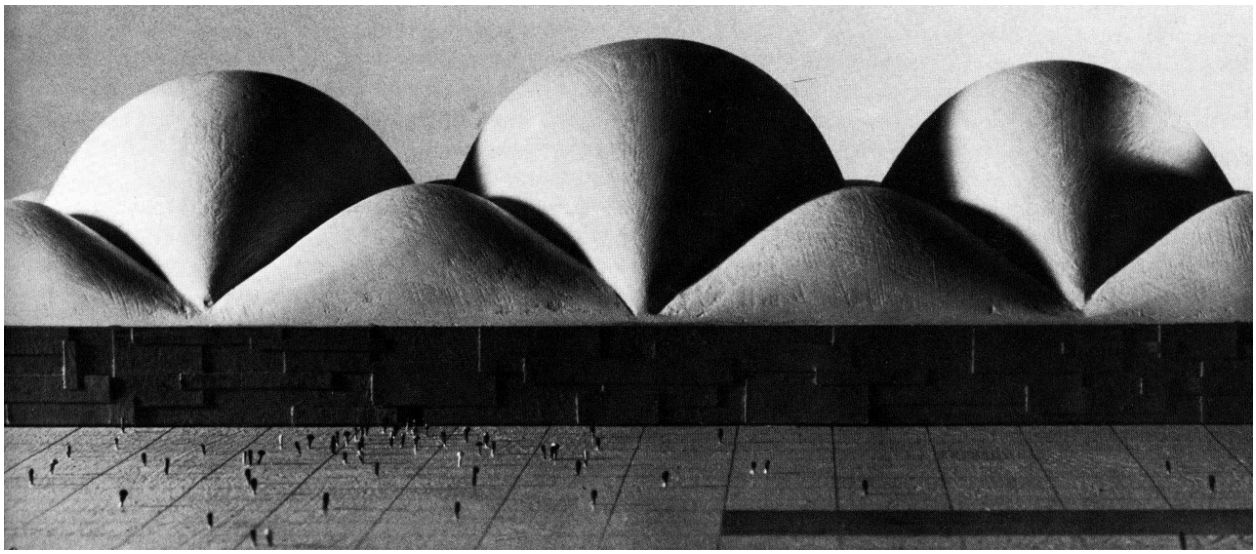
YONSEI STUDIO-X (Architectural Design Studio 4&6)

Unit 7 by Dae Song Lee

Digital Form Finding - Computational Morphology



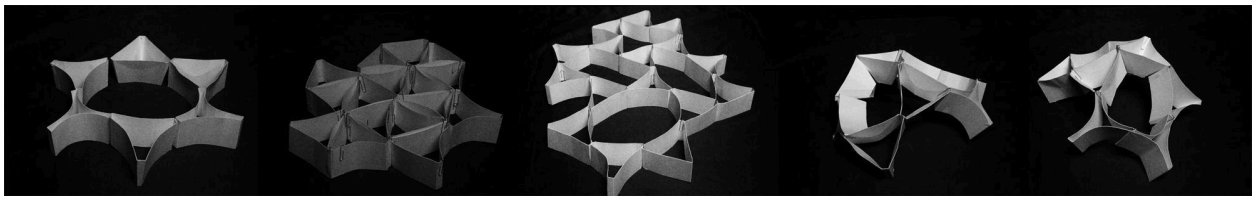
Frei Otto, Pneumatic Model Study for a Festival Hall Set on a Rectangular Superstructure

Unit Master:

이대송 Dae Song Lee AA Dipl PgDip ARB/RIBA // 영국왕립 건축사이고 설치 작가이며 현재 연세대학교 건축과 부교수로 활동하고 있다. 스스로를 신물질론자(New Materialist)로 선언한 이후, Material System과 Computational Being에 대한 실험과 연구를 하는 Design System Lab을 설립하고 운영중이다. DSL은 컴퓨터 프로세스와 디지털 제조를 기반으로 하는 제네러티브 디자인을 실험 연구하고 있다. 연구실의 창발과 어셈블리지 이론의 중요한 가이드라인과 철학적 배경으로 신물진론(New Materialism)을 근거로 하고 있다. 최근에는 단순한 원리에서 나오는 스마트한 현상에 관한 연구에 몰두하고 있으며 그의 작업은 2004년부터 한국과 북,중미 유럽의 다양한 곳에 출판 전시 소개 되었다.

주요 연구분야는 다음과 같다.

컴퓨테이셔날 디자인 / 재료체계 / 디지털 제조 / 건축 철학



Unit Agenda:

주제 **/// Computational Morphology - Super Structure**

Unit7은 신물질론(New Materialism)의 존재론적 입장(Ontological Stance)에서 출발한다.

“모든 존재는 스스로 존재할 수 있는 능력이 있다**”**

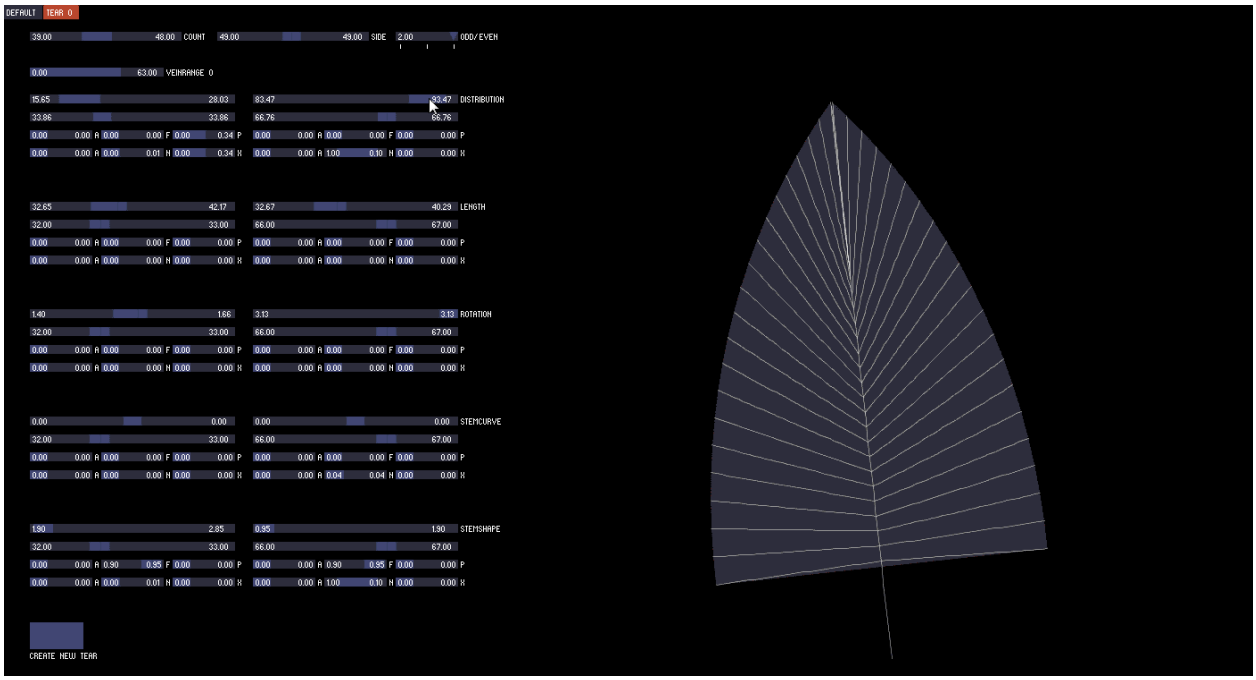
위의 고찰로 부터, 건축이란 존재를, 다양한 내-외부의 원리로 부터 스스로의 형태를 발현해 나가는 것으로 이해하고, 무수히 많은 가능성으로 열린 형태 실험으로 부터 건축이 가지는 여러 주제와 고민에 대응하는 노블-테크닉(Noble Technique) 혹은 스테이트 오브 아트(State of the Art)를 찾아 응용 하는 것을 목표로 한다.

그러므로 건축이 전통적으로 가져왔던 2가지 입장을 잠시 보류한다.

1)형이상학적 형태논리로 부터의 결별
2)경험적 노스탤지아 로부터의 결별

위 두가지 입장을 집행하는 기술적 혹은 이론적 방법론인 유형학 및 은유는 사용하지 않으며 대신 연구 대상의 체계와 현상을 디코딩(발현원리를 이해)하여 체계를 자신의 언어로 정의하는 방법을 사용한다.

이러한 활동은 연구 및 실험으로서 이해되고 누구나 이해 할수 있는 건축언어인 드로잉-다이어그램 등의 시각 이미지로 도큐멘테이션 되어야 하고, 축소 모형과 같은 물리적 재료로 들어내어야 한다.

