. Point 그리고 Data

06. Point List 그리고 Curve

07. Point Grid & Surface

08. Point, Curve 그리고 Brep(Closed Extrusion)

09. Point, Curve 그리고 Brep(Loft) - Optimization & Design Space

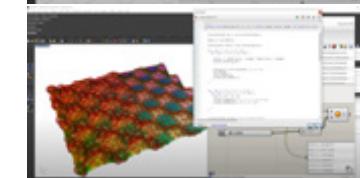
10. Point 그리고 Solid Brep - Primitive, Box, Cylinder, Cone

11. Point 그리고 Solid Brep - Primitive, Sphere, Indexing, Connectivity

12. Point 그리고 Tri Mesh - Vertices, Faces, Colors, Barycentric coordinate

13. Point 그리고 Mesh Sphere

14. 에피소드 A 종료 - 요약 그리고 이런 저런 생각



Rhino3d, Python, Mapping Workshop

Tistory - <https://computationaldesign.tistory.com/18?category=937139>

Video Playlist - <https://www.youtube.com/playlist?list=PLweNVwGgDKEYoRJA355KsGDS5x9nkzalF>

Rhino Python Mapping 01 Basic Syntax / 라이노 파이썬 매핑 01 파이썬 기초

NYIT에서 진행했던 매핑 워크숍입니다. 궁금하신 점은 질문 주세요. :)

Rhino Grasshopper Python, NJS Numerical Tool kit

01. Basic Syntax / 라이노 파이썬 매핑 01 파이썬 기초 - [link](#)

02. Data Manipulation CSV / 라이노 파이썬 매핑 02 CSV 데이터 - [link](#)

03. Data Manipulation JSON, GeoJSON / 라이노 파이썬 매핑 03 JSON, GeoJSON 데이터 - [link](#)

04. Data Manipulation OSM, Shapefile / 라이노 파이썬 매핑 04 OSM, Shapefile데이터 - [link](#)

05. Data Manipulation DEM / 라이노 파이썬 매핑 05 DEM데이터 - [link](#)

06. Image Processing / 라이노 파이썬 매핑 06 이미지 프로세싱 - [link](#)

[#컴퓨테이션디자인 18] 매핑 (건축, 도시) / Mapping for Urban and Architecture

건축 도시 디자인 프로세스에서 매핑을 많이 활용하죠. 매핑에 대한 생각을 공유합니다.

01:20 - 트레이닝

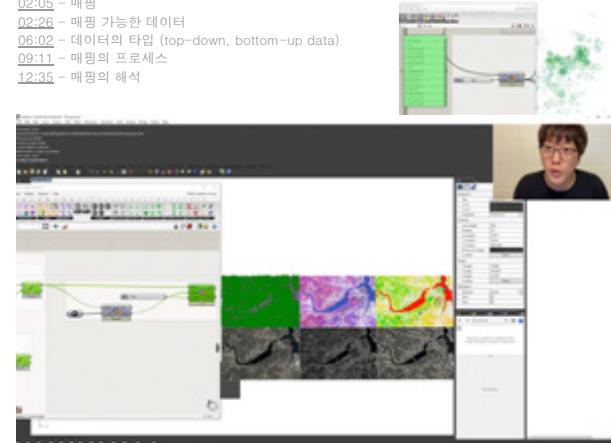
02:05 - 매핑

02:26 - 매핑 가능한 데이터

06:02 - 데이터의 탑재 (top-down, bottom-up data)

