

**Biomimicry Research Center**

**By  
Mahmudul Islam Chowdhury**

**Submitted in partial fulfillment of the requirements  
for the degree of bachelor of architecture  
Department of Architecture  
BRAC University  
Fall 2013**

## **Acknowledgement**

This project is dedicated to my mother who always believed in me.

A team was formed to carry out different tasks in the project.

### **Team**

RubaiyaNasrin  
MarziaHasan  
Mazharul Haque Tonmoy  
ShahriazAlam  
Nazeem Anwar  
Tanvir Ahmed Tousib  
Tashrifa  
Mala Malobika  
Adiba  
Bidoura Mosharraf  
Mushda  
Monica  
AsifIqbalAontu

Seniors also as Alma's

### **Supporting Seniors**

DhruboAntor  
Kallyan Islam  
Rubaiyat Ur Rahman  
Fahim Mostafa  
Shubho  
Tonu  
RaiyanulMomin

Professors who provided guidance

### **Mentors**

Ar.AKMShirajuddinRazu  
Ar.MahmudUnNobi  
Ar.ShimulShakil  
Ar.AtiqurRahman  
Ar.FuadMallick  
Ar.Megna  
Ar. IshratHossian

## **Table of Contents:**

### **1. Background of the project**

- 1.1 Introduction
- 1.2 Project Brief
- 1.3 Background of the project
- 1.4 Rationale of the project

### **2. Site appraisal**

- 2.1 Location of the site
- 2.2 Site and surrounding
- 2.3 Environmental consideration
- 2.4 Climatic consideration
- 2.5 SWOT Analysis
  - i. Potential
  - ii. Limitation
  - iii. Opportunity
  - iv. Problem
- 2.6 Functional Development
- 2.7 Current site activities
- 2.8 Views at the site

### **3. Literature Review**

- 3.1 Books
- 3.2 Journals
- 3.3 Thesis Papers

### **4. Case Study**

- 4.1 Introduction

4.2 Cases

4.3 Conclusion

## **5. Program Developments**

5.1 Rational of the Program

5.2 Problem Derivation

5.3 Program with area required

5.4 Volumetric analysis

## **6. Project Development**

5.1 Introduction

5.2 Development phase - I

5.3 Development phase - II

5.4 Development phase – III

## **7. Final Design**

7.1 Plans

7.2 Sections

7.3 Material Details

7.4 Landscape Details

7.5Photomontage

7.6 Rendered images

7.8 Model images

**Conclusion**

**Reference**

## **Chapter 1 : Background of the project**

- 1.1 Introduction
- 1.2 Project Brief
- 1.3 background of the project
- 1.4 Rationale of the project
- 1.5 Reasons for choosing the site

## Chapter 1 : Background of the project

### 1.1 Introduction

Biomimicry is a radically new technological concept that not only reexamines our relationship to nature, but also acts in a partnership with it. The guiding premise underlying its development is that nature can be seen as more than just a resource available for material exploitation. Rather, nature offers conceptual resources for design, production, and closed loop sustainable system building. Biomimicry is a way of recreating the processes and designs of nature through human technology so we are working with rather than against the natural world. This new development in technology and natural science goes directly against centuries of scientific thinking about nature and technology. I want to contrast this new relationship to nature with the traditional view of the natural world, as well as demonstrate how there is a long philosophical tradition within which we can best understand this new development. The purpose of this thesis is thus to contextualize this new technology, provide a philosophical foundation for it, and to show its relationship to an established tradition of natural philosophy. Examining the relationship human beings have toward the natural world will lead to the understanding of how our praxis, most clearly seen through our technologies, is determined by our self-understanding. This self-understanding is in turn dependent on, and developed from, the relationship between human cognitive development and the natural environment. In other words, our relationship to nature, our actions and technologies, as well as our self-understanding are in a dialectical relationship with one another. It is taken to be the case that our theories, through praxis, correspond and direct our actions in the world as well as our technologies. Technological development is the specific component of praxis that I intend to examine. Biomimicry then, just like the technologies antecedent to it, expresses a specific understanding of human beings and the environment.

## **1.2 Project Brief**

Bio mimicry is a technological approach to engaging with the natural world which looks to nature as an intellectual source to solve human problems. The current problems of environmental degradation and the challenges of long-term sustainable production have given rise to the practice of bio mimicry. This new form of technologically engaging with the world is reflective of a certain relationship between self and object.

## **1.3 Background of the project**

Often design inspirations are derived from an organic existence and later accustomed to the requirements of the end product. Therefore, there is a need of a space/research/institute/center, where the creative sectors of different design disciplines can carry out the observation and research

## **1.4 Rationale of the project**

Sustainability- “ what will be has always been” we often visit abundant sites and natural locations to gather solutions to the problems Following the capitalism & knowledge from nature. A the most successful and sustainable idea has been derived from organic matters. It is put under observation that Bangladesh is developing country. Where it is least affected by commercialism and other mainstream culture. Therefore such an institute/research center may lead the growth of the country towards a sustainable path.

## **Chapter 2 Site appraisal**

- 2.1 Location of the site
- 2.2 Site and surrounding
- 2.3 Environmental consideration
  - I. Prevailing Breeze, Views, Pedestrian
- 2.4 Climatic consideration
- 2.5 SWOT Analysis
  - I. Potential
  - II. Limitation
  - III. Opportunity
  - IV. Problem
- 2.6 Current site activities
- 2.7 Views of the site and surroundings



## **Chapter 2 Site appraisal**

### **2.1 Location of the site**

Location: Agargaon, Sher- e Banglanagar, Dhaka, Bangladesh

Site Area: 6.5 Acre

Plot no: D-30

Altitude: 9m From sea level



Source: Google Earth

The site for Biomimicry Research center is place in Agargaon, Sher- e Banglanagar. It is located on a secondary road opposite of Islamic Foundation

## 2.2 Site and surrounding



Panoramic view of the site

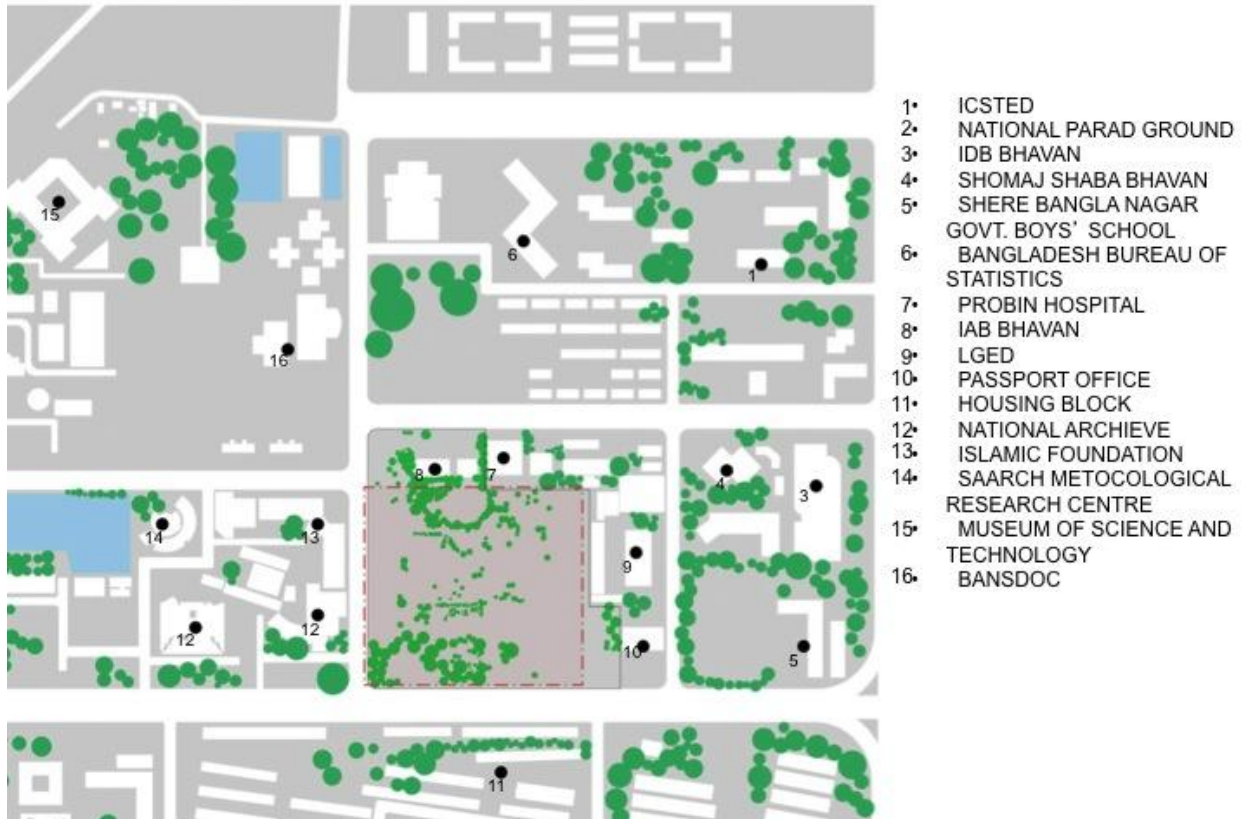


Panoramic view of the site inside

Currently occupied with illegal build slums, tea stalls, temporary Bus stand, and a portion of it used by the police. Maximum land area is now marshy low lying vacant land

## 2.3 Environmental consideration

I. Prevailing Breeze, Permeable green, Existing Trees, Traffic movement.



Site force map





Wind Analysis map



#### TRAFFIC

- 1 ATTACHED SIDEWALKS FOR BOTH PEDESTRIAN AND BICYCLE
- 2 NARROW SIDEWALKS
- 3 ATTACHED SIDEWALKS FOR BOTH PEDESTRIAN AND BICYCLE
- 4 LANDSCAPE WITH PEDESTRIAN ACCESS

RICKSHAW LANE  
 PEDESTRIAN ACCESS  
 BUS AND TEMPOO LANE  
 SITE AREA

Traffic Map

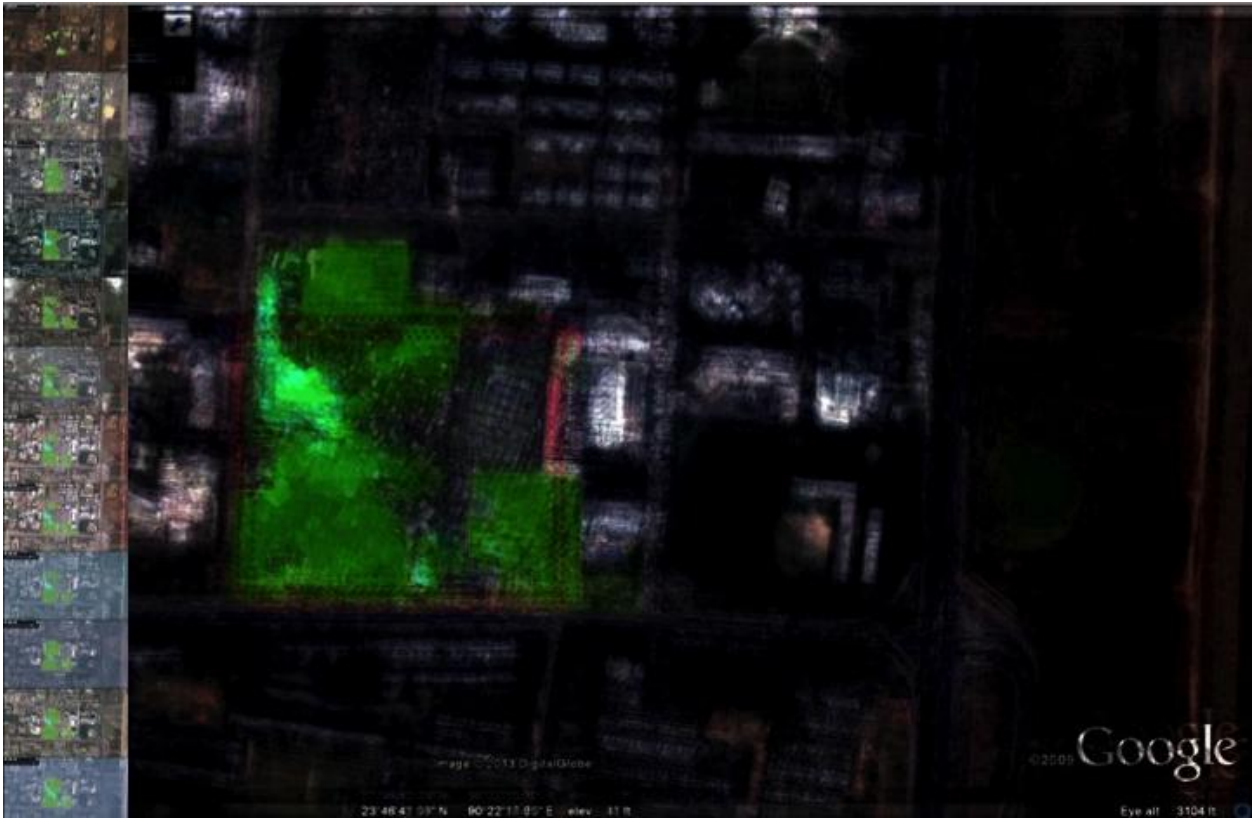
The site receives constant southern breeze as the building heights of southern side is not more than two storied. West side is blocked with buildings;do not need any Shadingimplementations. It also receives ample amount of north light.