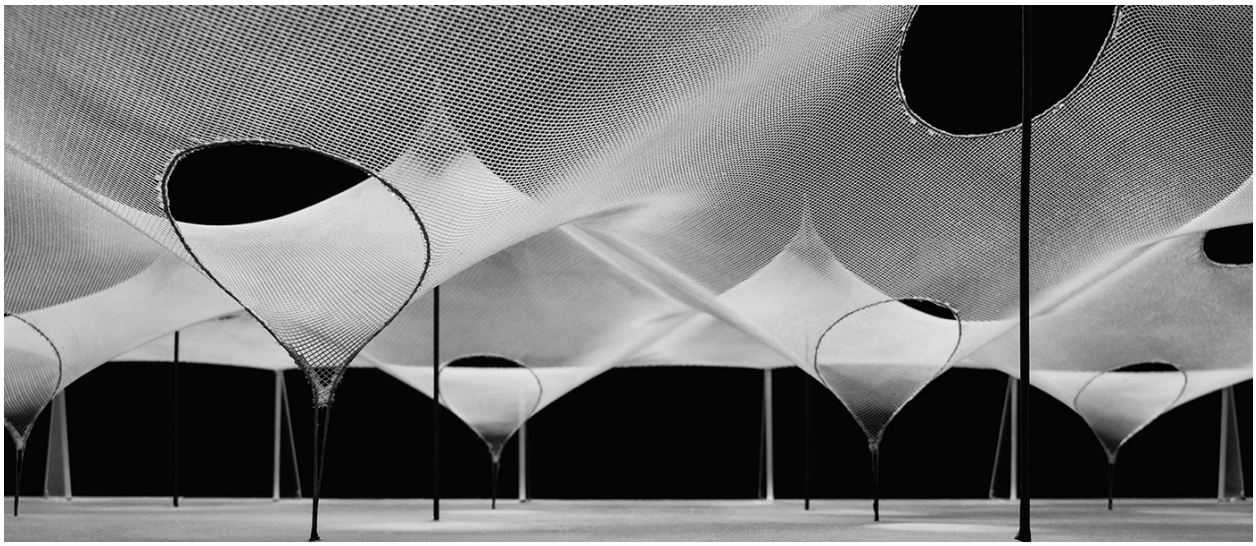


Reinoud van Laar, Fluid Leaves, http://reinoudvanlaar.nl/project/leavespattern/

Super Structure

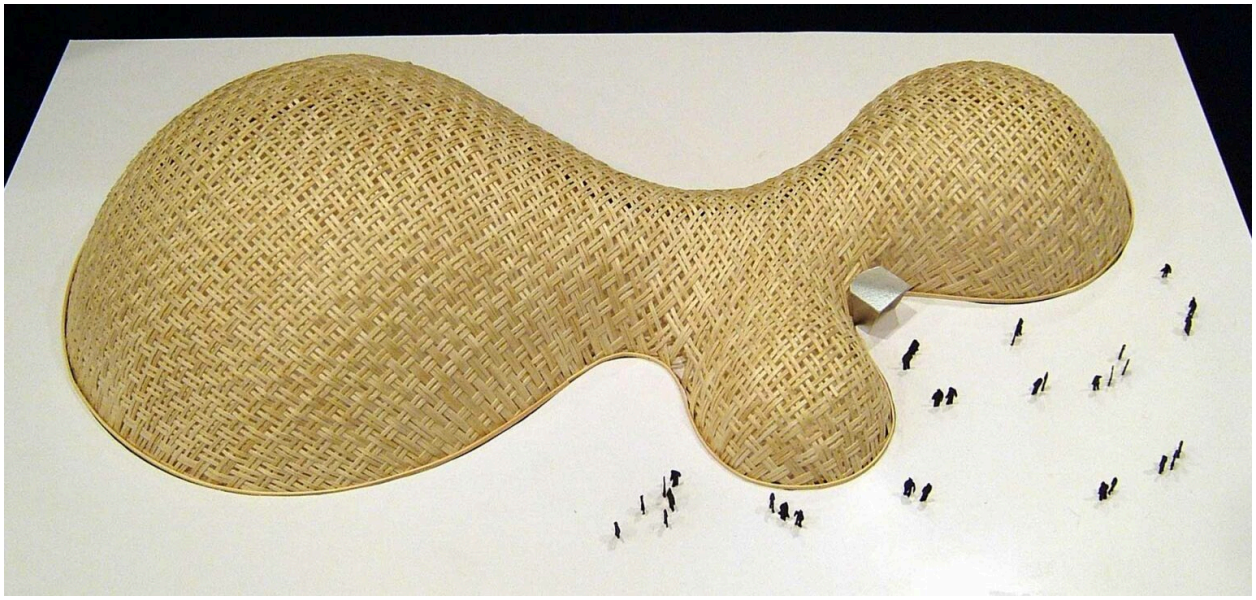
다양한 인간 문화 활동을 배경하는 플랫폼 건축으로서의 초구조를 탐구한다.

쇼핑(시장,상업), 여행(역사), 스포츠(경기장), 문화(미술,음악,공연), 교육(학교), 생산(농업,공업,유통), 여가(공원) 등의 다양한 인간의 활동 장(Field)로서의 건축을 연구하고 이들의 활동과 사용 그리고 공간의 조직등을 재 정의하고 건축의 시스템이 어떻게 대응하는지 혹은 새로운 건축의 시스템에 기존의 기능이 어떻게 조율되어야 하는지의 논쟁을 지적탐구의 대상으로 삼는다.



Frei Otto, *Form-finding study for the support of textile membranes and rope nets*

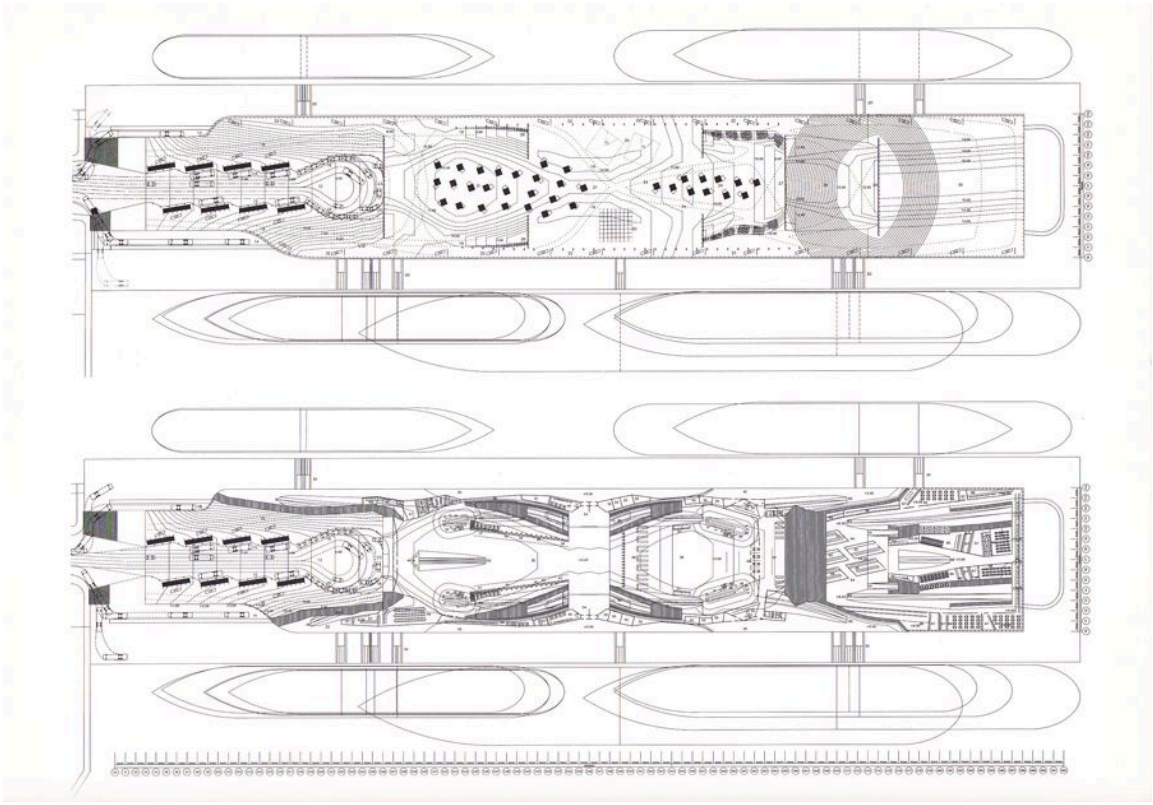
Foster + Partners, Mexico City International Airport