09:11 - 매핑의 프로세스

12:35 - 매핑의 해석



Digital Mapping Workshop, JSAPI

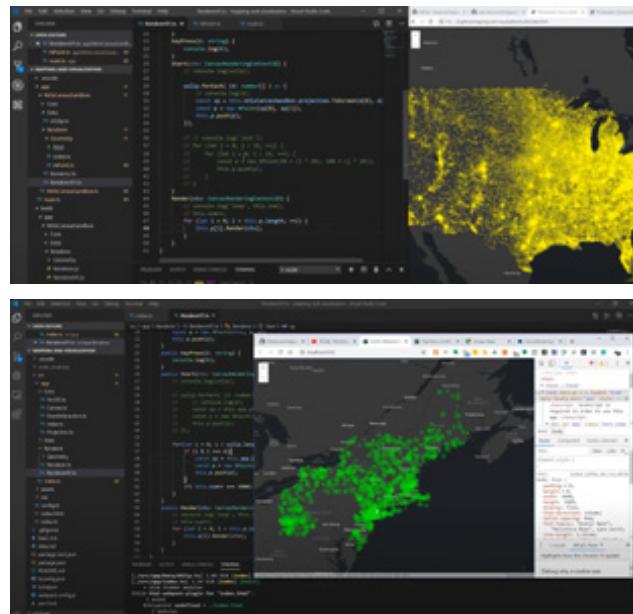
Tistory - <https://computationaldesign.tistory.com/17?category=937139>

Github :

<https://github.com/NamjuLee/mapping-and-visualization>

<https://github.com/Esri/isapi-resources>

ArcGIS JS API reference: <https://developers.arcgis.com/javascript/latest/api-reference>



Stand-alone & GH Addon

Tistory - <https://computationaldesign.tistory.com/36>

Playlist: [link](#)

레빗(Revit) 다이나모(Dynamo) c# 디자인 스크립팅, 어떻게 플러그인을 만들까? - [link](#)
나만의 라이브러리 만들기 Zero Touch

어떻게 라이노의 기능을 유니티(Unity)에서 활용할 수 있을까? - [link](#)

라이노 플러그인 어떻게 만들까? - [link](#)
템플릿 파일 <https://marketplace.visualstudio.com/items?itemName=McNeel.RhinoCommandTemplatesforVS>

라이노 그래스하퍼 (Rhino Grasshopper) 플러그인을 소개해 드립니다.
특별히 어떤 데이터들이 디자인할 때 사용할 수 있을까요

Rhino GH Addon - 01 Numerical Utility 소개와 설치 1/7 - [link](#)
Link <https://www.food4rhino.com/app/numerical-geometry/utility>

Rhino GH Addon, Design & Data 2-1 Numerical Geometry 2/7 - [link](#)
Link <https://www.food4rhino.com/app/numerical-geometry/utility>

Rhino GH Addon, Design & Data 2-2 Numerical Dynamic & Graph 2/7 - [link](#)
Link <https://www.food4rhino.com/app/numerical-geometry/utility>

Rhino GH Addon, Design & Data 3. Numerical Environment Utility 3/7 - [link](#)
Link <https://www.food4rhino.com/app/numerical-landscape-utility>

Rhino GH Addon, Design & Data 4. Numerical Urban Utility 4/7 - [link](#)
Link <https://www.food4rhino.com/app/numerical-urban-utility>

Rhino GH Addon, Design & Data 5. Numerical Utility 5/7 - [link](#)
Link <https://www.food4rhino.com/app/numerical-utility>

Rhino GH Addon, Design & Data 6. Numerical Landscape 6/7 - [link](#)
Link <https://www.food4rhino.com/app/numerical-landscape>

Rhino GH Addon, Design & Data 7. Numerical Dynamic & Graph 7/7 - [link](#)
Link <https://www.food4rhino.com/app/numerical-dynamic-graph>

Rhino GH Addon, Design & Data 8. Numerical Environment 8/7 - [link](#)
Link <https://www.food4rhino.com/app/numerical-environment>

Rhino GH Addon, Design & Data 9. Numerical Utility 9/7 - [link](#)
Link <https://www.food4rhino.com/app/numerical-utility>

Rhino GH Addon, Design & Data 10. Numerical Landscape 10/7 - [link](#)
Link <https://www.food4rhino.com/app/numerical-landscape>

Rhino GH Addon, Design & Data 11. Numerical Dynamic & Graph 11/7 - [link](#)
Link <https://www.food4rhino.com/app/numerical-dynamic-graph>

Rhino GH Addon, Design & Data 12. Numerical Environment 12/7 - [link](#)
Link <https://www.food4rhino.com/app/numerical-environment>