Existing Trees



Permeable Green



13 years of Google earth images were merged and the possible permeable green surface and water body was excavated in this map

## 2.5 SWOT Analysis

### I. Potential

- Agargaon hasn't fully developed yet, so the site has a potential of becoming a good urban public place and will speed up the process of development
- The place can be a center of Biomimicry research of the country
- In this center researchers from outside the country can be accommodated, therefore it will leave a mark globally
- The site is located in lash of green
- The site has no rush of traffic which is helpful for researcher
- It is located almost centrally in the city and easily accessible

- The adjacent 150 feet under construction road would ensure that in future, potential of the site will increase.
- Huge site is mostly provide vast open green spaces
- The west side is mostly filled with build structures, so it will provide sufficient shade

## **II. Limitation**

- The present access road is very narrow
- At night the area becomes insecure
- The site is larger in the east-west side. So it should be handled sensitively
- The site and surrounding is not properly taken care by authority

## **III. Opportunity**

- As the area does not have a proper public place, this site will give a chance to flourish the idea of public place in the city
- The other public building around the site would act as positive forces for the center.
- It will initiate a new kind of development in this area

## **IV. Problem**

- If the site is not handled appropriately, It might make a bad effect in community
- The environment would be affected if the ratio of build area and green is not properly balanced

## 2.6 Current site activities

The site is located in a mix land use of agargaon to Kahn's master plan. To the south and north , land is used for housing. To west and east is used for civic sectors. The site is surrounded mostly by schools, different offices, conference hall and museum



Site Activity Map



## 2.7 Views of the site and surroundings



(From top to bottom) Views: North west corner, Inside the site, Existing settlements in the plot, Southern Side – IAB building under construction.

## **Chapter 3 :Literature Review**

3.1 Books

3.2 Journals

3.3 Thesis Papers

### 3.1 Books

#### 3.1.1 Introduction To His Architecture: GAUDI

Juan Eduardo Cirlot, Pere Vivas, Ricard Pla. *Introduction to his architecture: Gaudi*. This book was brought to me by a very close friend of mine. It has documentations of Gaudi's work in Spain. Since I had an approach to work with parametric geometry, his construction drawings and images of his built works was an unparalleled support while designing.

#### 3.1.2 The power of Limits

Gyorgy Doczi. *The power of limits*. This is a popular manuscript that circulates among the students of our university, which has been introduced to us by a faculty member and an ex student of BRAC University, Ar. Shimul Shakil. The growth pattern of all living being is vividly illustrated in this book. That helped me to look further into the geometry of organic growth

#### 3.1.3 Fractals

Introduction guide. *Fractals*. A comical representation, illustrated very generically to be easily comprehensible. The basic believes of the evolution of forms and existing nature was stated in this book. It highly contradicts with the academic lessons taught to us.

#### 3.1.4 Manual of tropical Housing and Building: Climatic Housing

Koenigs Berger, Ingersoll, Mayhem, Szoivolay. *Introduction to his architecture: GAUDI* Since the site chosen for the execution of my thesis project was located in the Bangladesh, which is a tropical region. There was a high requirement for taking proper reference for this textbook, which was taught to us in our academic program as well. Sensitive observation of the inclusion of natural forces in architecture has been studied which had high appropriateness with our climate.

### 3.1.5 BiomimicryNature's Operating Instructions: The True Biotechnologies

Ausubel, Kenny. *Nature's Operating Instructions: The True Biotechnologies*. Sierra Club Books, 2004. This book is divided into five parts. Part I opens a window onto biomimicry and the myriad of imaginative technological applications drawn from nature that have shown the capacity to decontaminate our polluted world. Part II looks directly at the ways of the land and how people are using those to help the land heal itself. Part III provides a cautionary glimpse into the basic conceptual flaws embedded in the design of current so-called biotechnologies and illustrates some of the consequent threats to the environment. Part IV applies nature's operating instructions to industry's central production processes and touches on some of the thorny political and economic factors blocking their wider acceptance. Part V searches the human heart and spirit to invoke our unique cultural facility to create an earth-honoring civilization. This book further relays the notion that biomimicry is innovation inspired by nature, looking to nature as a teacher and mentor. I will use this resource in helping my research of the biomimetic process within design.

### 3.1.6 Biomimicry: Innovation Inspired by Nature

Benyus, Janine M. *Biomimicry: Innovation Inspired by Nature*. New York: William Morrow and Company, Inc., 1997. "Why Biomimicry Now? Biomimicry is a new science that studies nature's models and then imitates or takes inspiration from these designs and processes to solve human problems, e.g., a solar cell inspired by a leaf." Janine Benyus does a superb job in providing a thorough explanation of the biomimetic world and all that it encompasses. The book itself is told in her own narrative where she dispenses case studies that she either witnessed or was actually a part of. Within the case studies she presents how we can learn from nature today, using nature's perfect sense of design that has been successful for billions of years as a solution model for the most basic human problems. Benyus describes biomimicry in a variety of areas and

environments, which are concisely laid out from chapter to chapter. For instance, she examines biomimicry in the way we feed ourselves, how we harness energy, how we heal ourselves, how we conduct business and so on. What I have surveyed in this book is specifically how biomimicry can inspire and innovate how we make things fitting form to function; e.g., weaving fibers like a spider. Benyus bestows a lot of useful information regarding biomimicry within design and I will use this book extensively throughout my research.

### **3.1.7 Clinical Neuroanatomy**

Richard S. Snell. *Clinical Neuroanatomy*. A common illustrative book taught in medical colleges. The cohesive and orientation of how the human brain other organs is drawn in this book.

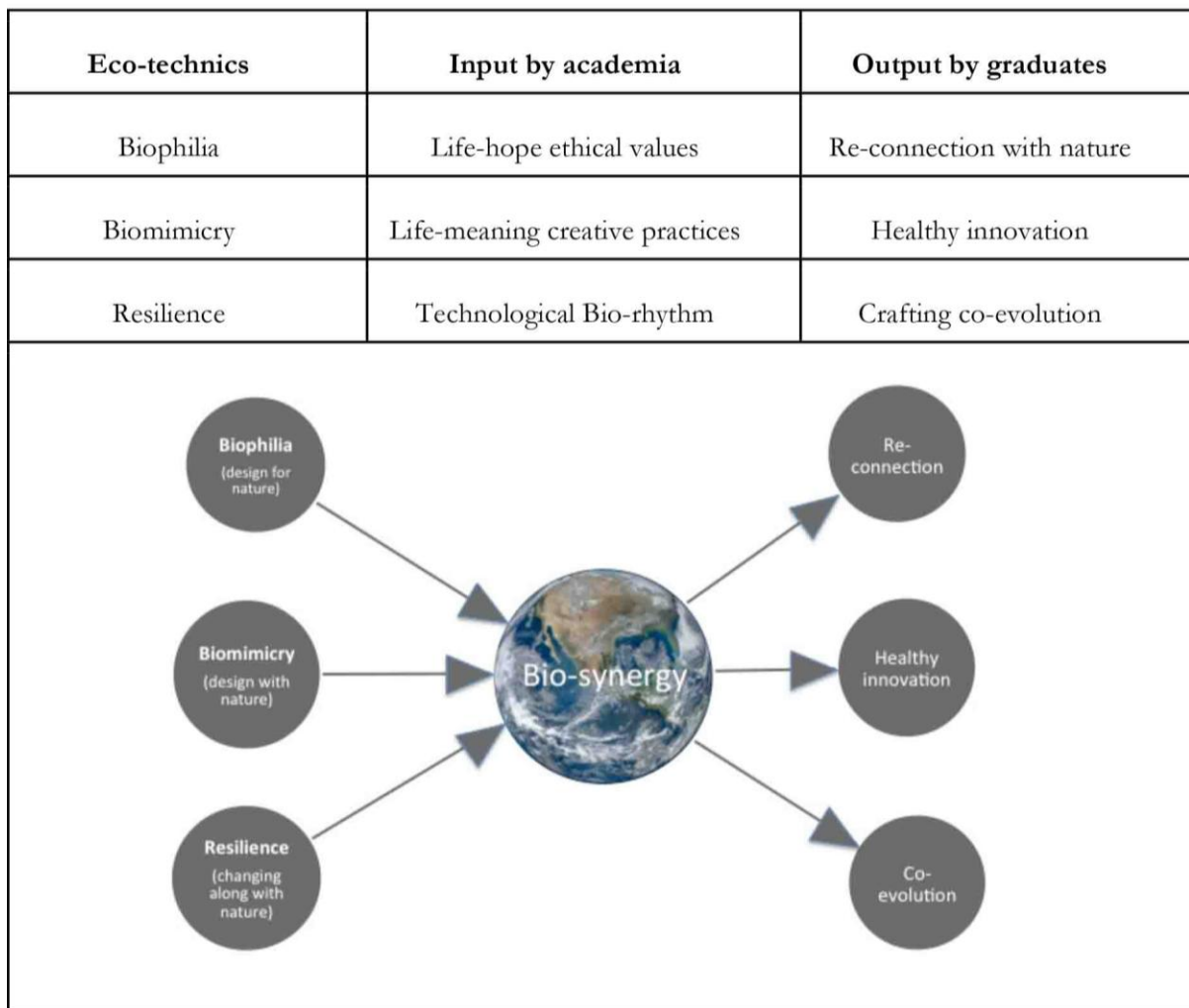
### **3.1.8 Drawing The Motive Forces Of Architecture**

Peter Cook. *Drawing The Motive Forces Of Architecture*. Since there is a requirement to make the project graphically pleasing to the eye certain references were taken from the works of Peter Cook. When the project reaches near completion the energy drains down rapidly in these circumstances brushing through books illustrative books like these can boost up motivation and energy.

## 3.2 Journals

### 3.2.1 The wonder of design with-in nature: towards an Eco technic future

David Sanchez , Fraser Bruce, Thomas Inns Centre for the Study of Natural Design University of Dundee, Scotland, UK. *The wonder of design with-in nature: towards an Eco technic future.* This journal speaks about three different stages of education that can actually accelerate the direct involvement of nature in the mainstream education.



New eco-technics in design education

### 3.2.2 Reinvesting in the Power of Interpretation & Representation

University of Utah Julio Bermudez & Albert Smith. *Reinvesting in the Power of Interpretation & Representation*. The title of this journal is self-explanatory. This piece of writing justifies the need of metaphorical interpretation in every creative field, especially in academic careers.

### 3.2.3 Outdoor Education: Play And Learning For Sustainability

Fiona Karen Wood, The Centre for the Study of Natural Design, University of Dundee, Scotland, UK. *Outdoor Education: Play And Learning For Sustainability*. Couple of student of the university of Dundee went on Winston Churchill traveling fellowship. They documented the physical education curriculum of children that are taught to learn through adventurous exploration.

### 3.3 Thesis Papers

#### 3.3.1 Graphic Design + Biomimicry. Integrating Nature into Modern Design Practices

A Thesis submitted to the Faculty of the College of Imaging Arts and Sciences for the degree of Masters of Fine Arts in Graphic Design. *Graphic Design + Biomimicry. Integrating Nature into Modern Design Practices*. The first usable piece of information found when I began this project. A fine arts student trying to merge graphics design with nature and in the process trying to establish the base of biomimicry. A lot of reference has been taken from this thesis in order to organize this paper.

#### 3.3.2 The dialectical environment of the mind: a philosophical foundation for biomimicry in the theories of G.W.F.Hegel and Jean Piaget.

Robert R. Windle III B.A., University of New Mexico, 2007. *The dialectical environment of the mind*. This carries a surgical process to seed the concepts of biomimicry in the human psychology and severely criticizes the preconceived notions of this subject. In addition the paper combines the philosophies of great thinkers with biomimicry.

#### 3.3.3 Contemporary Art Museum

Ar. Suhaili. BRAC University, 2011. A Thesis submitted to the Faculty of the Architecture for the degree of Bachelors of Architecture. *Contemporary Art Museum. Aug 2011*. This project was executed in the same site and thereby in-depth analysis about Agargaon was consumed from this site.

#### 3.3.4 Platform of Ideas

Ar. DhruboAntor. BRAC University, 2012. A Thesis submitted to the Faculty of the Architecture for the degree of Bachelors of Architecture. *Platform of Ideas*. The writer one of the most toughest and critical mentor for my thesis. Several of his work process was adapted from this paper to establish the concept to my design.