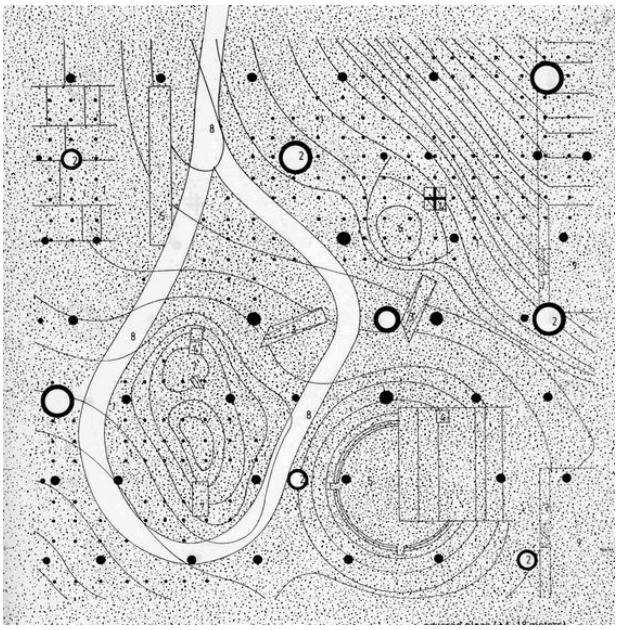
Shigeru Ban, Frei Otto Laboratory

Fields - Plan

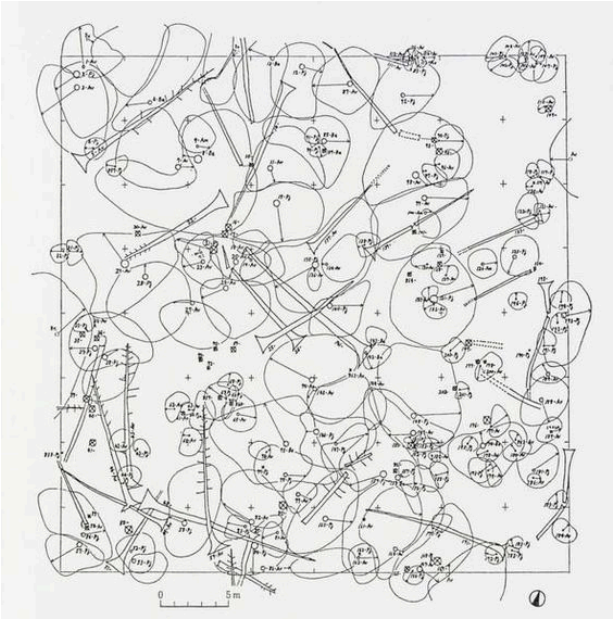
평면은 기계론적 우주를 혹은 불확정적 활동을 가능하게 하는 실제적인 공간이자 여러 사건 활동을 만들어내는 장-Field이다. 이는 Super-Structure와 서로 반응하여 제안 되어야 한다.



FOA, Yokohoma Port Terminal Plans



OMA agadir convention centre site plan



Junya Ishigami's Tree Canopy Projection

방법 **/// Proto-Architecture**

학기운영은 크게 중간, 기말고사를 기점으로 2개의 Phase로 나누어 진다. 간단히 요약하면 중간고사 까지는 연구와 실험을 통해 개발된, Proto-Architecture라 이름 붙인 다양한 가능성을 가지는 실험적 모델을 제시하고 이후 기말고사까지는 이를 자신이 선택한 혹은 주어진 건물에 적용시켜 최종 건축안을 완성하는 것으로 이루어진다.

프로토 아키텍처를 개발하기 위해 수만년동안 성취한 다양한 생물의 생존 전략 혹은 자연의 물리적 현상을 연구하고 이의 원리를 자신의 언어로 정리하여 설득력있는 재료체계로 만드는 탐구의 과정을 거친다.

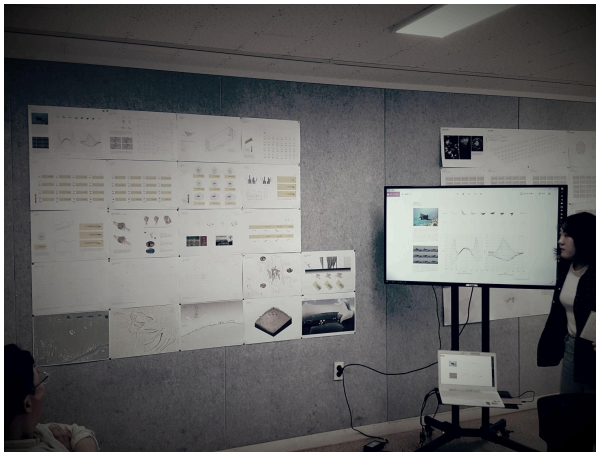
결과물 **/// Documentation, Model**

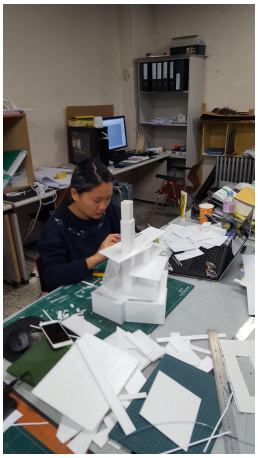
모델과 드로잉 같은 다양한 연구와 실험물들 그리고 이들로부터 정리된 도큐멘테이션, 최종 핀업과 발표

평가 ***///***

매주마다의 튜토리얼 동안 이루어지는 개인/전체 핀업과(발표) 그리고 매끄러운 Documentation, Principal Killer Drawing and Model의 수준으로 평가함.

SPC /// SPC01 - 건축과 과학기술 및 원리
SPC05 - 형태및공간구성
SPC11 - 연구기반종합설계
SPC12 - 구조원리





Book

강도의 과학과 잠재성의 철학

Performance-Oriented Architecture

Versatility and Vicissitude

Emergence : Morphogenetic Design Strategies

Morphogenetic Design : Techniques and Technologies

Emergent Technologies and Design : Towards a Biological Paradigm for Architecture

Material Synthesis

Material Computation

Computational Design Thinking

The Architecture of Emergence

Scripting Cultures

The New Mathematics of Architecture

Lecture

Manuel DeLanda

https://www.youtube.com/watch?v=50-d_J0hKz0&t=168s

https://www.youtube.com/watch?v=mZUotjDvJyM&list=PL44lVODthUCp7xNepXQ5NpCSHPpobEcpo