Rhino GH Addon, Design & Data 13. Numerical Utility 13/7 - [link](#)
Link <https://www.food4rhino.com/app/numerical-utility>

Rhino GH Addon, Design & Data 14. Numerical Landscape 14/7 - [link](#)
Link <https://www.food4rhino.com/app/numerical-landscape>

Rhino GH Addon, Design & Data 15. Numerical Dynamic & Graph 15/7 - [link](#)
Link <https://www.food4rhino.com/app/numerical-dynamic-graph>

Rhino GH Addon, Design & Data 16. Numerical Environment 16/7 - [link](#)
Link <https://www.food4rhino.com/app/numerical-environment>

Numeric Network Analysis

SA 7.0 Unit 2

Daum Brunch : <https://brunch.co.kr/@rinamju/91>

Video Playlist - <https://www.youtube.com/playlist?list=PLweNViGdQREhGYBpV4xH4MchJW245c3A>

Medium : <https://rinamju.medium.com/numeric-network-analysis-post-covid-19-urbanism-6-ft-cde-de267886028>

유튜브 한국어 전체강좌(수업, 워크숍, 미팅, 프레젠테이션) – 플레이 리스트
유튜브 영어 전체강좌(수업, 워크숍, 미팅, 프레젠테이션) – 플레이 리스트

원문 링크 Numeric Network Analysis: Post-COVID-19 Urbanism, 6 ft rule – link
선수 공부 자료 – link

이남주 / NJ Namju Lee / nj.namju@gmail.com
우정현 박사 / Junghyun Woo / axuplatform@gmail.com

SA 7.0 Unit 2 한국어 강좌

0. Introduction Unit 2 – Medium link
유닛 2 수업 소개 – 전체 버전 (Eng)

1. Lecture, Data and Design – Medium link
데이터 그리고 디자인 – 전체버전 – 편집버전

2. Lecture, Computational Design Thinking for Designers – Medium link
디자이너를 위한 컴퓨터아이셔널 사고 – 전체버전 – 편집버전

3. Lecture, Pipeline for Interaction, Data, and Geometry Visualization – Medium link
CAD 소프트웨어의 구조 그리고 데이터의 흐름과 시각화 – 전체버전 – 편집버전

4. Lecture, Urban Design Quality and Walkability – Medium link
도시디자인과 보행환경 – 전체버전

5. Lecture, Spatial Network Analysis In Transportation Geography – Medium link
교통계획 분야에서의 공간 네트워크 분석의 활용 – 전체버전

6. Lecture, Examples of Numeric Network Analysis using the NNA Toolbox – Medium link
NNA toolbox를 활용한 도시 공간정보 분석 예시 – 전체버전

7. Lecture, Discrete Urban Space and Connectivity – Medium link
이산 도시 공간연결성 – 전체버전 – 편집버전

8. Lecture, Geometry as Data Structure and Visualization – Medium link
데이터 구조로서의 기하학 그리기 시각화 – 전체버전

9. Workshop, Pedestrian Volume Studies– Medium link / Post-COVID-19 Urbanism –Medium link
보행자 이동성 정보 수집 방법 / 포스트 COVID-19를 대비한 도시 환경 계획 및 아이디어 – 전체버전

10. Workshop, Data Visualization, Numerical Image Utility
데이터 시각화 / 이미지 둘 – 전체버전

Discrete Urban Space and Connectivity

NJ Namju Lee Ad 10.2020 3 min read

SASocial Networks) 2020, Computational Design

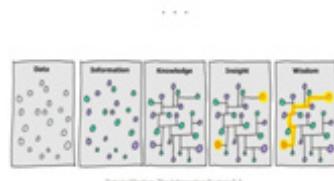
Subtitle: Partition & Relationship

Keyword

Data Structure, Graph, Matrix, Pixel, Voxel, Discretization, Partition, Connection, Search

Workshop Reference

1. Computational Design Thinking for Designers – [link](#)(Eng)
2. Data & Design – [link](#)(Eng) – [link](#)(KR)

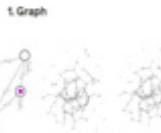


We are able to answer these questions below.