## **Chapter 4 :Case Study**

4.1 Introduction

4.2 Cases

4.3 Conclusion

## 4.1 Introduction

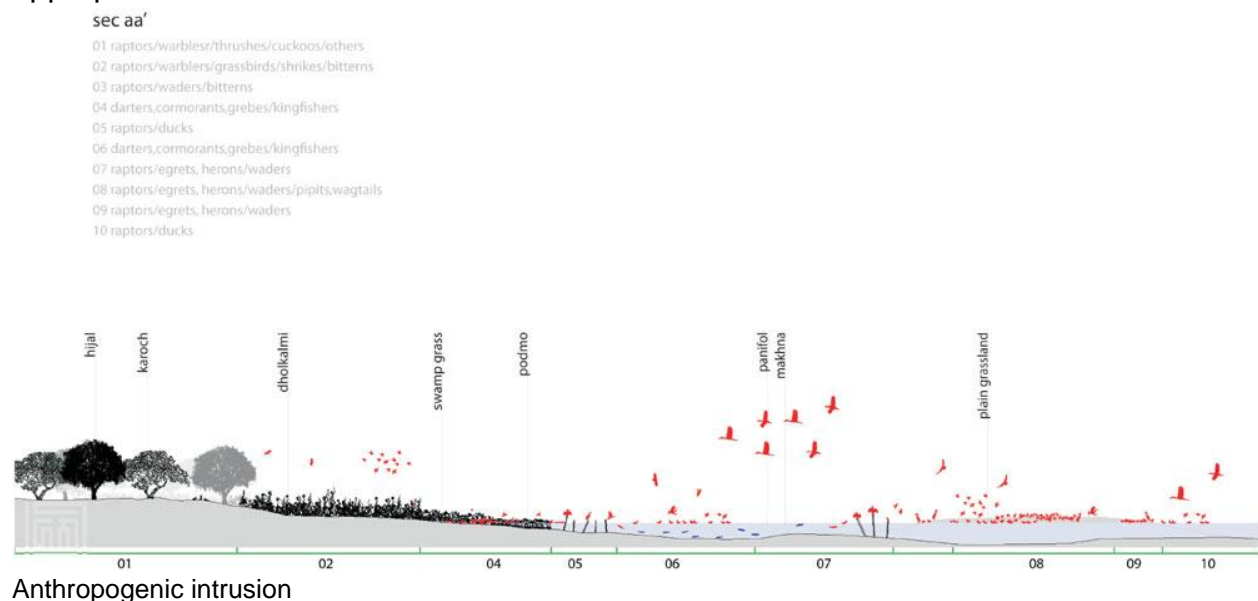
As there are no exactly similar projects like this, it is not possible to make comparative or analytical studies of similar projects elsewhere. Therefore in this chapter different aspects of the project would be briefly analyzed with a number of various local and international project.

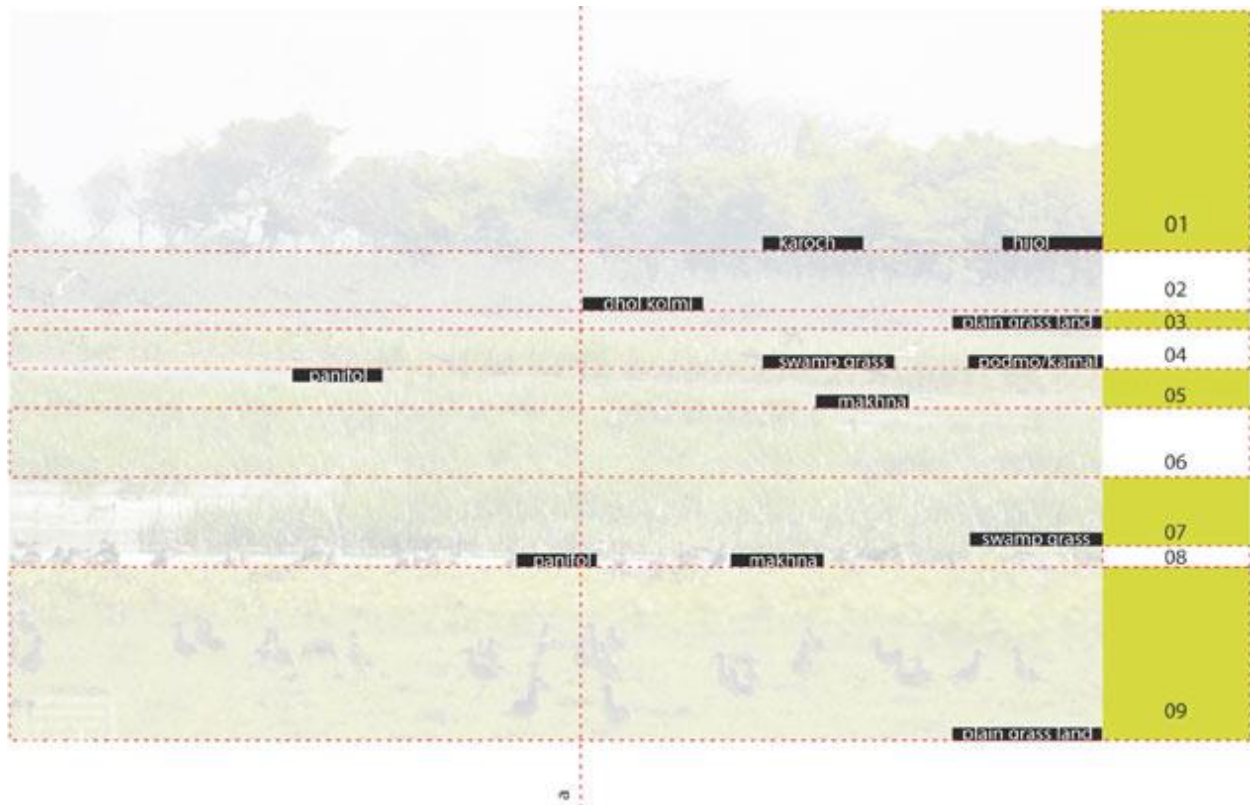
## 4.2 Cases

### 4.2.1 Deshi architects

Ar. IsmatHossian of this local architecture firm was interviewed in several occasions before the initiation of this project to extract her experience that she acquired during her masters in Bauhaus under the super vision of Niel Leach. It was a great disappointment for loosing the opportunity to meet this visionary revolutionist in person when he paid a visit to Dhaka few months before the interviews sessions started. For the first time I encountered generative architecture from bone marrow. Later she shared her attempt to implement her Masters program into practical projects.

This architectural firm has several projects that deals critically with the climate and the appropriateness of this land. And their observations of found in their official website.

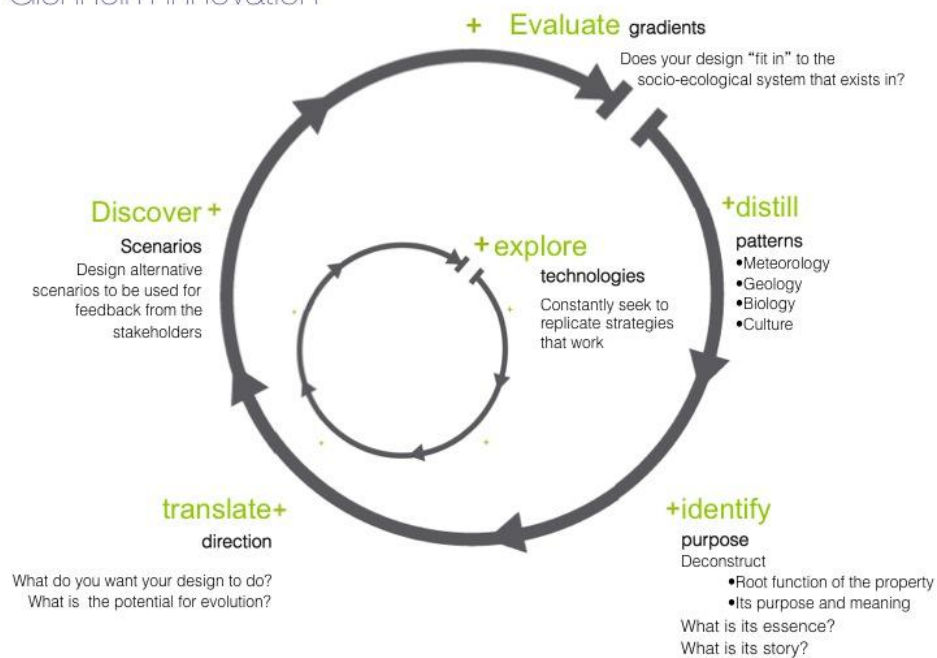




Layers in the landscape commonly since in naturally existing sites in Bangladesh

#### 4.2.2 Jamie Miller

Glenholm Innovation



This Scottish architect currently carries his projects under the name exploration architecture. The diagram above illustrates the work methodologies he follows in the biomimicry research center place in Scotland. More than anything else it is the amalgamation of different fields coming together to share ideas and opinions to tackle the future problems

#### 4.2.3 Work Architecture: Assembly Hall for the 2014 African Union Summit

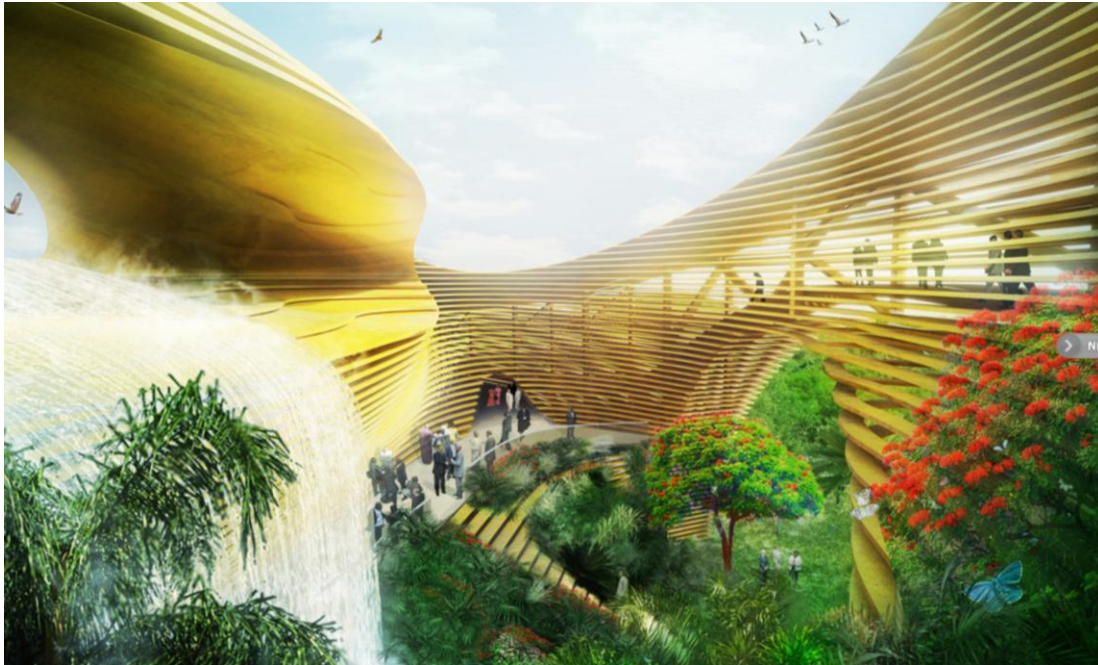
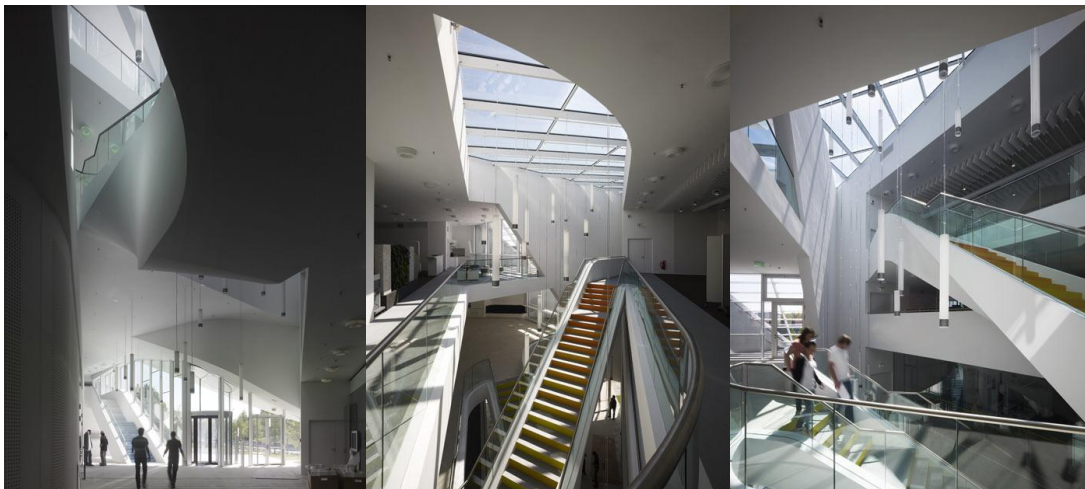


Image collected from [www.arch2o.com](http://www.arch2o.com)

Merging the landscape with the built form and excavating the instinctive regional aspects.

