PORTFOLIO

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SMArchS Architecture Design 2020
Massachusetts Institute of Technology MIT
Interacting narrations on the boundary on the island of Ioannina

aktiver, generer, integrer

eco-cocoon

Off site

Symmetry Sentience: Interlace

Fu Bridge

Functional Gradated Interfaces I Helmetic

Paint-it
Interacting narrations on the boundary on the island of Ioannina

Diploma Thesis - Aristotle University of Thessaloniki (AUTH)
location: Ioannina, Greece
project type: academic (Architecture-Landscape architecture)
work type: individual work
year: 2014-2015
supervisor: Alexandra Alexopoulou

On the northwest of a preserved settlement, of a coniferous forest and a family of reed, a rock, a boundary between the lake Pamvotis and the hinterland of the island of Ioannina, receives and gives meaning by new to human existence through a different understanding of the ‘genius loci’. A spatial narration, inside, outside and close to the boundary, gets shaped by a path articulated by building types and building non-types.

The study uses the architectural elements in such a way as to redefine the ‘genius loci’. The path is formed through a typological analysis of the spatial qualities traced, natural or man-made. The rock is treated as a volume of distinct geometric features and a peculiar section. In its core, an environmental education center is placed. The building’s axis follows the rock’s symmetry axis and distributes the horizontal and vertical movements. The volumes’ typology and scale follow those of the buildings of the preserved settlement integrating into the island’s physiognomy.

**Mediterranean Mimar Sinan Prize 2016 Distinction, Istanbul, Turkey
**Published in KooZArch / The Architectural Review / Greekarchitects.gr / Archfolios / FreeArchBook
**Presented at the Architecture Lecture ‘Στο τέλος της μικρής μας πόλης...’, Ioannina, Greece
**Exhibited at ‘Mediterranean Mimar Sinan Prize 2016’ Exhibition, Istanbul, Turkey, and at ‘Horizons’ Architectural Exhibition, Ioannina, Greece
Study area analysis
rock’s geometry

reeds’ chronological change

built typologies existing boundaries and textures

relation of spatial uses
education information administration cafe

(+478.85m)

Site plan
aktiver, generer, integrer!

International architectural competition entry: Kunstsilo in Kristiansand
location: Kristiansand, Norway
project type: professional (Architecture/ Restoration-Reuse/ Urban Design)
work type: group work
in collaboration with: SPARCH Architects, Meinich Architekter (Oslo)
year: May 2016

The competition focuses on designing a Museum of Modern Art in an old industrial silo in Kristiansand, Norway. Situated in a former industrial zone, an old grain silo with its 30 cylindrical towers one next to the other is envisioned to stand as part of the currently initiated urban development plan.

‘activer, generer, integrer!’ (‘activate, generate, integrate!’) aims to become a prompt to ‘activate’ the area, to connect it with the city center and use art and public space to create a centrality. On an architectural level, its aim is to transform the silo into a modern art museum highlighting the structure, creating multiple spatial experiences and incorporating the magic of natural light with art and architecture.

The museum is designed as a hybrid space: once an industrial area, today an art space. The silo towers hide an interior patio filled with light and movement. Bridges at different levels connect the exhibition spaces on the patio’s sides and the users’ movement gets layered. The light penetrates from above letting the two new additions converse with the existing building.

**Commendation at MIPIM AR Future Projects Awards 2017, Cannes, France
**Distinction in the Competition ‘Kunstsilo in Kristiansand’, Norway
**Exhibition at Kilden Performing Arts Center, Kristiansand, Norway
**Publication in KTIRIO.GR / Athens Voice
Silo Museum

(Top) Conceptual and programmatic analysis
(Top, Left) Floor plan 6
(Top, Right) Floor plan 5

© SPARCH Architects
(Top, Left) Programmatic analysis
(Middle) Foyer view
(Right) Museum bridge view
eco-cocoon

International architectural competition entry: Green Academy
location: Bologna, Italy
project type: professional (Architecture/ Restoration-Rehabilitation-Reuse)
work type: group work
in collaboration with: SPARCH Architects
year: July 2016

The ‘Green Academy’ competition encourages the transformation of an old paper factory, designed by Pier Luigi Nervi, in Marzabotto, Bologna, Italy, into a school and a business incubator for start-ups with a focus on environmental and sustainable practices.

The proposal is structured based on the belief that ecology is an ever-changing field; a recycling of ideas, materials and objects. An “eco-cocoon”-a canvas of materials for sustainable energy, from panels of algae to new experimental photovoltaics—covers the old and new buildings.