Achim Menges

https://www.youtube.com/watch?v=5Phrq6YAj8M

https://www.youtube.com/watch?v=PbgArau_4vI

Neri Oxman

https://www.youtube.com/watch?v=CVa_IZVzUoc&t=1s

https://www.youtube.com/watch?v=txl4QR0GDnU&t=10s

Frei Otto - Julian Lienhard

https://www.youtube.com/watch?v=cywoFHgVyhE

Gaudi - Mark Burry

https://www.youtube.com/watch?v=oiofvf_4EcY

https://www.youtube.com/watch?v=DKEhWLr9bsg&t=1382s

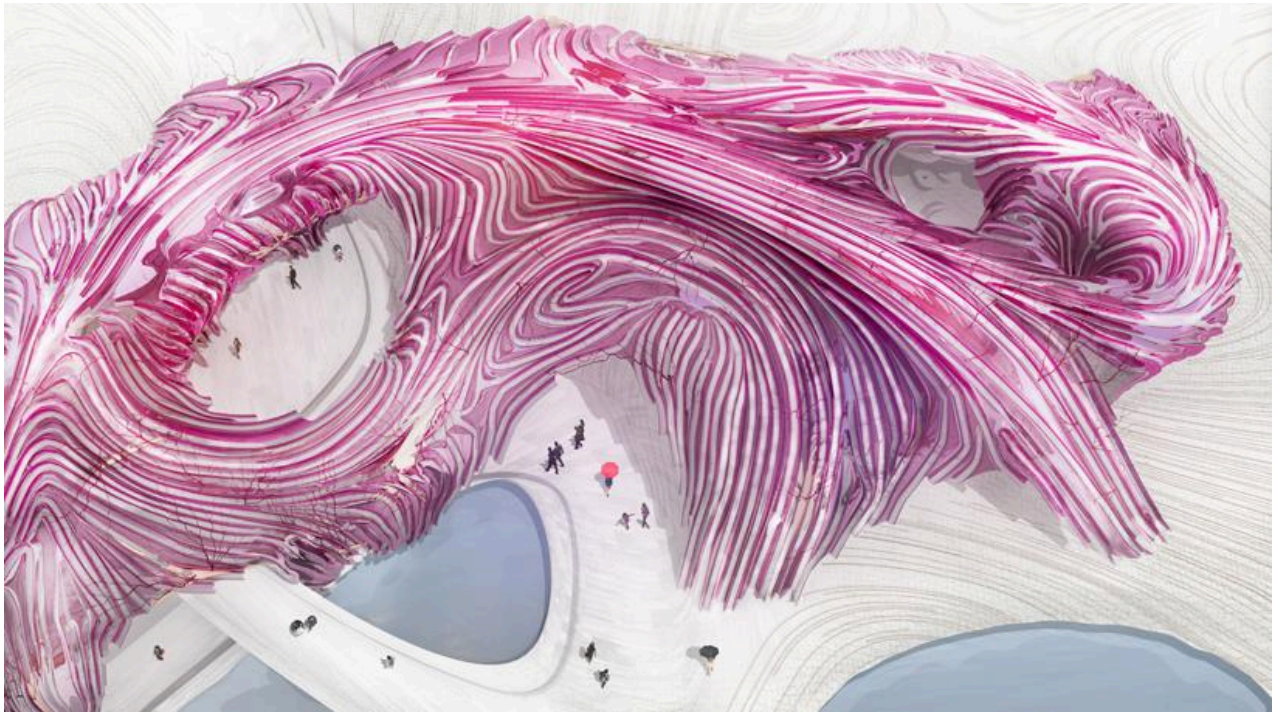
Chiris Williams

https://www.youtube.com/watch?v=BkbPtzRfEB0

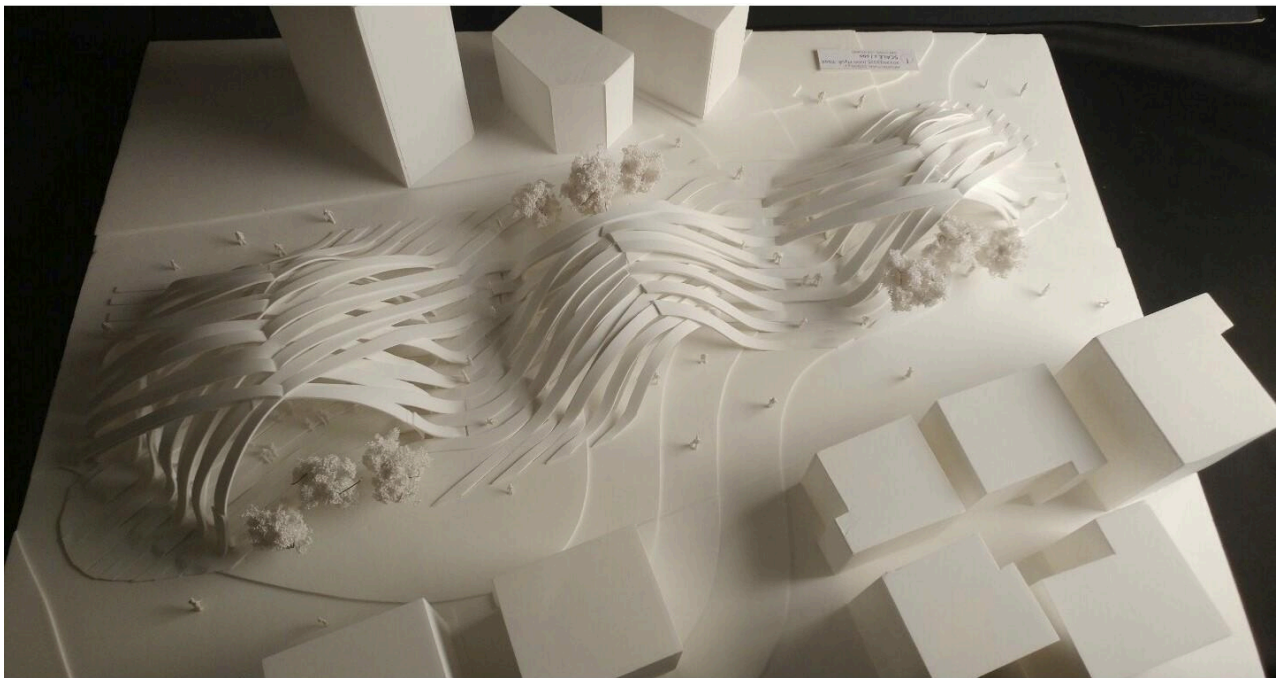
Phillipe Block

https://vimeo.com/243893939

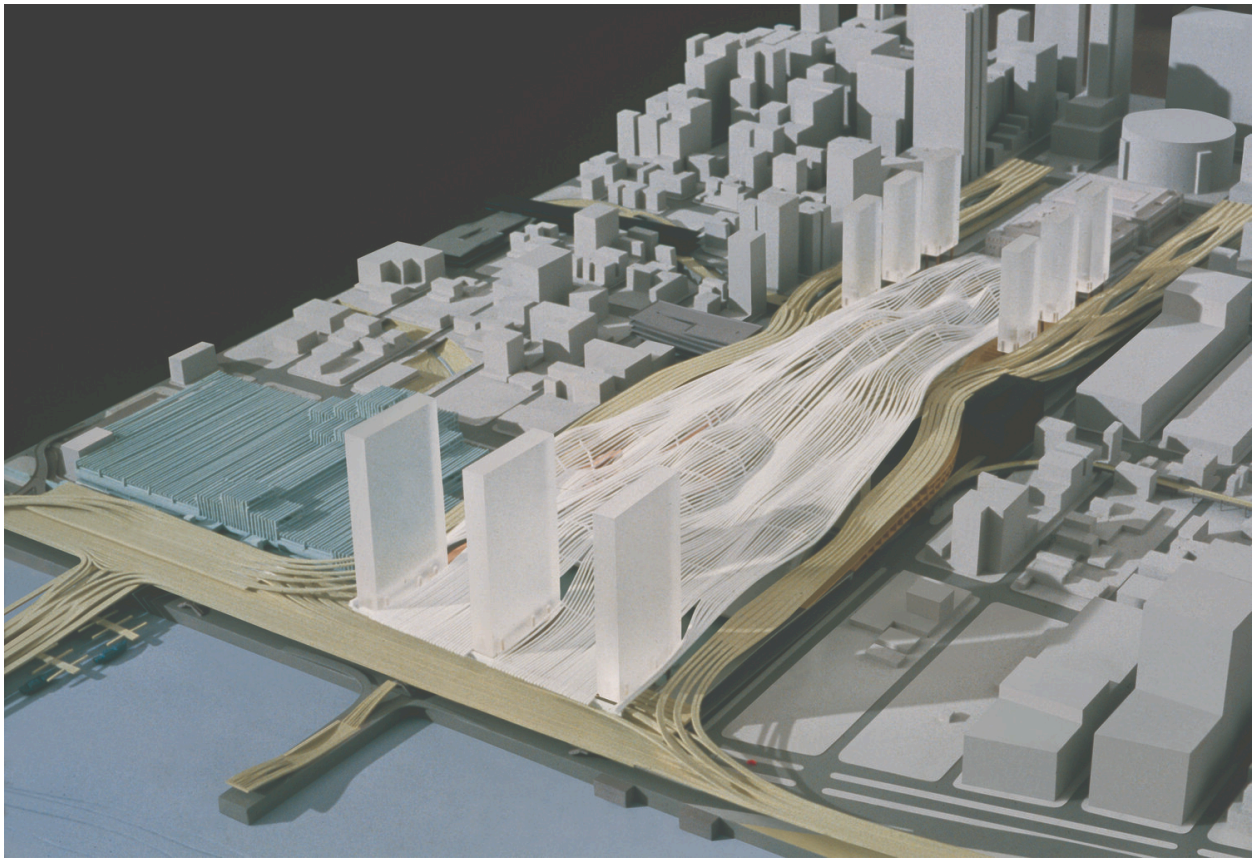
https://www.youtube.com/watch?v=fzJ4LVuTZKE

