

# BRANE Architecture – skin & bones as one

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### Abstract

New architecture in 21<sup>st</sup> Century will be the symbiosis and amalgamation of new materials; construction technology; information technology; biochemistry and nano technology. This 'Symbiosis and Amalgamation' will revolutionize the concept of building construction and will generate new architectural forms.

This Architectural Research aims to explore a new architectural prototype in the simplest form which has the minimal use of resources while performing the functional requirements of a structure and envelope. This architectural prototype would revolutionize the concept of building construction using new materials and new construction methods. It would not only generate new form and space, but also become a manifestation of an environmentally conscious architecture.

### 1. Biomimetics for Architecture

The simplest life in the form of protozoa begins in water. Simple microorganism has evolved into complicated species. Turning back the clock of evolution, this single cell organism shows the most primitive life form – 'MEMBRANE', which skin and bone are one. Inspired by protozoa and jelly fish, the research explores architecture of membrane – the BRANE Architecture.

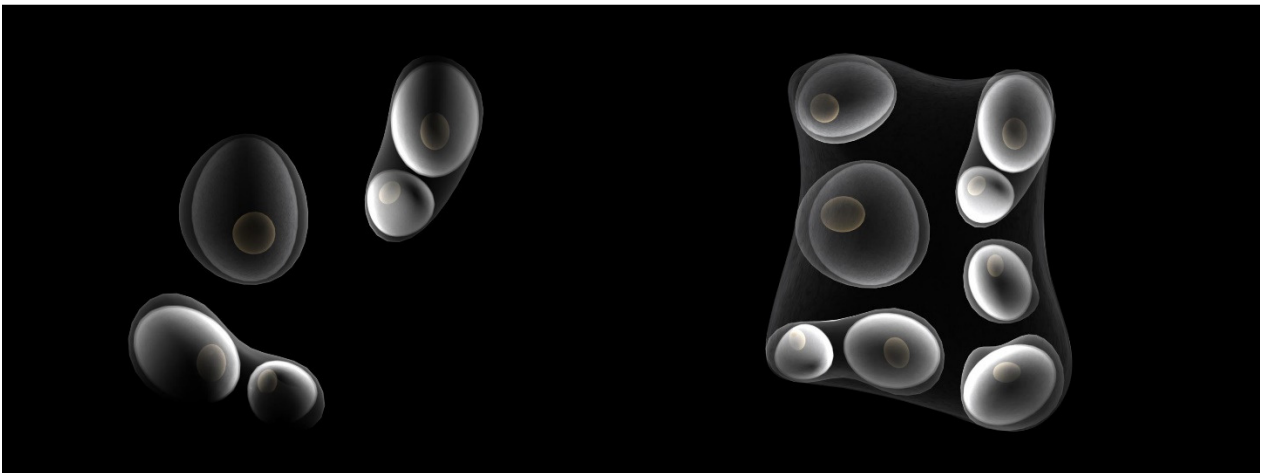


Figure 1: The simplest life form is 'Membrane' which skin and bone are one.

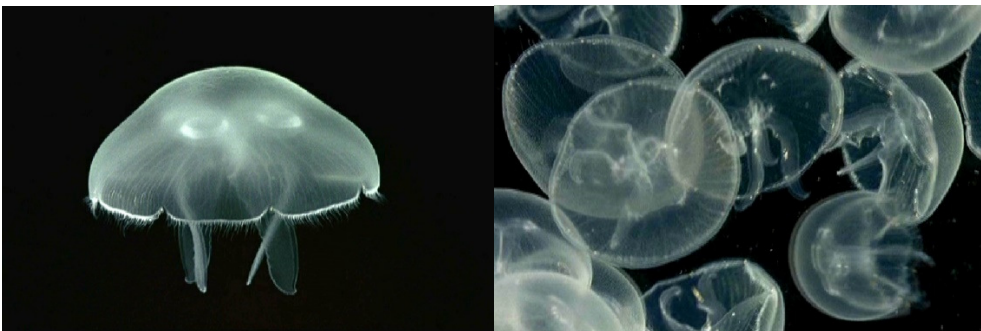


Figure 2: Inspired by Jelly Fish, the explores BRANE Architecture.

## 2. Parametric Design and Digital Fabrication

The form of the prototype is inspired by 'Spacetime and Wormhole' where the gravitational pull of the fabric of Spacetime forms the Wormhole. By pulling inwards down a conical membrane, form and space are created simultaneously in the prototype.