#### 4.2.4 UN Studios: Center for Visual Engineering

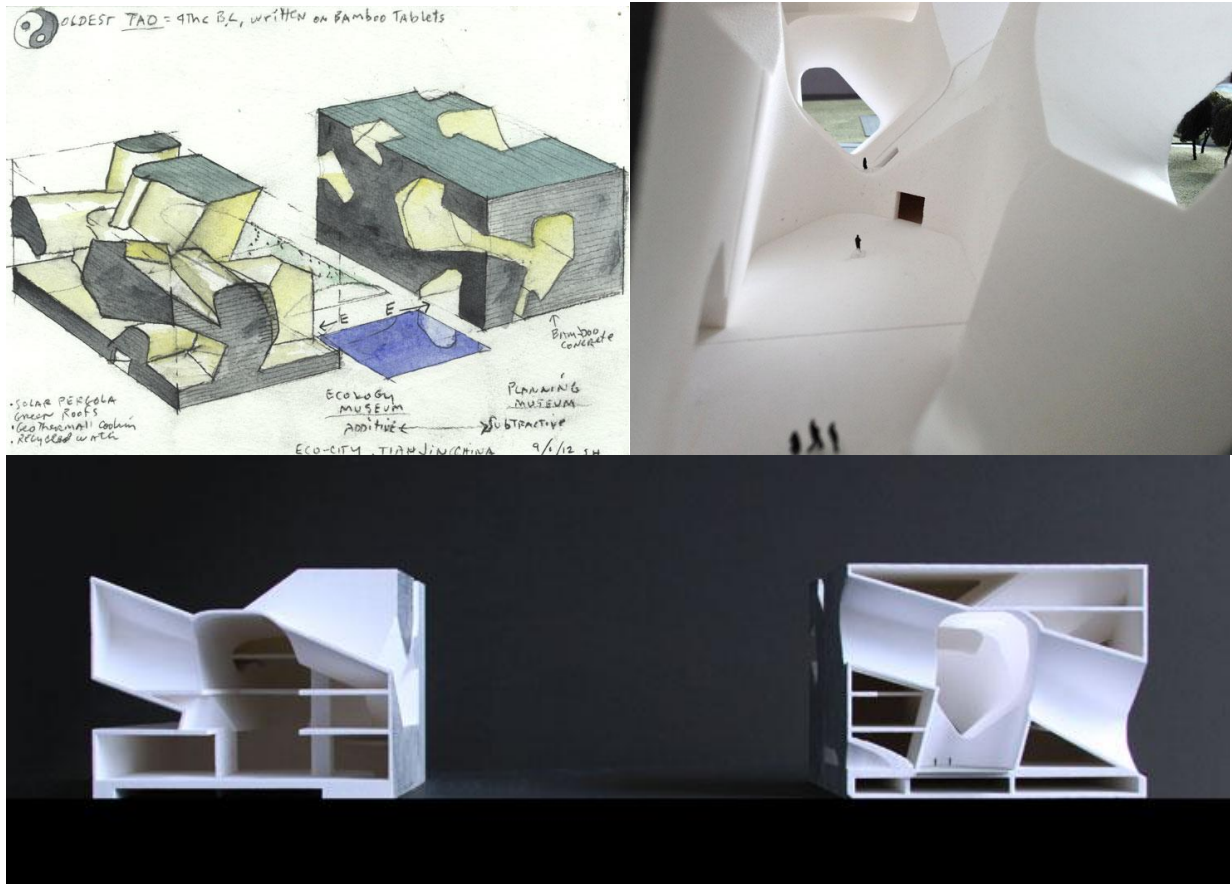


The triple height internal spaces and the heterogeneous circulation spaces



#### 4.2.5 Steven Holl :Tianjin Eco city Ecology And Planning Museums

Steven Holl has created some dramatic spaces in this museum. The internal spaces and the play with light is the mostly observed in this project.

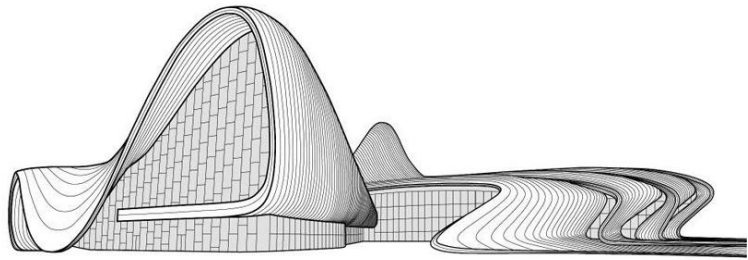


#### 4.2.6 HOK + Beck Group :Salvador Dali Museum



Most literal architectural interpretation of Parasitic design that depicted the essence of the most contemporary and controversial artist of all time, Salvador Dali.

#### 4.2.7 Zahahadid: HeydarAliyev Center, Baku Azerbaijan



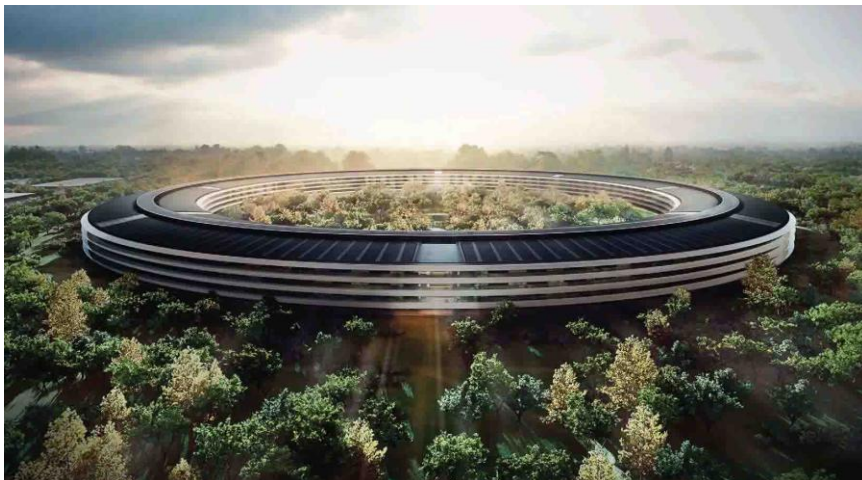
Other Projects: Guggenheim Museum  
Science Museum

#### 4.2.8 Peter Eisenman



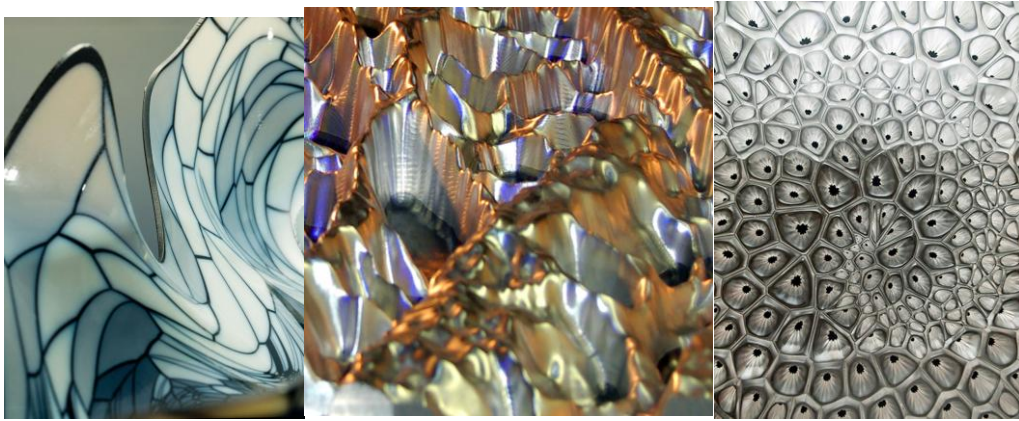
City of culture, Garcia, Spain

#### 4.2.9 Norman Foster : Apple Campus 2, USA





#### 4.2.10 NeriOxman



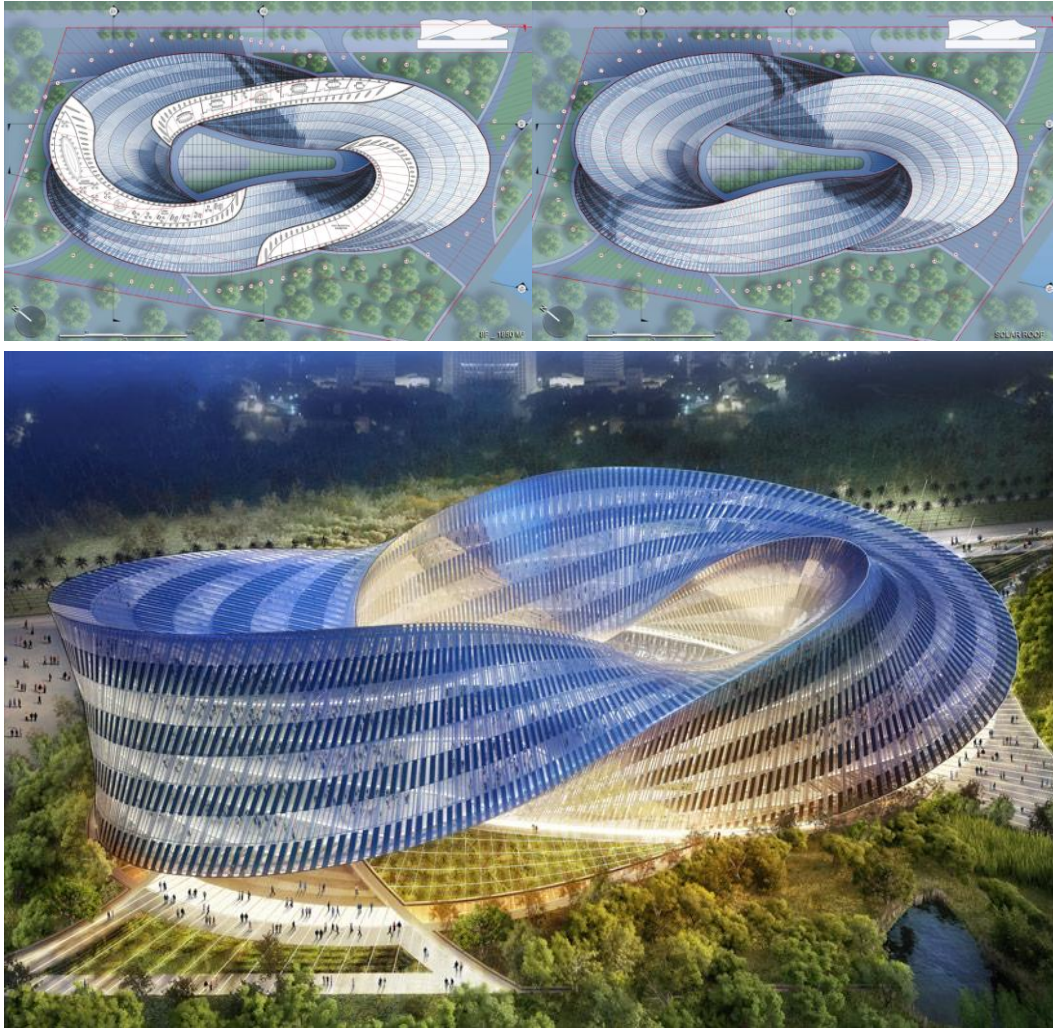
NeriOxman, a professor at the university of MIT. Does several material experiments that involves diverse natural aspects. One of the materials involves depicting the insides of an intestine, organs and skin of a dragonfly. Where others deals with the different forms of forces, XYZST. X,Y,Z are the commonly known axis but the other two are Stress and tension, which are usually ignored. The use of 3d printer and its practice.