How to capture and process spatial data in design

Relationship among data in a space

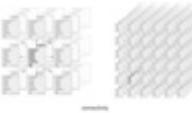
Discrete a space into parts



Graph is a mathematical object that consists of set of points and edges, dealing with discrete information.

Graph is widely used for computation, discrete mathematics or representing relational data structures, and it has explicit relationship among vertices by edges visualizing the topological aspect such as street network of urban, highway or the railway map, whose graphs closely resemble their physical forms due to its characteristics.

2. Pixel / Voxel (Volumetric Element)



- Voxel could be considered as a set of image pixel

Voxel for geometry in space is a discretized space of proximity where it has a beam or node are connecting but as a continuous map in space. This is basically an idea that an object become a 3 dimensional map.

3. Partition

Linear regression, KNN, Support vector machine, Random Forest, CNN, Deep learning, Playground

Delaney triangulation / Voronoi diagram

Discrete space – Space Partitioning

Quadtree / Octree / Bin System

Area(Area) / Distance

Clustering Points: Collision-Based Dynamic Graph method – [link](#)

4. Connectivity

GRAPH – [link](#)

Graph: Data Structure for Spatial data – [link](#)(KR)

Social network as Graph – [link](#)

Transportation as Graph ([link](#), [link](#), [link](#), [link](#), [link](#))

Folder structure as Graph – [link](#)

Programming executions as Graph – [link](#)

Zenodo as Graph – [link](#)

Associative geometry – [link](#)

Interface – [link](#) / [link](#)

Network for ML – [link](#)

Streamlit – [link](#), [link](#)

Mesh/Meshnet as Graph – [link](#)

Mesh from Rhinoceros – [link](#)

NURBS/UE4 Presentation slide

Data structure as Graph

SGDN / GSON as Graph

Matrix ([link](#)) / Fast ([link](#)) and Voxel ([link](#)) as Graph

AI & Data for Design

Link: <https://computationaldesign.tistory.com/29>

AI and Data for design / 데이터 그리고 디자인 / 디자이너를 위한 인공지능

J-Term 2017, Harvard GSD :

Title: Introduction to Data Science for Building Simulation

1 Python Basic

2 Data process & Visualization

3 Train modes & Predict missing values

Data Process

Numpy, Pandas, CV

Workshop

Temperature Conversion

Multiplication Table 1. regression model 2. cnn model

Smart Drawing 1. Data process 2. Model A 3. Model B

Smart Commander

Semantic Segmentation

Third Place Prediction

Map Classifier

Super Resolution

Smart Map Tracer

Texture Prediction

Color Prediction

3D Volumetric Representation and Machine Learning in Design

Python Basic

TypeScript Basic, Tensorflow JS

Project

Project, Smart Map Tracer, ESRI Storymaps Hackathon – [video](#)

Project, Smart Drawing - Writing / Video / [Demo](#)

Project, Remixing and Resampling Three Dimensional Objects,

Use of Volumetric Representation and Machine Learning in Design - [link](#) / [video](#)

Project, Politics of Space and Its Shadows - [link](#) / [video](#)

Project, Built Environment Assessment - [link](#) / [video](#)

Analytical housing prediction model with spatial observation in City of Boston

link 4-Smart Drawing

link Linear-regression, Polynomial Regression , Regression Model , XQR

Codename - Tensorflow playground state, TypeScript

Introduction to Computational Design

Digital FUTURES World Workshop 2020

Tistory Search: <https://computationaldesign.tistory.com/16?category=937139>

Video Playlist - <https://www.youtube.com/playlist?list=PLweNVwGgDKEZZyedJj632ULMj6allmz2s>

DigitalFUTURES Word link <https://www.digitalfutures.world/workshops-asia-pacific/blog/nilee-kr>

Medium link <https://medium.com/@nji.namju/introduction-to-computational-design-data-geometry-and-visualization-using-digital-media-141016fb021>