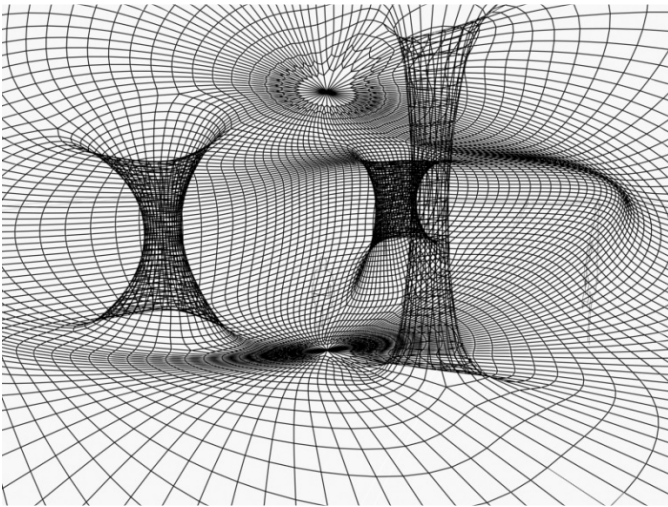


Figure 3: Spacetime and Wormhole.

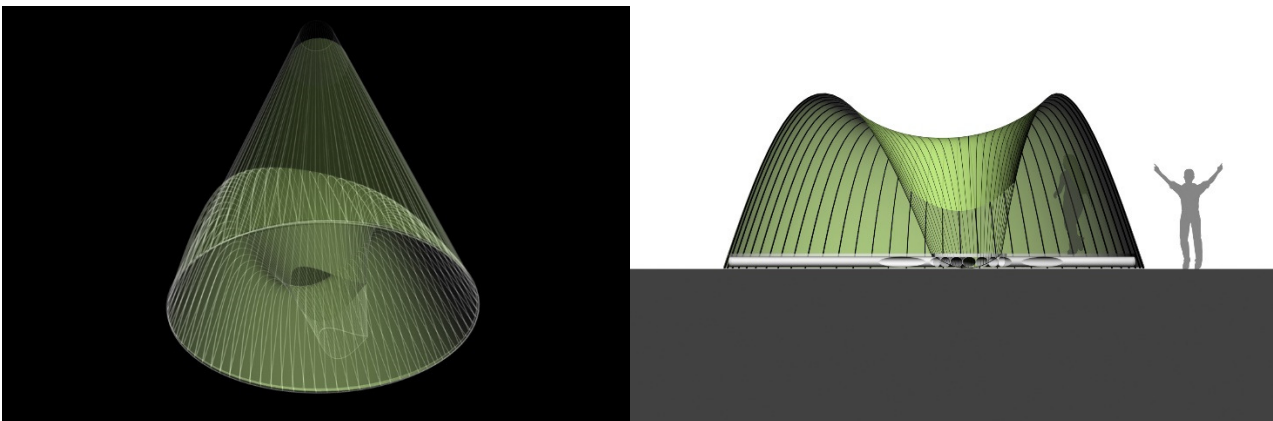


Figure 4: By pulling inwards down a conical membrane, form and space are created simultaneously.

A 'Voronoi Mesh' is applied to the membrane which makes the 'skin and bones' into one unified element. The hollow Voronoi Mesh (the bones) and the infill (the skin) are unified into a membrane made of a single material – photopolymer.