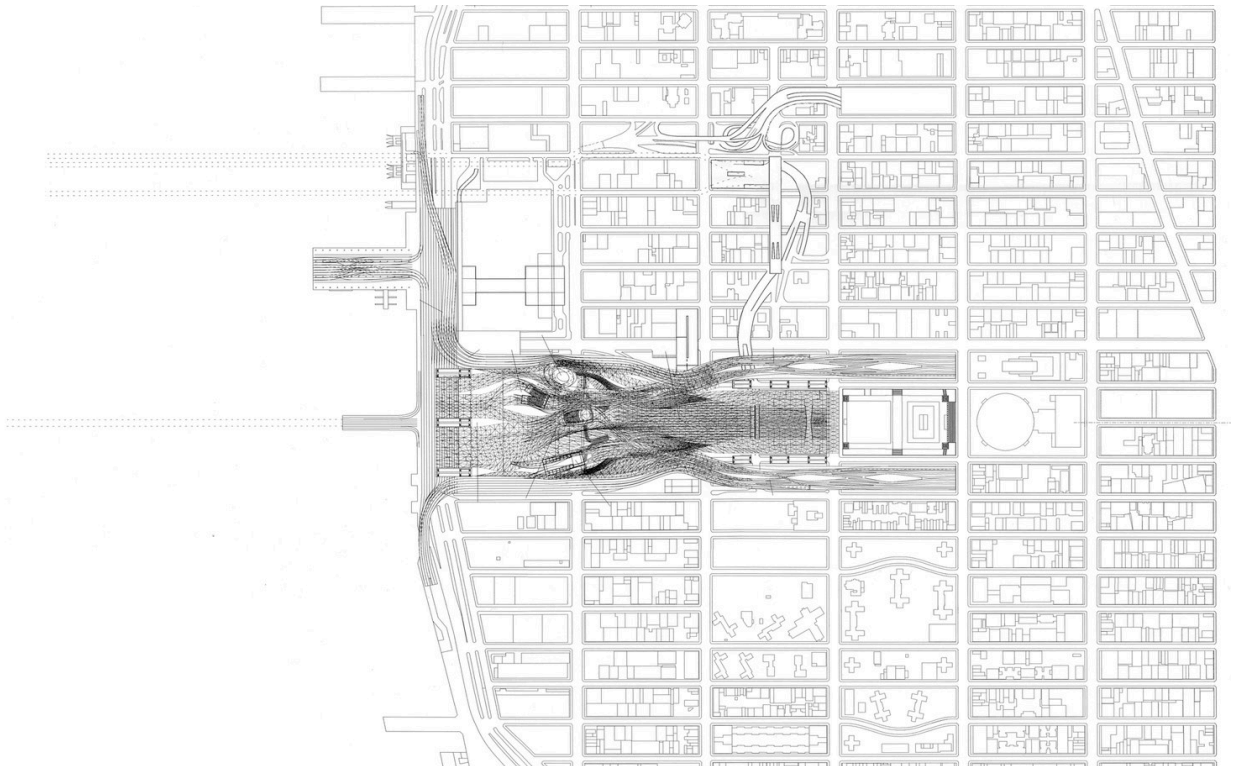


thinktank and the life aquatech: water generative design



Jun Hyuk Yoon, Noise Free Out door space in Hongdae, 2016



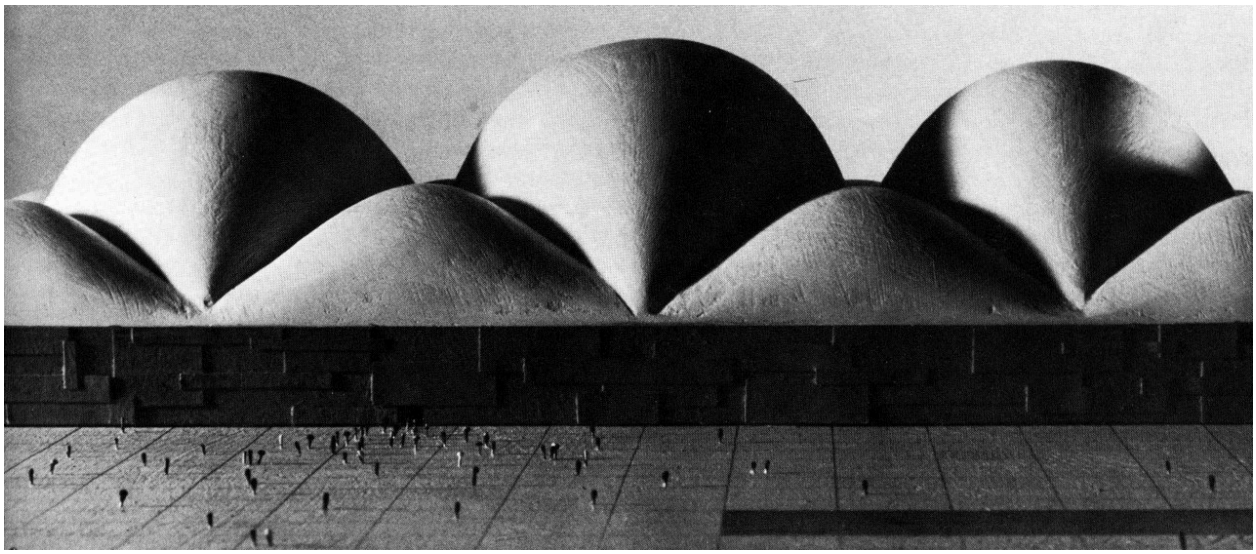


Reiser+Umemoto,West Side Convergence

YONSEI STUDIO-X (Architectural Design Studio 4&6)

Unit 7 by Dae Song Lee

Digital Form Finding - Computational Morphology

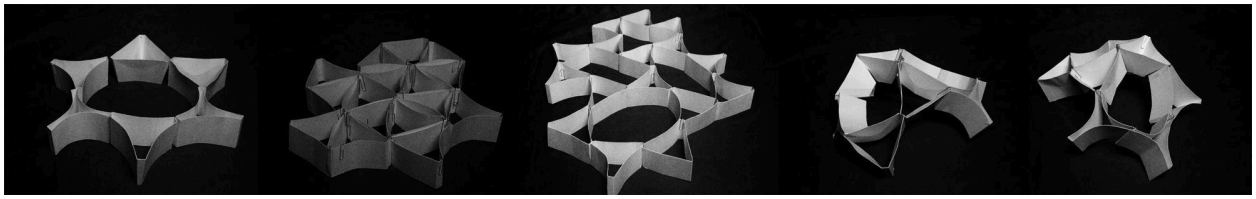


Frei Otto, Pneumatic Model Study for a Festival Hall Set on a Rectangular Superstructure

Unit Master:

Dae Song Lee AA Dipl PgDip ARB/RIBA is a Royal Institute of British Architects (RIBA) certified architect and installation artist, currently serving as an associate professor in the Department of Architecture at Yonsei University. After declaring himself a New Materialist, he founded and operates the Design System Lab (DSL), where he experiments and researches Material Systems and Computational Being. DSL focuses on generative design, based on computer processes and digital fabrication. The lab's emergent and assemblage theories are grounded in New Materialism, providing crucial guidelines and philosophical background for its work. Recently, he has been dedicated to researching intelligent phenomena derived from simple principles. His works have been published, exhibited, and introduced in various locations across Korea, North and Central America, and Europe since 2004.

His primary research areas include:.
Computational Design / Material Systems / Digital Fabrication / Philosophy of Architecture



Unit Agenda:

주제 ***///*** **Computational Morphology - Super Structure**

Unit7 starts from the ontological stance of New Materialism, which asserts that

"Everything has the capacity to exist on its own."

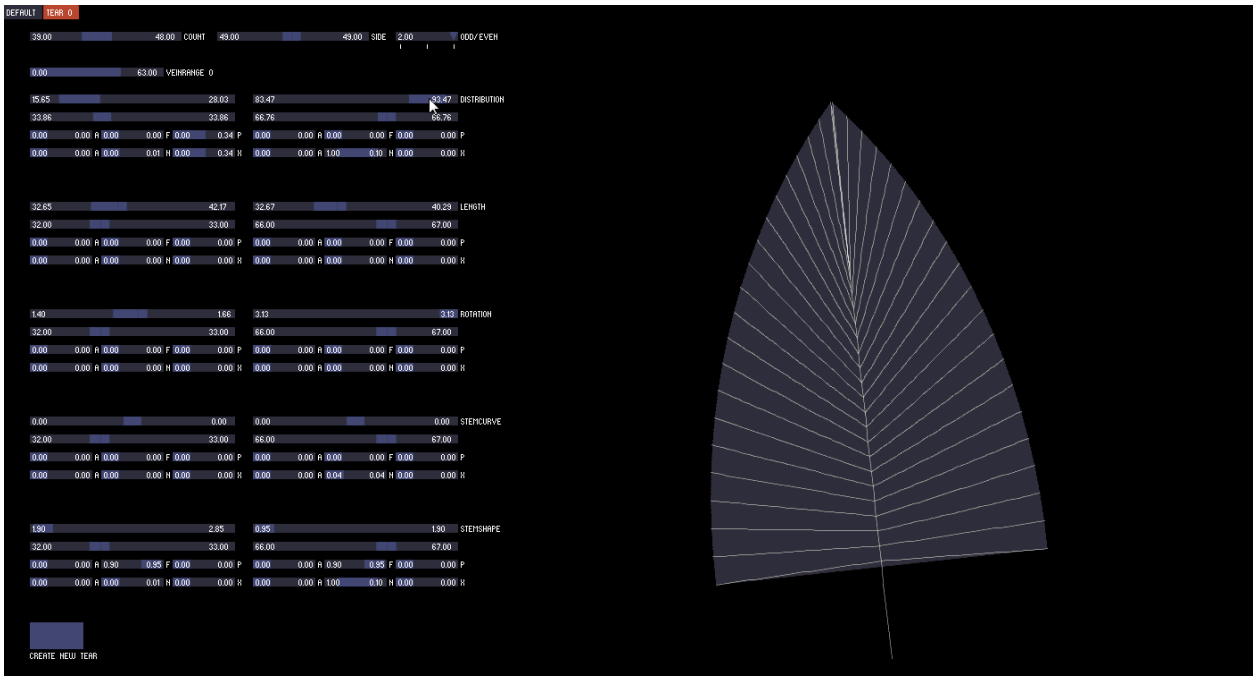
From this perspective, architecture is understood as an entity that manifests its form from various internal and external principles, evolving autonomously. The aim is to explore architecture through open-ended formal experiments, investigating myriad possibilities to discover and apply Noble Techniques or the State of the Art, addressing architectural themes and challenges.

Thus, two traditional architectural stances are temporarily suspended:

1) A departure from metaphysical formal logic
2) A departure from empirical nostalgia

Typology and metaphor, which are the technical or theoretical methodologies that enforce these two positions, are not used. Instead, the approach involves decoding (understanding the principles of emergence) the systems and phenomena of the research subject, defining the system in one's own language.