1 Python Basic

2. Data Visualization, RhinoGH Python

3. Typescript & HTML Canvas Visualization

4. Computational Geometry & Geometry Class & Visualization

5. Pipeline for Interaction, Data, and Geometry Visualization

6. Digital Mapping using ArcGIS JSAPI

Introduction to Computational Design for Mapping and Data Visualization

Workshop Leader: Naji Namju (naji139)

Original post: <https://computationaldesign.tistory.com/16?category=937139>
Archived post: <https://web.archive.org/web/20200811114543/https://computationaldesign.tistory.com/16?category=937139>



Introduction to Design Visualization

Harvard GSD, MIT SA+P

Link - <https://namjulee.github.io/3d-visualization-harvard-gsd.github.com/>

Video - <https://youtu.be/3VeLfmt2N-0>

Git - <https://github.com/NamjuLee/Harvard-GSD-Workshop>

Download:

Content(pdf)

Example files

BasicAnimation.pdf

BasicParticleSystem.pdf

Workshop at Harvard Graduate School of Design

Please use this content only for educational purpose, not for commercial one

The aim of this workshop is to provide students with a knowledge of 3D visualization and Post-Production in architecture, landscape architecture and urban design domains.

- The rendering sequence files are excluded because they are simple too big
- some files above 100mb are excluded because of the limitation. If you need to get entire exercise files, please contact me
nji.namju@gmail.com



KEYWORD

Design Engineering

Numerical Design	Urban mapping	OpenGL
Parametric Design	GIS	WebGL
Data-Driven Design	Data structure in design	OpenCV
Agent-based Design	Data Visualization	Standalone
Algorithmic Design	Compatibility	Addons
Design Space		Plugins
Data processing	Geometry Computation	Immersive experience & design
Data Mining	Differential geometry	Metaverse VR / AR / MR
Data Visualization	Dynamics	Interactivity
Machine Learning	3D Visualization	Creative Coding
Data Science	Animation	Design Scripting
Deep Learning	Fabrication	
Computer Vision	Robotics	
Image processing	Physical computing	
	Optimization	
	Automation	

DOMAIN & TECHNOLOGY

Software

• Built Environment	Architectural design Spatial design Urban design Interaction	• Code	JAVA, C# for OpenGL, Unity3D, GLSL(Shader), and Rhino3D, Python for AI(TF, SKLearn...) Maya and Rhino3D, Rhino3D Script, 3ds maxscript, HTML, CSS, Typescript, Javascript(TFJS, THREE.js(WebGL), NodeJS)
• development	Geometry Interaction Data driven design system	• 2D, 3D	Illustrator, Photoshop, AutoCAD, 3ds Max, Maya, SketchUp, Rhino3D, Grasshopper, Particle systems, Simulation engines, and various plug-Ins Renderer : Vray, Mental ray, Brazil render, Final render, Maxwell render, Hyper Short, Key Short
• 3D Visualization	Modeling Lighting Rendering Animation		
• Data Visualization	Data pre processing Train Network AI, ML, DL Visualization	• VR, Motion	Unity, After Effect, Premiere, Combustion, Boujou, Quest3D, Turn Tool,
• Computation in Design	GIS / Urban scale Environmental issue Urban design / Smart City Architectural design Product scale Interaction (human Computer Interaction) Digital Fabrication / Robotics Media AI, ML, DL VR /AR / MR / Metaverse		
	...		

Thank you :)

NJ Namju Lee

nj.namju@gmail.com

Resume - http://www.njstudio.co.kr/pdf/Resume_Namju_Lee.pdf

NJ Design Studio - <http://www.njstudio.co.kr>

NJS Lab - <http://www.njslab.com/NJSLabCore/>

NJS Data Lab - <http://www.njslab.com/NJSLabDataEnv>

NJS Sandbox env - <http://www.njslab.com/NJSLabEnv/>

github - <https://github.com/NamjuLee>

LinkedIn - <https://www.linkedin.com/in/nj-namju-lee-926b3252/>

Medium(Eng) - <https://nj-namju.medium.com/>

Daum Brunch(Kr) - <https://brunch.co.kr/@njnamju#articles>