#### 4.2.11 VincetteCorbette



Iconic buildings inspired from dragon fly wings





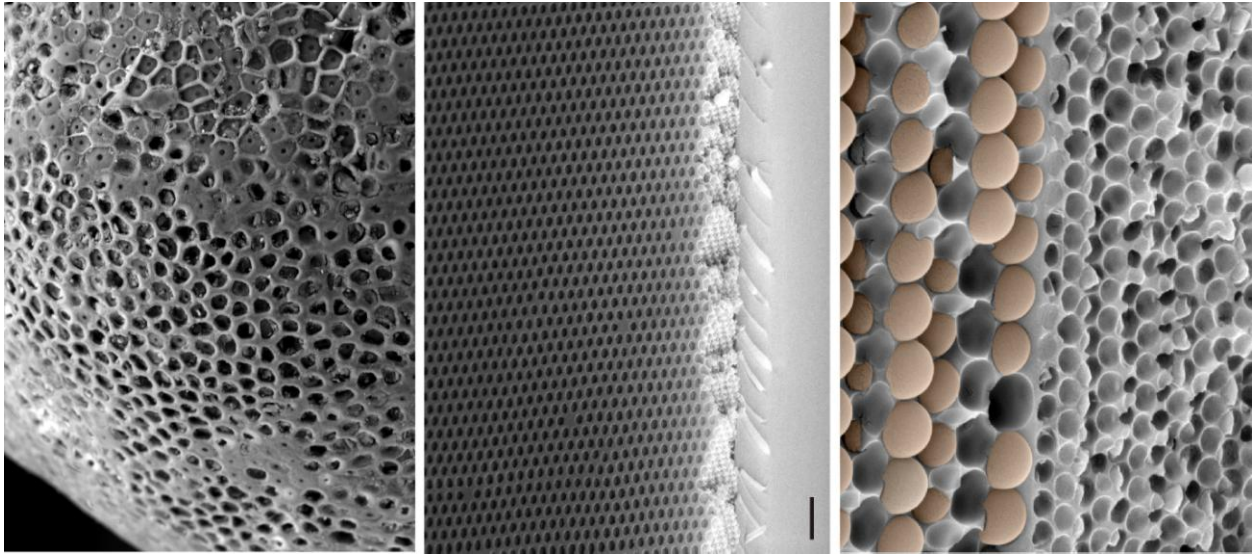
Inspired form a Manifold curvature



High-rise inspired from pebbles



#### 4.2.12 Joanna Aizenberg: Biomineralization and Biomimetics Lab at the Harvard School of Engineering and Applied Sciences (SEAS)



Material and shell Design: A Closer Look at Inverse Opals

There are certain criteria of these materials, among which are: self-healing, defect-free bio-inspired.

## **Chapter - 5 :Program Developments**

5.1 Rational of the Program

5.2 Problem Derivation

5.3 Program with area required

5.4 Volumetric analysis

## 5.1 Rational of the program

The program has been selected to make the complex more public. The center houses all the functions which create a suitable ambience for carrying out the researches, The temporary galleries have been provided to exhibit the works produced in the workshops. Individual studios will facilitate the researcher's work in silence. the studios will be rented for months. Workshops can be arranged in the studio block. People would be in different types of specialized fields and general biomimicry exhibition. Once in 4 months, the galleries will be opened for the public to see the work. Archive will give an opportunity to acquire knowledge about art. Children space will encourage the young mind to be involved. People would know about Biomimicry. The research center will have two types of basic workshops, where the researches will be carried out and conserved.

## 5.2 Program derivation

The primary idea is to seek solution to problems from nature. So that, ultimately sustainability can be achieved. It is very important to involve the locals in this pursuit. Therefore in addition to segregated workshops there will be exhibition areas and interaction spaces.

**5.3 Program with area required:**

Broad Program	Area (sq.ft)
1 Seminar Hall	4500
2. Multipurpose Hall	4800
3. Temporary Gallery Space	58000
4. Library	6200
5. Cafe	2400
6. Plaza/ Theater	4400
7. Children's Room	6000
8. Workshops/ Labs	19190
9. Admin	5500
10. Service and Facilities	2300
11. Studios for artists	7000

<b>Total Program Area</b>	<b>120290</b>
<b>Circulation 30%</b>	<b>36087</b>
<b>Total built area</b>	<b>156377</b>

<b>1. Seminar Hall</b>	<b>Quantity</b>	<b>Area (sq.ft)</b>
Lobby	1	300
Toilet	Man-6, women-4	300
Seating	300 person	3500
Chair Closet	1	250
<b>Total</b>		<b>4500</b>

<b>2. Temporary Gallery Space</b>	<b>Area (sq.ft)</b>
Lobby space	4000
Highly secured gallery	50000
Air Handling unit	2000
Store/ Archive	2000
<b>Total</b>	<b>58000</b>

3. Multipurpose Hall	Quantity	Area (sq.ft)
Lobby	1	1000
Toilet	Men-8, women-6	300
Ticket Counter	1	100
Seating	325 person	3000
Store	1	100
Projector room	1	200
<b>Total</b>		<b>4800</b>

4. Library (10,000 volume)	Quantity	Area (sq.ft)
Lobby	1	400
Information centre	1	250
Toilet	Men-10, Women-7	400
Reading space	66 person	3200
Storage	1	250
Stack Area	1	1200
Librarian Room	2	500
<b>Total</b>		<b>6200</b>

5. Cafe	Quantity	Area (sq.ft)
Service Area	1	600
Store	1	200
Toilet	Men-8, Women-7	400
Eating Space	66 person	1000
<b>Total</b>	<b>1</b>	<b>2400</b>

6. Plaza/ Open theater	Quantity	Area (sq.ft)
Performance Place (indoor)	1	2000
Toilet	Men-8, Women-7	400
Performance Place (outdoor)	1	2000
<b>Total</b>		<b>4400</b>

<b>7. Children Space (Learning school)</b>	<b>Quantity</b>	<b>Area (sq.ft)</b>
Learning space	1	600
Toilet	Men-8, Women-7	200
Classrooms	10 (20'X20')	400
Exhibition space		600
<b>Total</b>		<b>6000</b>

<b>8. Workshops/ Labs</b>	<b>Quantity</b>	<b>Area (sqft)</b>
Combined workshop area	1	5000
Store	1	1000
Toilet	Men-8, Women-7	400
Kitchenette	1	200
Virtual Information research	1	1000
Audio Video Lab		
Lecture Room	20 person	350
Audio Recording Room	1	200
Video Recording Room	1	200
Control Room	1	250
Tape Lock Room	1	250
Biology Lab	1	2250
Publication		
Office	6 Person	400
Space for Compose	1	100
Processing Room	1	100
Pasting	1	100
Printing	1	150
Binding	1	150
Storage	1	200
Clay workshop	1	5000
3d Printing	3	2250
<b>Total</b>		<b>19190</b>

9. Admin	Quantity	Area (sqft)
Lobby	1	400
Reception	1	100
Toilet	Men-5, Women-3	250
Curator	1	200
Curator PA	1	100
Toilet	1	50
Complex Superintendent	6	300
Office Space	18 persons	2000
Conference Room	110 persons	1200
Staff Room	6 persons	800
Toilet	Men-1, Women-1	100
Total		5500

10. Service and Facility	Quantity	Area (sqft)
Food Court	1	1000
Mechanical Room	1	500
Collection Storage	1	500
Security Monitoring room	1	300
Total		2300

11. Studio For artists	Quantity	Area (sqft)
Studio Space	15 x (20X20)	6000
Toilet	Men -6, Woman-3	400
Common space for interaction		600
Total	1	7000



#### 5.4 Volumetric analysis of the program

The tentative volume for each function was made in form of a model and set in order of the required zoning. The form derivation also began from this phase



## **Chapter- 6 : Design Development**

6.1 Introduction

6.2 Development phase -1

6.3 Development phase -2

6.4 Development phase -3

6.5 Development phase 4

## 6.1 Introduction

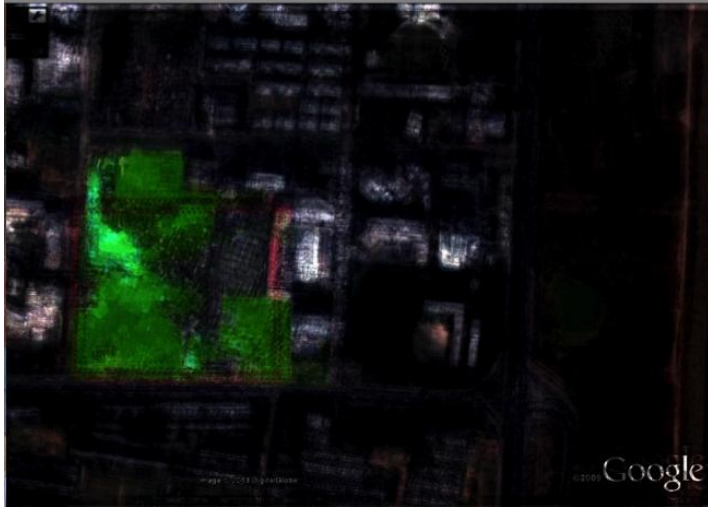
Since this was a “Biomimicry” research center, that every step that I take in this project has to be an innovation or a radical invention derived from nature. But it was getting painful to not develop the concept with such greatness. Therefore the project grew from a very down to earth approach, which was the site. Several visits were paid to the site and dozens of panoramas from each and every angle possible. The maps were made with great care presented in a very pleasing manner. Like Louis I Kahn once said “Every good design starts with a beautiful moment”. In my case it was a good map drawn by me using the color schemes used in the documentation of project by Norman Foster, Apple campus 2.

## 6.2 Development phases

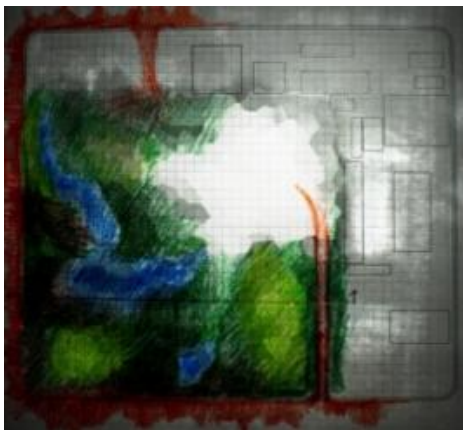
### 6.2.1 Extraction of possibilities



I would like to state this map was the first image of opportunity. The high permeable green signified that there is existence of uncountable number of network of organisms.



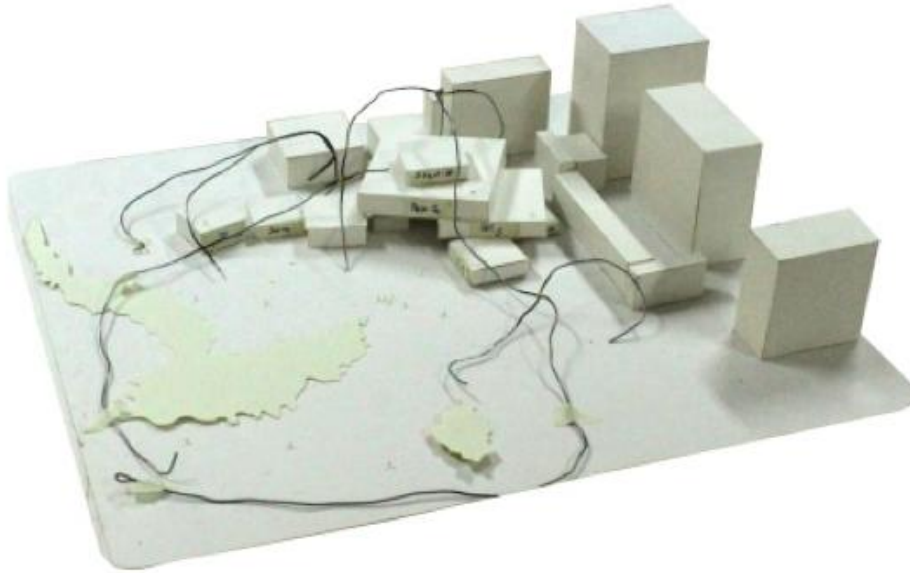
This is possibly the beautiful moment that Louis I Kahn was referring to. By merging all the Google earth images of the last 13 years. I got the most suitable areas where the most biodiversity could still remain. And this vigorous change in the landscape occurred due to the changes in the temporary mobile illegal residence in my site. The image below depicts the aspiration of how I took the decision of the built area, water body and the green area in the landscape



The white portions show the built area, and the red depicts the vehicular circulation, hence permanent concrete paved roads.

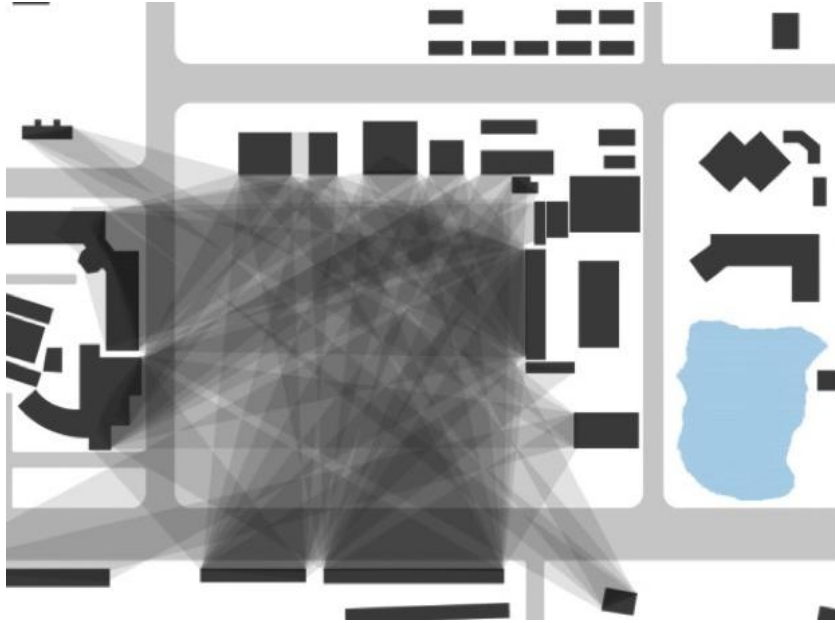
### 6.2.2 Merging with the landscape

Models were become rewards after being build. The volumes of the functions were setup and the wire mesh was used to visualize the approach to merge the form with the landscape



### 6.2.3 Joining solids and finding the leakages of opportunity

A simple experiment was carried to join the solids around my site. What became a remarkable discovery the void which created windows of opportunity.