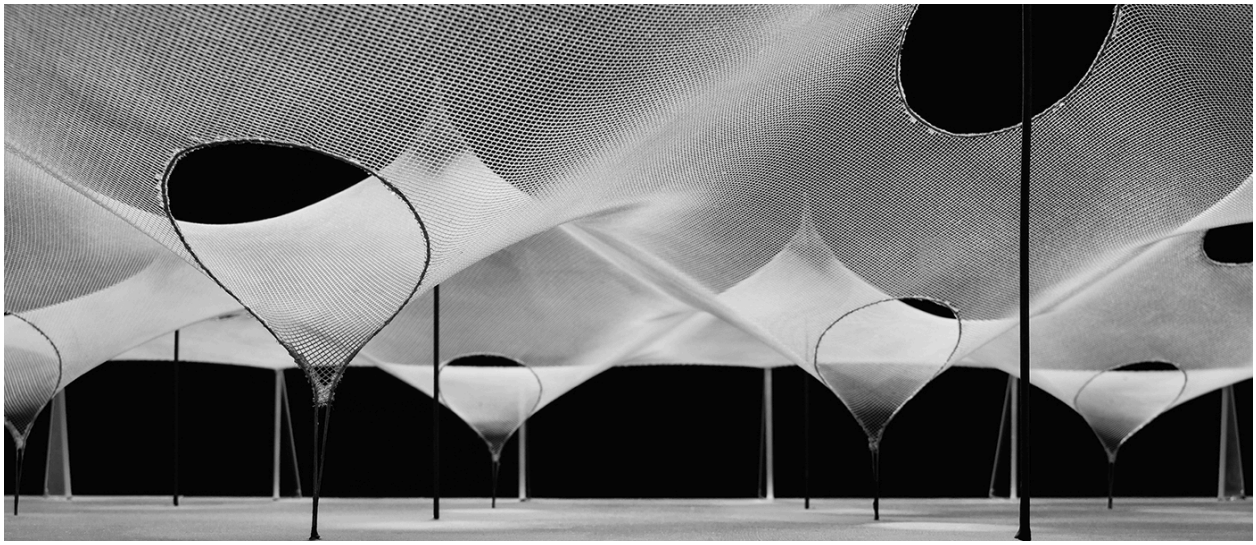
These activities are understood as research and experimentation and must be documented through visual images, such as drawings and diagrams, which can be universally understood as architectural language. Additionally, the research should be revealed through physical materials, such as scaled models.



Reinoud van Laar, Fluid Leaves, http://reinoudvanlaar.nl/project/leavespattern/

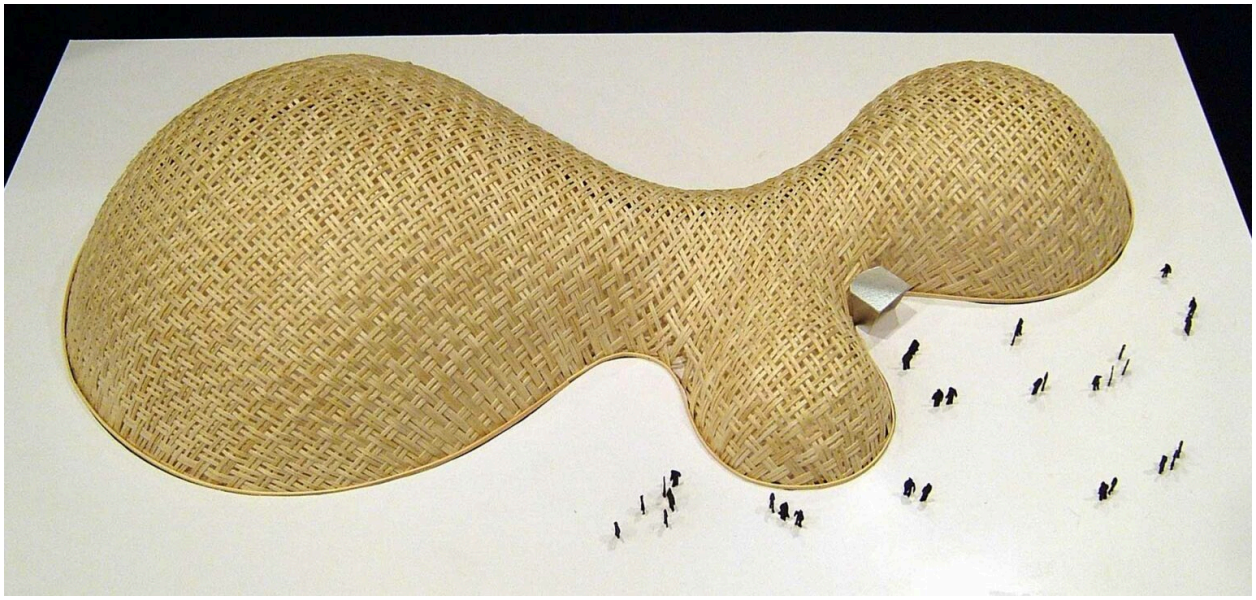
Super Structure

The exploration focuses on megastructures as platforms for various human cultural activities. It investigates architecture as fields for human activities such as shopping (markets, commerce), travel (transportation hubs), sports (stadiums), culture (art, music, performance), education (schools), production (agriculture, industry, distribution), and leisure (parks). The research aims to redefine the activities, usage, and spatial organization of these fields and critically examine how architectural systems respond to them. Additionally, it seeks to explore how existing functions should be adapted or coordinated within new architectural systems, making this discourse a subject of intellectual inquiry.



Frei Otto, *Form-finding study for the support of textile membranes and rope nets*

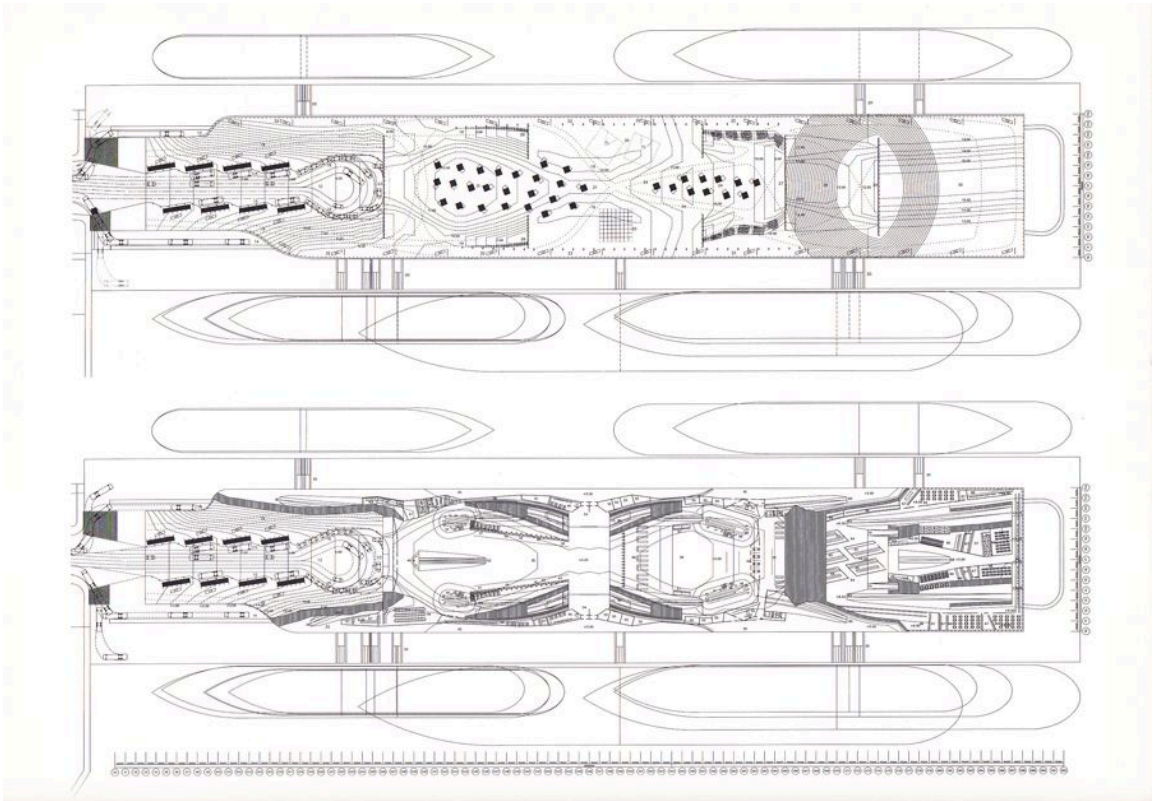
Foster + Partners, Mexico City International Airport