On the ground floor the longitudinal start-up spaces are connected with the child’s museum via a passage-showroom where the building’s main entrance is located. On the upper floors there is the eco-science museum with linear cuts visually connecting its two floors. On top a roof garden with various plants encourages the experimentation and improves the building’s micro-climate. The old and new buildings are connected via an open space for bazaars, eating and gathering activities. Space is left untreated and rough evoking the memory of the past. The blocks are covered in re-usable brick and re-usable glass claustra that filter the natural light.

**Honorable Mention in DOMES Awards 2017, Athens, Greece, 2017
**Finalist Mention in the Competition ‘Green Academy’, Bologna, Italy
(Top) **Perspective Section** (teamwork product)
(Bottom) **Perspective Top view**
SPARCH Architects

Sustainability strategy

Materiality analysis

Programmatic analysis

Green terrace floor plan

Ground floor plan (teamwork product)

Green Energy production (Photovoltaic panels)

heat absorption via vegetation

(top level operable windows for natural ventilation and stack effect)

aerodynamic shape maximizing wind flow

natural ventilation through perforated skin

natural cooling and production of oxygen from vegetation

build-up of green material

building envelope from recycled materials

Green Energy production (Photovoltaic panels)

caged recycled glass (claustra)

reused bricks

panels of algae-photovoltaics

(top) Programmatic analysis

(bottom) Sustainability strategy | Materiality analysis

(teamwork product)

(Middle) Ground floor plan (teamwork product)

(Middle, Left) Summer performance
Off site

Massachusetts Institute of Technology
course: Design Experience Workshop-Augmented, Immersive and Mobile Kyoto
location: Kyoto, Japan
project type: academic (VR-Architecture)
work type: individual work
year: February 2019
instructor: Takehiko Nagakura

‘Off site’ explores how one experiences space through only vision and sound. It questions how space can be redefined by decomposing the spatial experience into its structural elements. To this end, audio and video are translated, distorted, and altered dissociating these elements from each other to form a new spatial order. Two different space typologies - a temple (Miidera temple) and a market street- in Kyoto are, therefore, perceived and narrated through an immersive interplay between light and darkness, inside and outside, natural and man-made. Akira Kurosawa’s optical reflections (mirrors) film technique and the point-cloud environment are combined with photogrammetry and VR stereoscopic video techniques to create an immersive architectural narrative.
Interlace

AA Athens Visiting School: “Symmetry Sentience”
location: Athens, Greece
project type: academic (Architecture-Digital fabrication)
work type: group work
year: July 2017

‘Symmetry Sentience’ considers materiality and form as a unified whole and investigates how membranes’ curvature and translucency can define both the architect’s and the user’s architectural understanding by new.

In this program, ‘partition elements’ are asked to be set invalid and reshaped by a new theoretical and design context. It integrates manufacturing techniques and a theoretical background based on computational space, machinic control and kinetic design.

‘Interlace’, as the final product is named, gets formed after experimenting on the flexible nature of tensile fabric (lycra) combined with wood veneer.

The final 1:1 structure, thus, is a complex system of intricately crossed wood veneer stripes that shape the frame for the lycra-covered components which interact with the structure based on the users’ proximity to it. There are two rotation axis structuring the movement of the interactive components while the triangular geometry of each of the stable components enhances the prototype’s stability. Both materials are energized by the users’ motion and real-time reactions creating thus a ‘living’ structure.

**Presented at eCAADe 2018 (36th Annual Conference), Faculty of Civil Engineering, Architecture and Environmental Engineering, Lodz, Poland**
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<th><strong>Prototype component</strong> (teamwork product)</th>
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<th><strong>Prototype as a canopy</strong> (3D printed model)</th>
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(Top) 1:1 Prototype as a partition (teamwork product)

(Bottom, Left) Elevation (by team)
(Bottom, Right) Top view (by team)
**Fu Bridge: Spanning with folds**

**Massachusetts Institute of Technology - ETH Zurich - Tongji University**

**course:** Robotic Force Printing (IAP)

**location:** Shanghai, China

**project type:** academic (Architecture-Digital fabrication)

**work type:** group work

**year:** January 2019

**instructors:** Philippe Block (ETH Zurich), Philip Yuan (Tongji University)

Bringing together new materials and ‘good structural form’, “Fu Bridge” is a corrugated, cast concrete bridge assembled with the help of 3d-printed, reusable plastic formwork. In response to the workshop’s objective - that is, the robotic 3d printing of flat sheets to form an efficient, compression-only, doubly-curved structure - a “folded” bridge is designed and fabricated by corrugating locally planarized, 3d-print ready sheets that describes the original form-found geometry. the creases help the plastic gain stiffness and structural depth, bearing the load of the first layer of concrete.