### 6.2.4 Evolution of model study

#### 6.2.4.1 Intuition depicted

This was the first model made, precisely on the second review. This model did not get the opportunity to evolve due to immense scrutinization but this model will . The only reason for the birth of this model was to realize the forces felt from the forces around the site. Names it natural forces or the intuitive forces.



#### 6.2.4.2 Initial phase

The first model that was built from the reasoning the volumetric analysis, and the decisions taken from merging the permeable green.



#### 6.2.4.3 Layers accommodating functions

The circulation and the zoning of the functions were located in this model.



#### 6.2.4.4 Horizontal Connections

The previous volumetric form was strategically penetrated horizontally. And the circulation spaces and the places required to place openings within the building was found.



#### 6.2.4.5 Diagonal Punctures

The previously made model named “Layers accommodation functions” was diagonally punctured to create dramatic spaces. This attempt was taken after being inspired from the project: Eco city museum in Taichung.





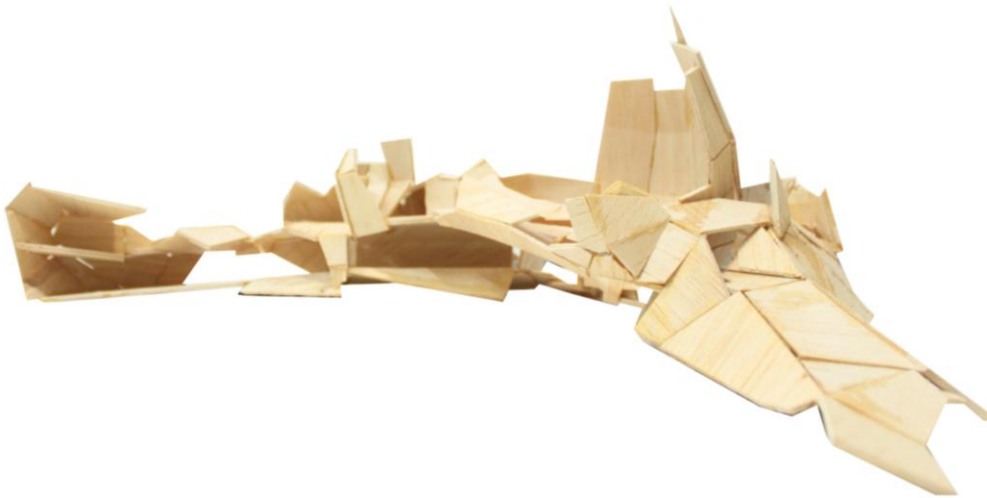
#### 6.2.4.6 Structural Orientation

The form was growing to become a radical organic shape. That it needed a physical structural orientation. Therefore the net was used to state the best possible illustrate the best possible way to sustain the form of the design.



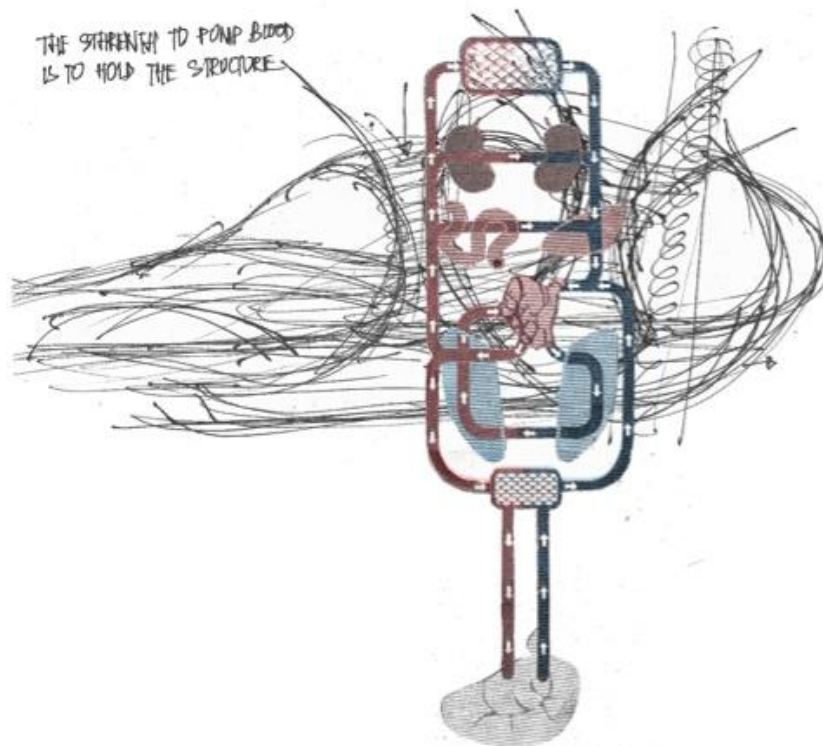
#### 6.2.4.6 Internal Anatomy

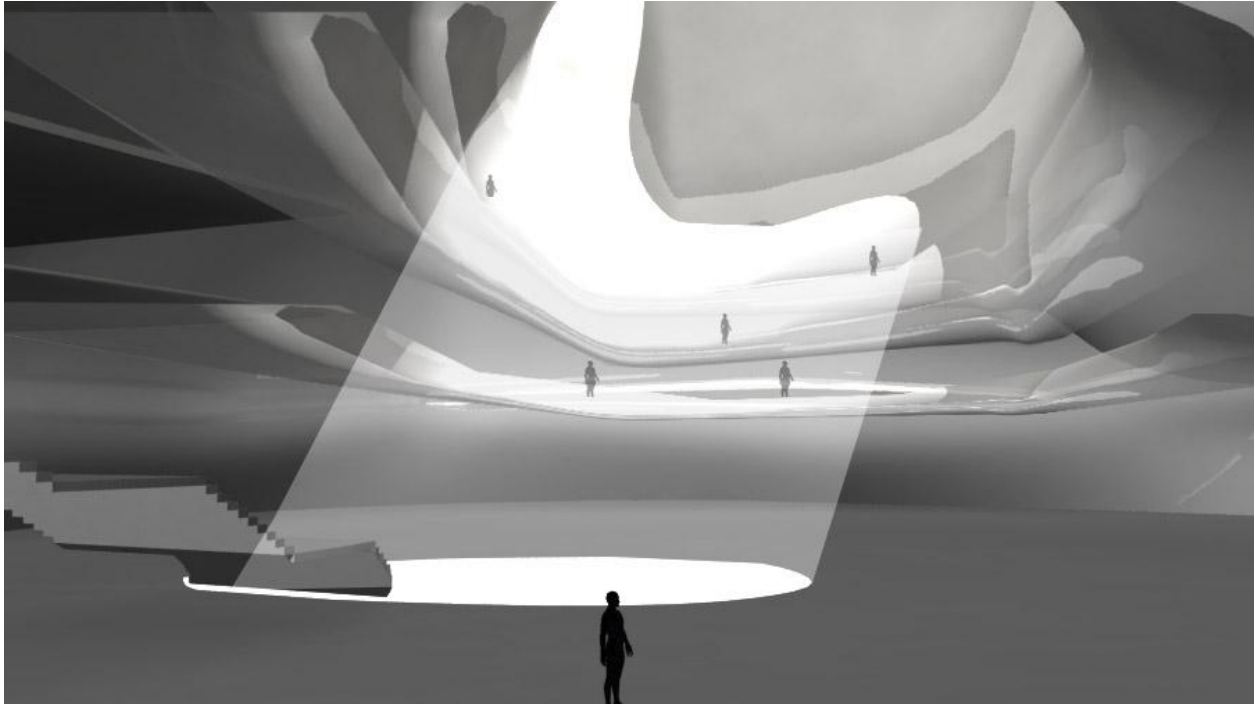
It was excruciatingly painful not to be able to visualize the internal spaces of the form. Since the project required curved surfaces. Therefore, this model was an attempt to figure out the internal spatial patterns within the design.



### 6.2.5 Metaphorical interpretation

There was a continuous approach to do something in my thesis project that acted as a pump and generated growth. And the thought of pump generated the idea of heart. The heart represented the central atrium of the research center. And the brain was interpreted as the part that does the research. The brain was split into two. The right side is known to do the creative thoughts and the left side does the analytical thought process. Since the research lab required an area where the researches could take place where the air movement, temperature, humidity is mechanically controlled. Therefore the Labs are located in the floor below, underground and and the studios and workshops that are place on the floors above where the creative studies are predicted to be carried out. The exhibition spaces interpreted for the concept of lungs where people circulate regular and share their views.





The Conceptual Internal space- Atrium

### 6.2.6 Visualization through Photomontage

A tentative model was build on the digital visualization software, Maya and the aspired images from various cases was place on the renders Maya images. This helped taking decision of where each activity would occur and requirements to do the plan.



### **6.6.7 Initiation Of Plan Layout**

Drawing the plans began from deriving the plan from the approximate area achieved from the Maya drawings. Layer those were hand traced and practiced traditionally onwards. After a certain maturity of the drawing the drawings were traces in cad and proper dimensions were readjusted and finally it was rendered in photoshopped in placed where the curvilinear surfaces need more definition.

## **Chapter – 7 :Final Design**

7.1 Plans

7.2 Sections

7.3 Material Details

7.4 Landscape Details

7.5Photomontage

7.6Model Images



## 7.1 Plans

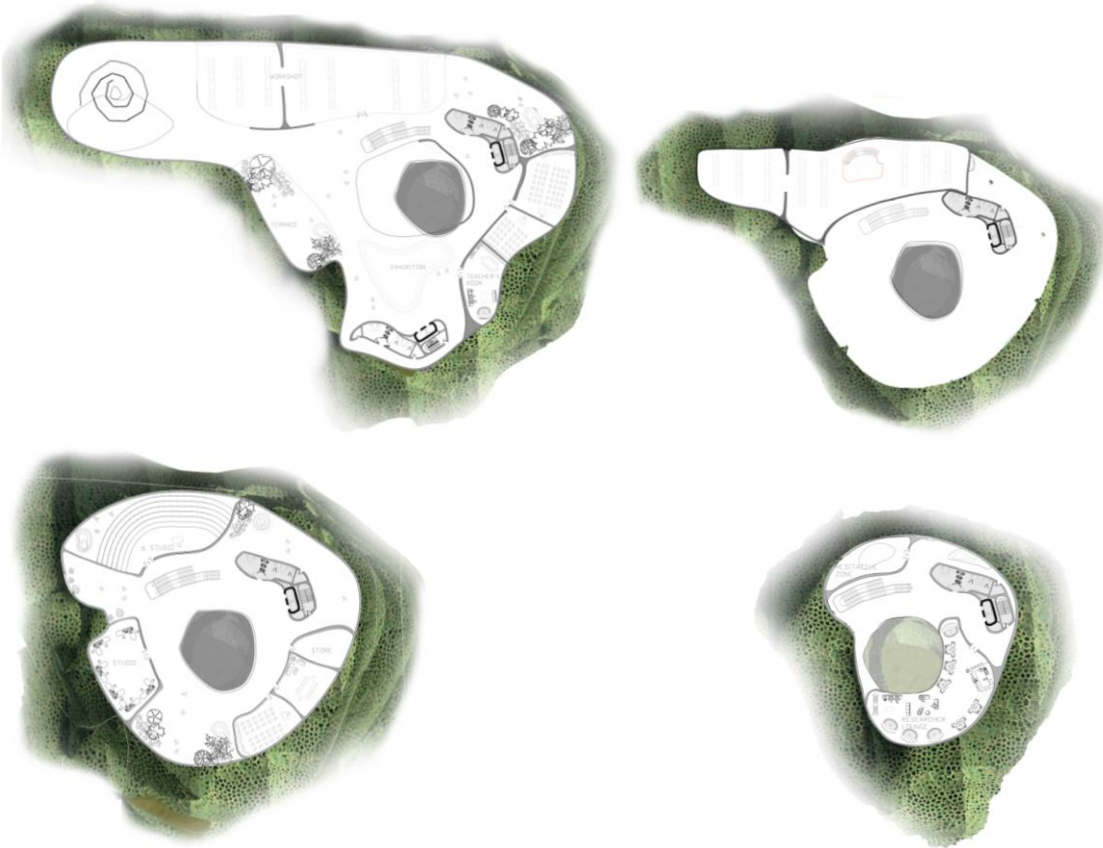


Ground Floor Plan (Not in Scale)