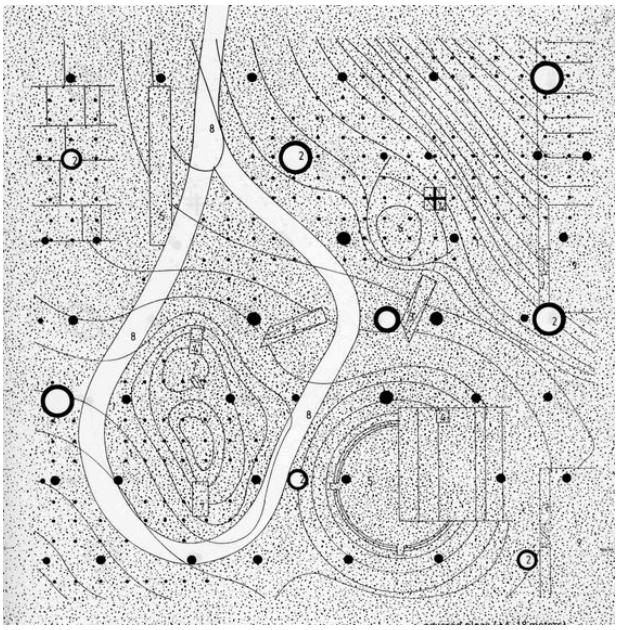
Shigeru Ban, Frei Otto Laboratory

Fields - Plan

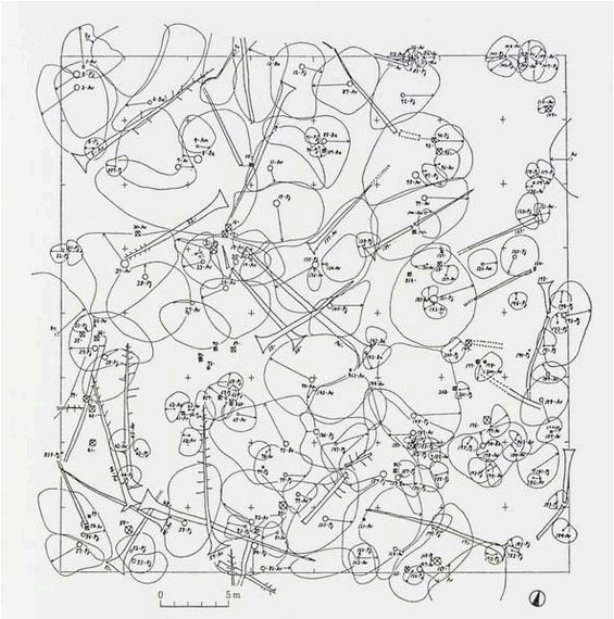
The plan is a tangible space that enables both a mechanistic universe and indeterminate activities, serving as a field that generates various events and actions. It must be proposed in interaction with the Super-Structure.



FOA, Yokohoma Port Terminal Plans



OMA agadir convention centre site plan



Junya Ishigami's Tree Canopy Projection

Method /// Proto-Architecture

The course is divided into two phases, marked by the midterm and final exams. In summary, by midterm, students present experimental models with various possibilities, referred to as "Proto-Architecture," developed through research and experimentation. Afterward, until the final exam, they apply these models to a chosen or assigned building, completing the final architectural proposal.

To develop Proto-Architecture, students research various survival strategies of living organisms and physical phenomena in nature that have been accomplished over millennia. They then go through a process of interpreting these principles in their own language, transforming them into a persuasive material system.

Final Submission /// Documentation, Model

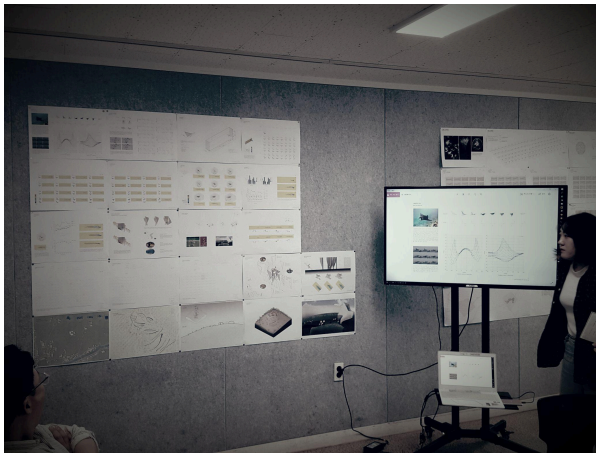
The outcomes include various research and experimental materials such as models and drawings, as well as the organized documentation derived from them. The final pin-up and presentation will showcase these efforts.

Evaluation ///

Assessment is based on weekly individual and group pin-ups (presentations) during tutorials, along with the quality of the documentation, Principal Killer Drawing, and the model.

SPC (Student Performance Criteria) ///
SPC01: Architecture and Scientific Technology and Principles
SPC05: Form and Spatial Organization
SPC11: Research-Based Comprehensive Design

SPC12: Structural Principles



Book

intensive science & virtual philosophy
Performance-Oriented Architecture
Versatility and Vicissitude
Emergence : Morphogenetic Design Strategies
Morphogenetic Design : Techniques and Technologies
Emergent Technologies and Design : Towards a Biological Paradigm for Architecture
Material Synthesis
Material Computation
Computational Design Thinking
The Architecture of Emergence
Scripting Cultures
The New Mathematics of Architecture

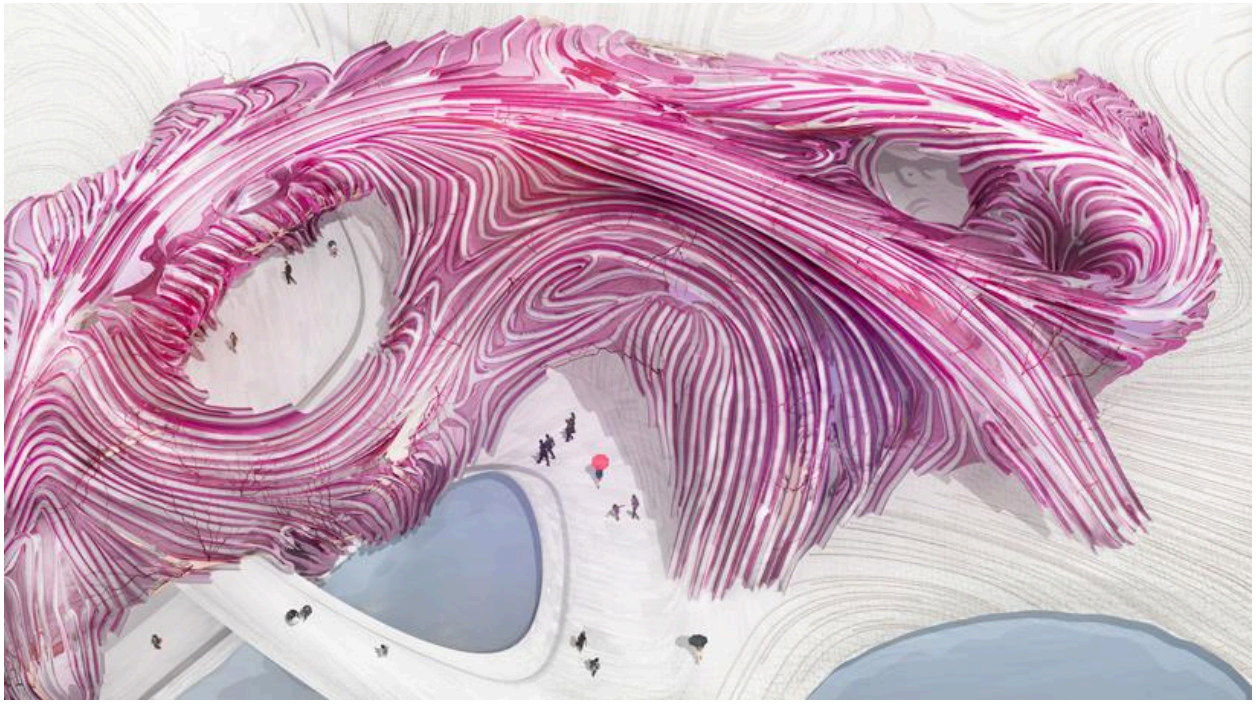
Lecture

Manuel DeLanda
https://www.youtube.com/watch?v=50-d_J0hKz0&t=168s
https://www.youtube.com/watch?v=mZUotjDvJyM&list=PL44lVODthUCp7xNepXQ5NpCSHPpobEcpo
Achim Menges
https://www.youtube.com/watch?v=5Phrq6YAj8M
https://www.youtube.com/watch?v=PbgArau_4vI
Neri Oxman
https://www.youtube.com/watch?v=CVa_IZVzUoc&t=1s
https://www.youtube.com/watch?v=txl4QR0GDnU&t=10s
Frei Otto - Julian Lienhard
https://www.youtube.com/watch?v=cywoFHgVyhE
Gaudi - Mark Burry
https://www.youtube.com/watch?v=oiofvf_4EcY
https://www.youtube.com/watch?v=DKEhWLr9bsg&t=1382s
Chiris Williams
https://www.youtube.com/watch?v=BkbPtzRfEB0