The initial studies and concept for the pavilion included a series of bounded forms that support one another, creating a set of co-dependent structures. These studies all deployed Rhinovault and Compass Pattern as refined design tools that can closely approximate a plan as an input. Thus, a site-specific proposal at Arch-Union Architects’ office space was transformed into a bridge over a small pond within the studio. After refining the technique of constructing structural patterns in plan to reach a greater structural stability, the vault could closely approximate the required width of each spanning member while also keeping the support locations based on the available space next to the pond’s ledge.
1. Original geometry
2. Depth (global evolutionary) [0.22 m, 0.31 m]
3. Pattern 1 (global evolutionary)
4. Pattern 2 (local quadratic)

(Top, Left) Conceptual plan (by team members)
(Top, Right) Conceptual form-finding (by team members)

(Top, Middle) Process analysis (teamwork product)
(Middle) Form-finding diagrams
(Bottom) Optimization (by team members)

1. Pattern generation
2. Form-finding
3. Discretization
4. Planarization
5. 3D print path generation

Initial height: 1.00 m
height: 1.40 m
height: 2.00 m
Final

1. 1500 500 6000 2000 2000 2000
Conceptual plan (by team members)
(Top, Left)

Conceptual form-finding (by team members)
(Top, Right)

Process analysis (teamwork product)
(Top, Middle)

Form-finding diagrams
(Middle)

Optimization (by team members)
(Bottom)

Forces
Concrete shell
Concrete folds with rebar
3D printed truss
3D printed combs
Ideal geometry (fold centerline)
Supports

GRC
Metal
Wire mesh
Joint ties
GRC
Rebar
Glass fiber
GRC
PLA

(Top, Left) Assembly parts
(Top, Right) Section detail
(by team members)
(Middle) Site plan (by team members)
(Middle-Bottom, Left) Prototype 1 (teamwork product)
(Middle-Bottom, Middle) Design iteration 2-Support combs for Prototype 2 (teamwork product)
(Middle-Bottom, Right) Design iteration 2-Failure parts (teamwork product)
(Bottom, Left) Load testing of final prototype (teamwork product)
(Bottom, Right) In-situ assembly of final prototype (teamwork product)
‘Functional Gradated Interfaces’ is a system of architectured materials that are designed to perform in an extraordinary way. Geometric and material properties are used in parallel to tune the instabilities of nodal structures (auxetic and non-auxetic) in order to analog-program their behavior. Building on the research of auxetic surfaces the proposal aims to test how material gradients may add new opportunities on the tunability of responsive structures.

In order to test the effects that porosity, material composition and geometry have on the material behavior of an element, a series of pucks is designed presenting a variety of twelve different combinations of these variables. The shuffleboard is used as a test bed to evaluate their performance. The project focuses on one application - a helmet for the urban commuter - and leads eventually, based on extensive market research, to the design and fabrication of the final prototype.
(Top, Left) Nodal Structures-Analog Programming
(teamwork product)
(Middle, Left-Middle) Pattern Generation (teamwork product)
(Top, Middle-Right) Tunable Multi-directional Damping-Porosity and Material Gradient (teamwork product)
(Middle, Right) Analog Programming and Back-balance-Multi-material 3D Printing (teamwork product)
(Bottom) Final Prototype
Paint-it

Massachusetts Institute of Technology
course: Material Interfaces for User-Centered Design
project type: academic (Architecture-Prototyping-User testing)
work type: individual work
year: February 2019
instructors: Maroula Bacharidou

The project approaches privacy in the lens of affordances as an analog generative experiment initiated by the user. Based on the patterns the distribution of ferrofluid inside a screen box triggers, it aims for three types of affordances: readability, transformability, and tactile-ability. Via material testing two main challenges are overcome: the substances’ uniform distribution in the screen box for a specific amount of time and their stainless interaction. One out of the four different material combinations tested - water, ferrofluid, and soap - reached the aimed results.

To control ferrofluid’s ionized behavior a rule-based system is designed, bringing the screen to a transparent, an intermediate, and an opaque state. Ferrofluid stays in each state as long as the correct magnet combination is reached. With four magnetic buttons of opposite polarity initially placed inside four sets of slots on each corner of the box, transparency is the default state. Six etched “on/off” symbols matching the ones on the magnetic buttons is designed on the screen, triggering the user’s interaction with it and the in-between state. The total opaqueness is reached once the magnets are back to their original position.
Thank you