Plan at 30' (Not in Scale)



Plan at 60', Plan at 85', Plan at 105' & Plan at 115' ( Not In Scale)

## 7.2 Sections



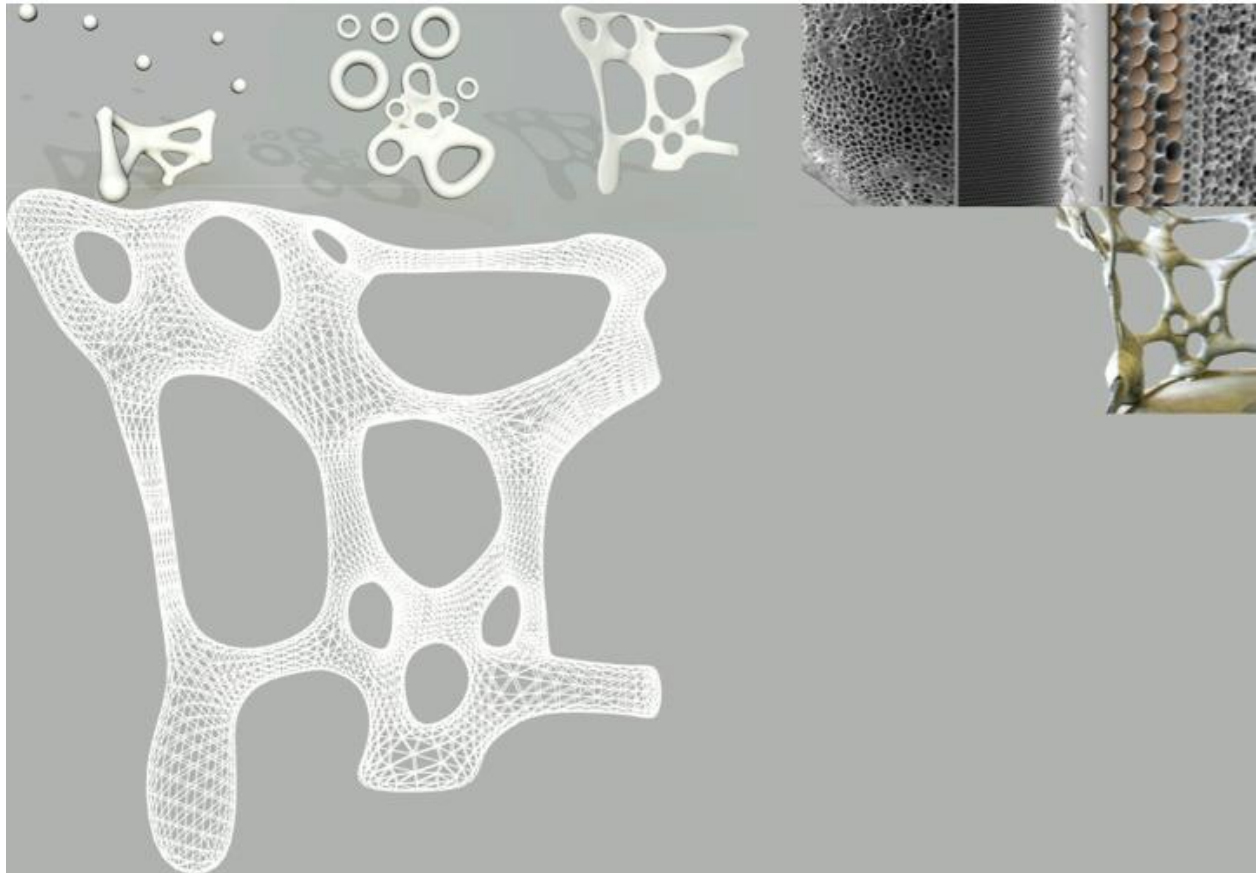
Section AA'



Section BB'

### 7.3 Material Detail

An amalgamation of coral reef and fatty acids gave birth to this structure. This arrangement of structure was multiplied all over the form that acted as a load bearing mesh



## 7.4 Landscape Details

Three different locations were given stress: Areas next to the road, areas next to the water body and the places next to the paths. Initially the existing plants were identified. There was the approach to relocated in the landscape design. But there was a need to introduce other local plants there to meet the requirements





Names of flowersWATERBODYEDGE OF THE ROAD AND FOOTPATHBESIDES ROADS

NAME	FOLIAGE	SPAN	SEASON
Logjaboti	<ul style="list-style-type: none"> <li>It closes when the leaf is in contact with anything</li> <li>Soft leaf</li> <li>With thorn</li> <li>Flowers are pink in color</li> </ul>	<ul style="list-style-type: none"> <li>4.5 cm height</li> </ul>	<ul style="list-style-type: none"> <li>All season flower</li> </ul>
Porkulaka	<ul style="list-style-type: none"> <li>Different colored flower</li> <li>Soft leafs but almost like Durba Ghash</li> <li>Blooms only in daylight</li> </ul>	<ul style="list-style-type: none"> <li>4.5 cm wide flower</li> </ul>	<ul style="list-style-type: none"> <li>All season flower</li> </ul>
Durba Ghash	<ul style="list-style-type: none"> <li>Leaves are of dark green</li> <li>Soft leaf</li> </ul>	<ul style="list-style-type: none"> <li>4.5 cm height</li> </ul>	<ul style="list-style-type: none"> <li>All season flower</li> </ul>

NAME	FOLIAGE	SPAN	SEASON
Koroi	<ul style="list-style-type: none"> <li>The flower produces seed</li> <li>White and pink colored flower</li> </ul>	<ul style="list-style-type: none"> <li>60-65 ft height</li> </ul>	<ul style="list-style-type: none"> <li>All season flower</li> </ul>
Mahguni	<ul style="list-style-type: none"> <li>Big leaf</li> </ul>	<ul style="list-style-type: none"> <li>20-40 m height</li> </ul>	<ul style="list-style-type: none"> <li>Summer</li> </ul>
Krisnochura	<ul style="list-style-type: none"> <li>Color of flower red</li> <li>Small leaf</li> </ul>	<ul style="list-style-type: none"> <li>20-30 m wide</li> </ul>	<ul style="list-style-type: none"> <li>Spring</li> </ul>

Names of flowersWATERBODYEDGE OF THE ROAD AND FOOTPATHBESIDES ROADS

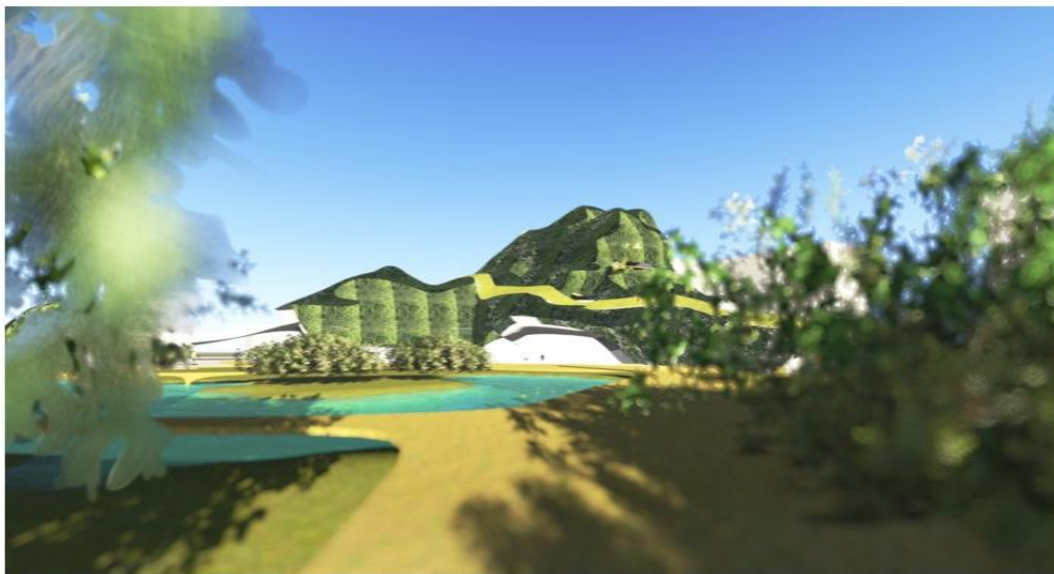
NAME	FOLIAGE	SPAN	SEASON
Water Lilly	<ul style="list-style-type: none"> <li>On water</li> <li>Can be seen in red, white and violet</li> <li>Leaves are of dark green</li> </ul>	<ul style="list-style-type: none"> <li>10-15 cm wide</li> </ul>	<ul style="list-style-type: none"> <li>All season else then winter</li> </ul>
Makhba	<ul style="list-style-type: none"> <li>Like Water Lilly but got thorn</li> <li>Big red and pink colored flower.</li> <li>Blooms at night</li> </ul>	<ul style="list-style-type: none"> <li>10-20 cm wide</li> <li>Big leaves</li> </ul>	<ul style="list-style-type: none"> <li>All season mostly at the end of winter</li> </ul>
Chandmala	<ul style="list-style-type: none"> <li>Small white color flower</li> <li>Round flower</li> </ul>	<ul style="list-style-type: none"> <li>Leaf size 5-8 cm</li> </ul>	<ul style="list-style-type: none"> <li>Rainy season</li> </ul>
Kachuripana	<ul style="list-style-type: none"> <li>Floats above water</li> <li>Light violet color flower</li> <li>Leaves are of dark green</li> </ul>	<ul style="list-style-type: none"> <li>Leaf 10-15 cm</li> <li>Height of the plant 1m</li> <li>Many branches in one place</li> </ul>	<ul style="list-style-type: none"> <li>Rainy and Autumn season</li> </ul>
Kolmi	<ul style="list-style-type: none"> <li>Light pink flower</li> </ul>	<ul style="list-style-type: none"> <li>2-2.5 ft height</li> </ul>	<ul style="list-style-type: none"> <li>All season flower</li> </ul>
Kash ful	<ul style="list-style-type: none"> <li>White flower</li> <li>Grows inside bushes</li> </ul>	<ul style="list-style-type: none"> <li>3-4 ft height</li> </ul>	<ul style="list-style-type: none"> <li>Autumn</li> </ul>