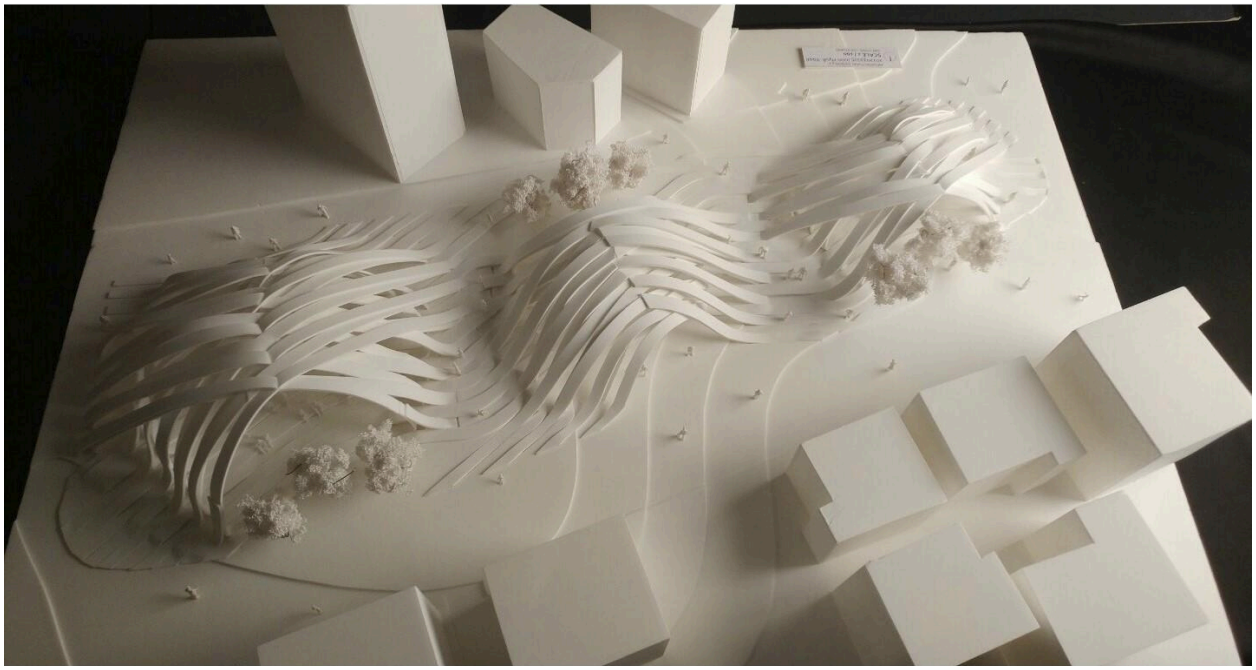
Phillipe Block

https://vimeo.com/243893939

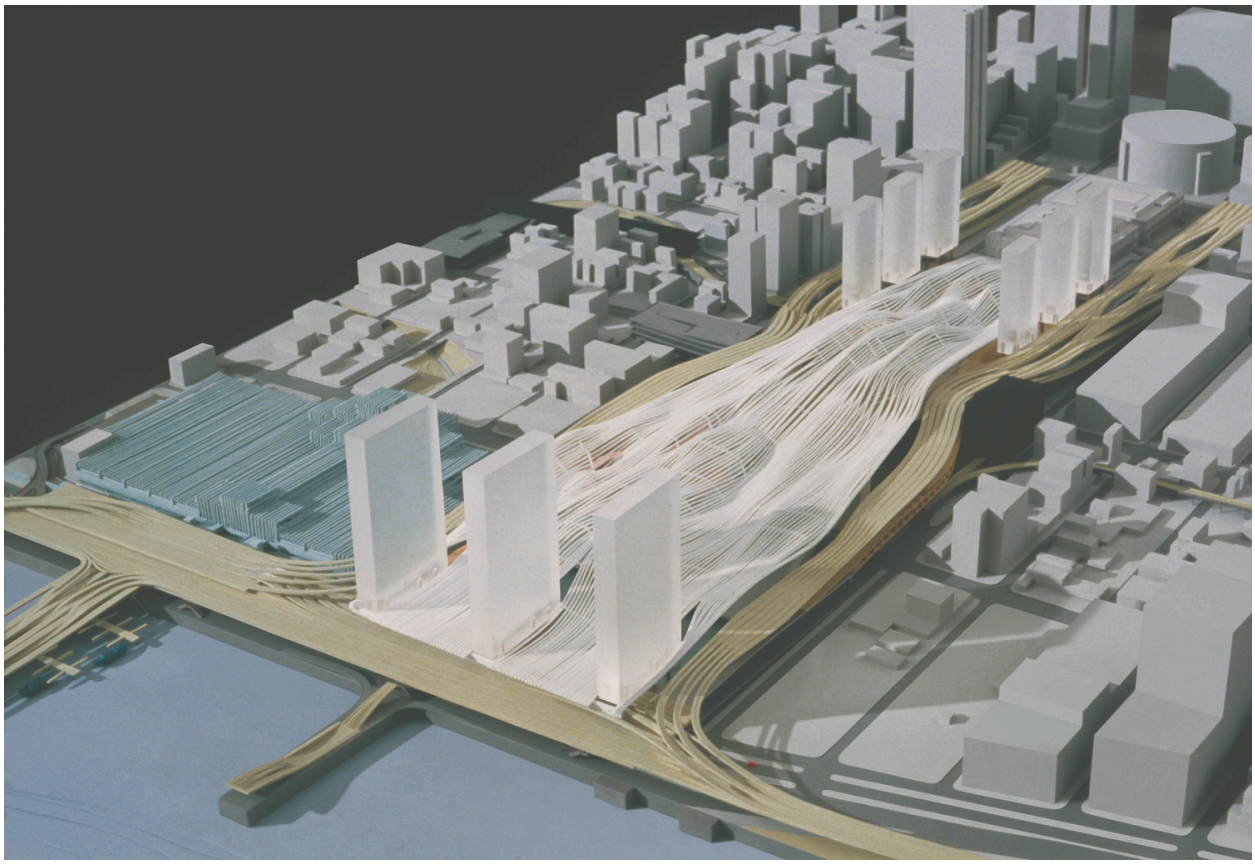
https://www.youtube.com/watch?v=fzJ4LVuTZKE

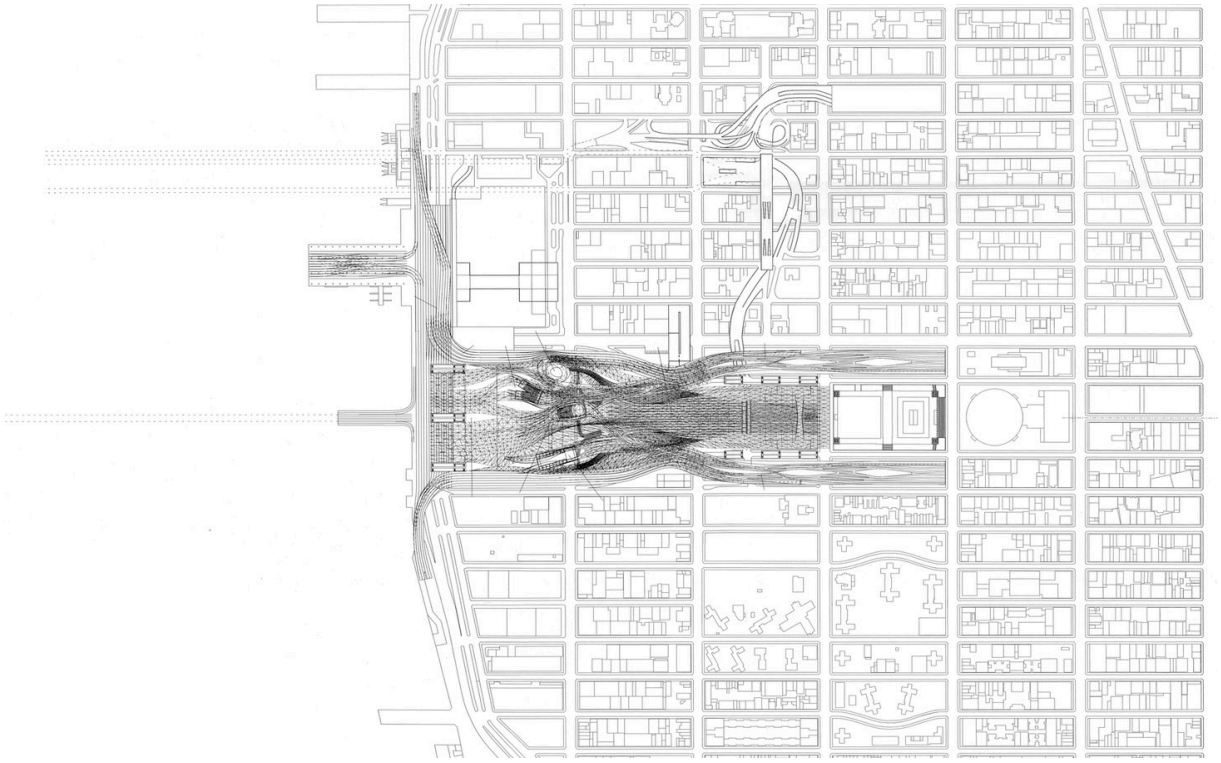


thinktank and the life aquatech: water generative design



Jun Hyuk Yoon, Noise Free Out door space in Hongdae, 2016





Reiser+Umemoto,West Side Convergence