## 7.5 Photomontage

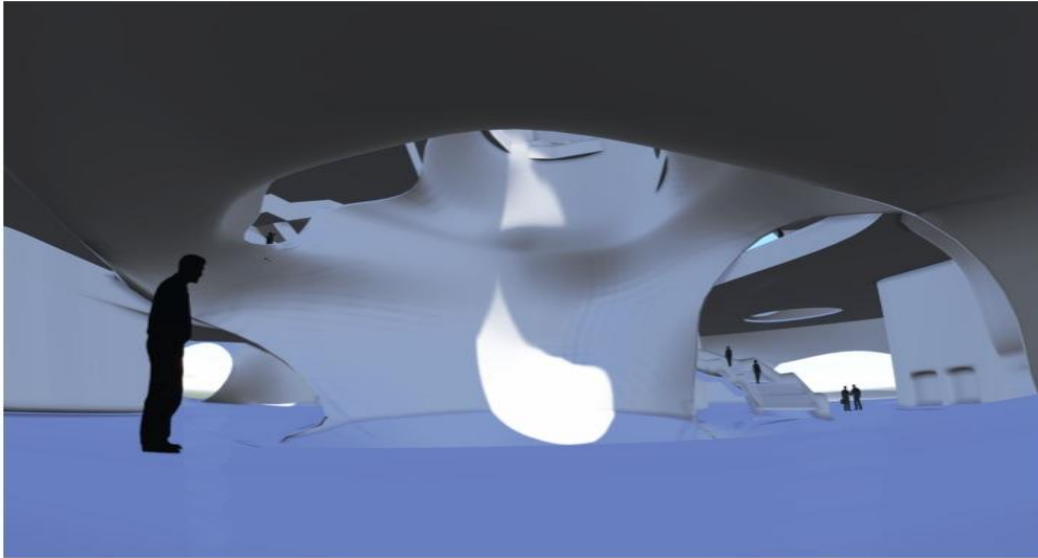


## 7.6 Rendered images

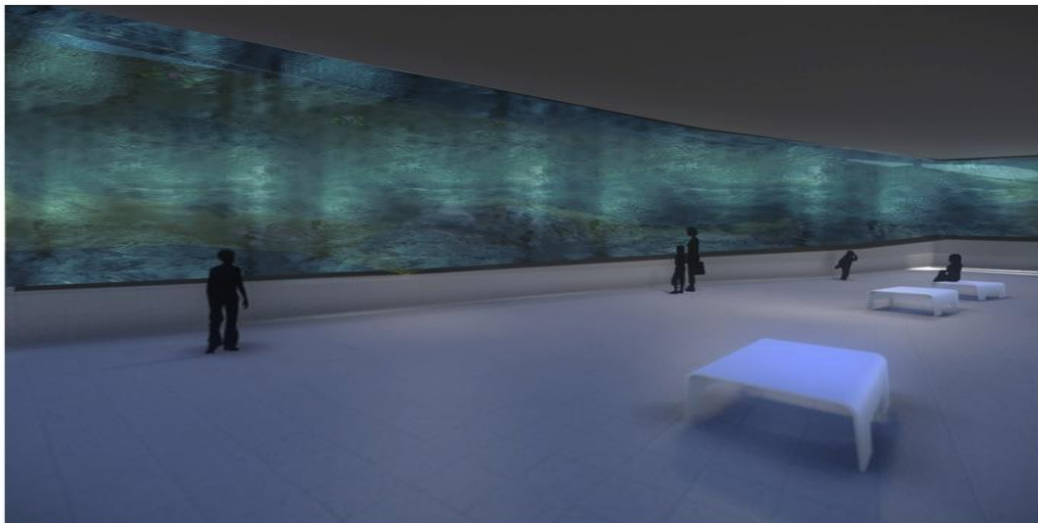


Entrance





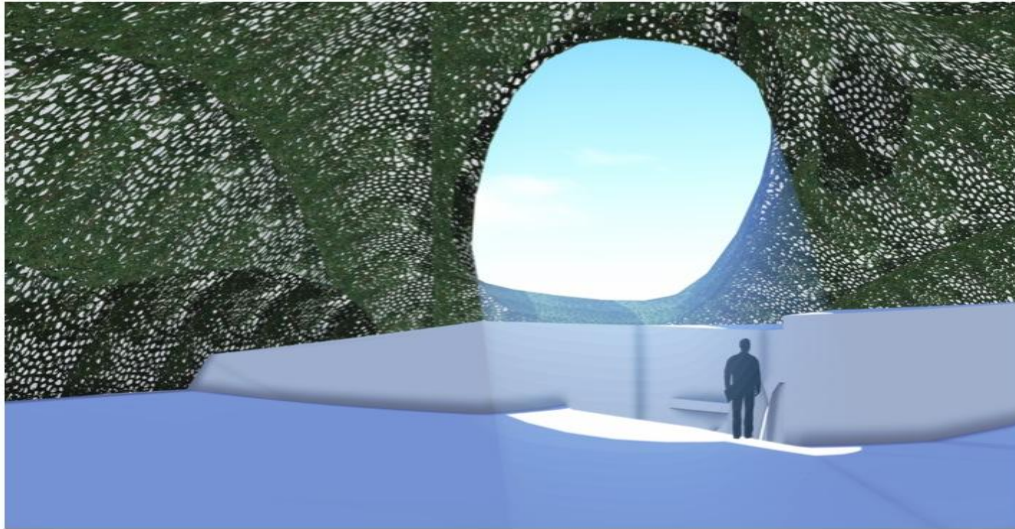
The Atrium



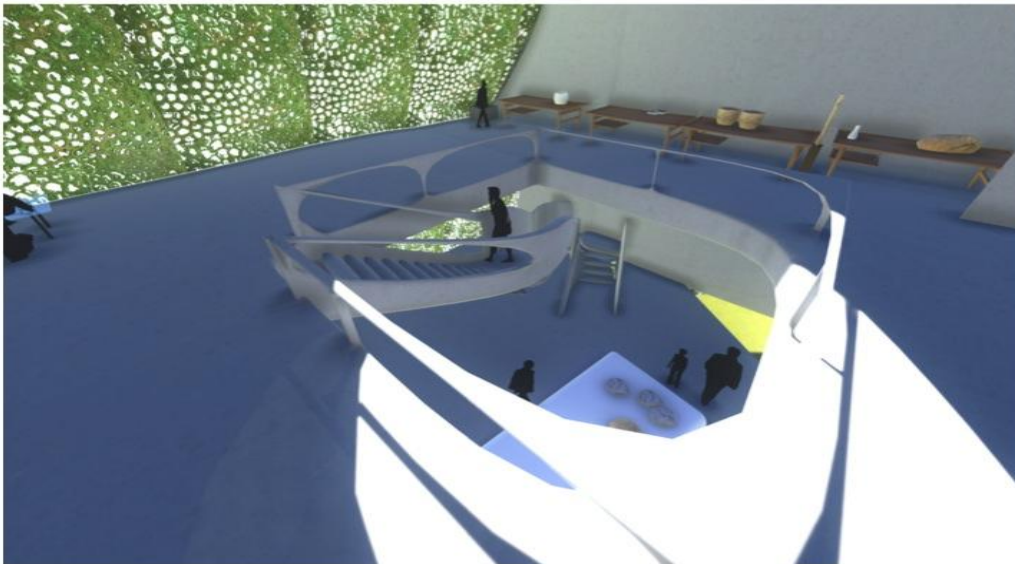
Obsevatory



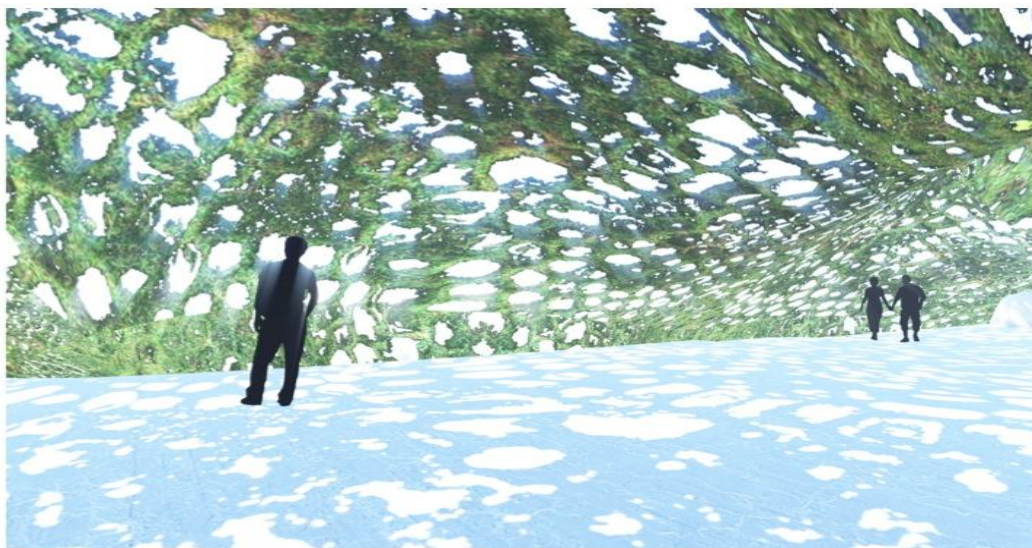
Library



2<sup>nd</sup> Atrium

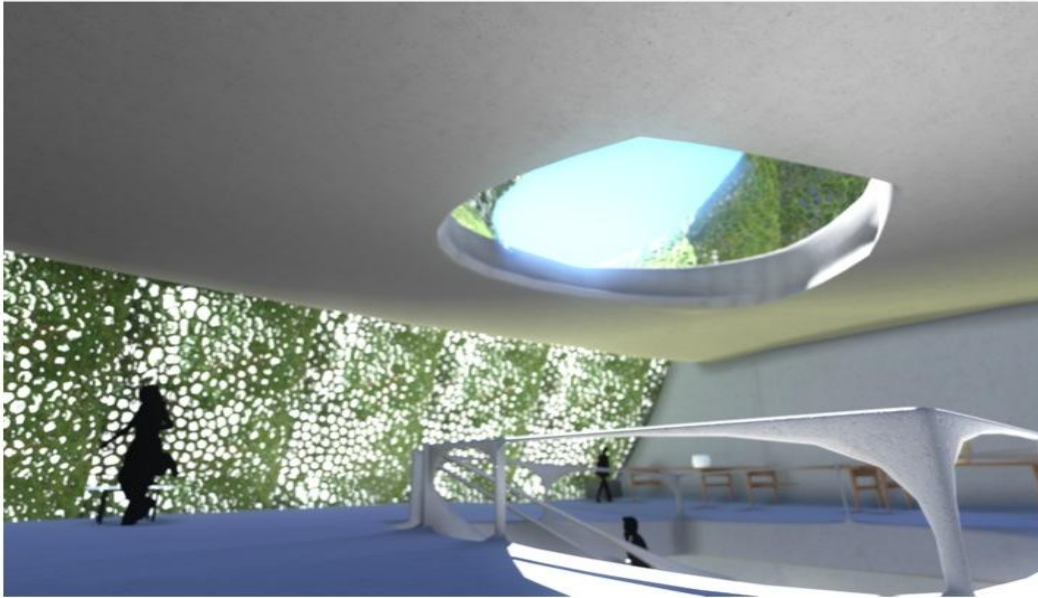


Studios



Corridors





Studios



At different hours of the day

## 7.6 Model Images



Evolution of forms



Site model



Structural Detail model



Extrusion of the solid connectionStructural Detail (Larger scale) model





Main model

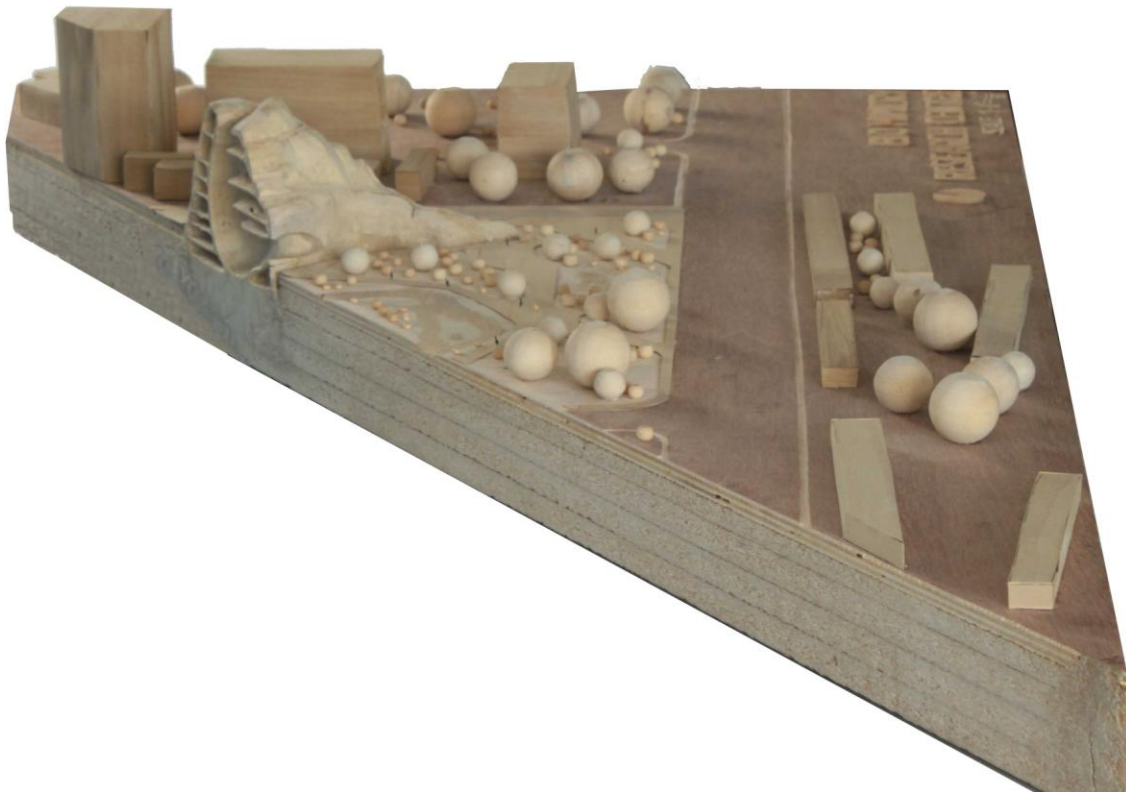


Sectional Model image -I





Sectional model Image- II



Section Model Image – III

## Conclusion

## Conclusion

At the end of my academic career it had to answer two important questions. What have I turned into and another is what I will pursue in future. Both have been achieved as I figured my strength with parametric design and my affinity towards biomimicry. In the pursuit of finding the answers , I figured a process of how students can conduct if they want to practice organic architecture. This was probably the biggest achievement.

## Reference

1. <http://www.ted.com>
2. <http://www.bustler.com>
3. <http://www.asknature.org>
4. <http://www.academia.edu>
5. <http://www.inhabitat.com>
6. <http://www.biomimicryinstitute.com>
7. <http://www.explorationarchitecture.com>