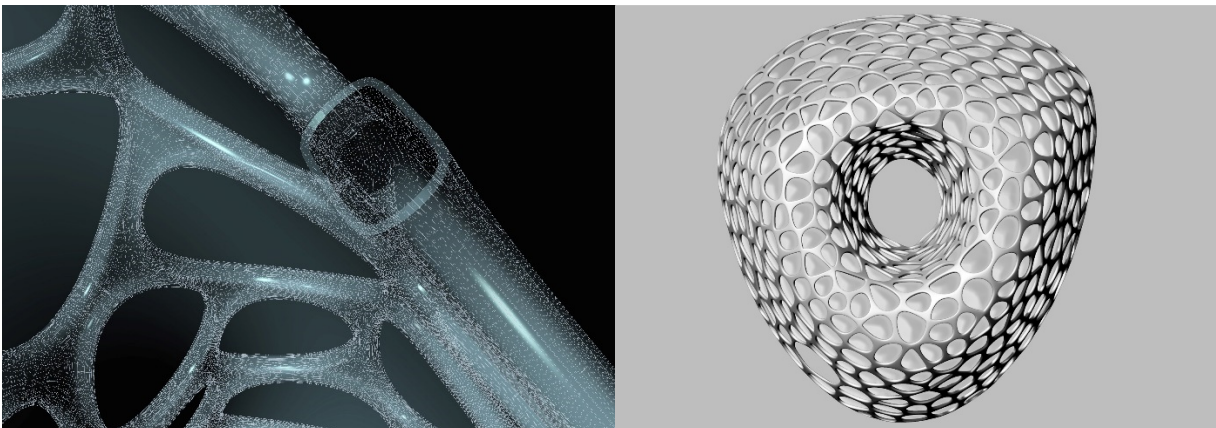
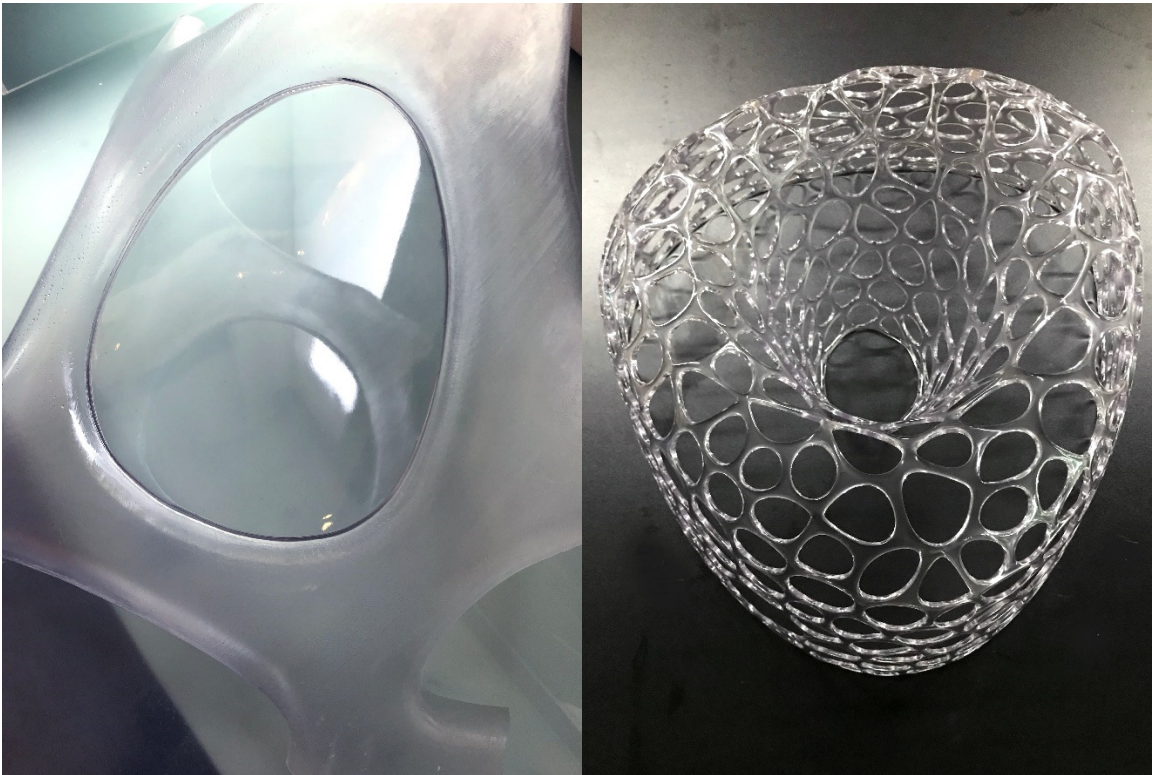


Figure 5: Voronoi Mesh.

Stereolithography, a form of 3D printing technology is used in constructing the architectural prototype. UV laser causes the liquid monomers to link together to form photopolymer. Layer by layer, this photochemical process builds the three-dimensional prototype.



*Figure 6: Prototype is constructed using 3D printing.*

The 'Voronoi Mesh' will be a new concept for development of interactive and responsive building skins.

### **3. Jelly House – the new Prototype**

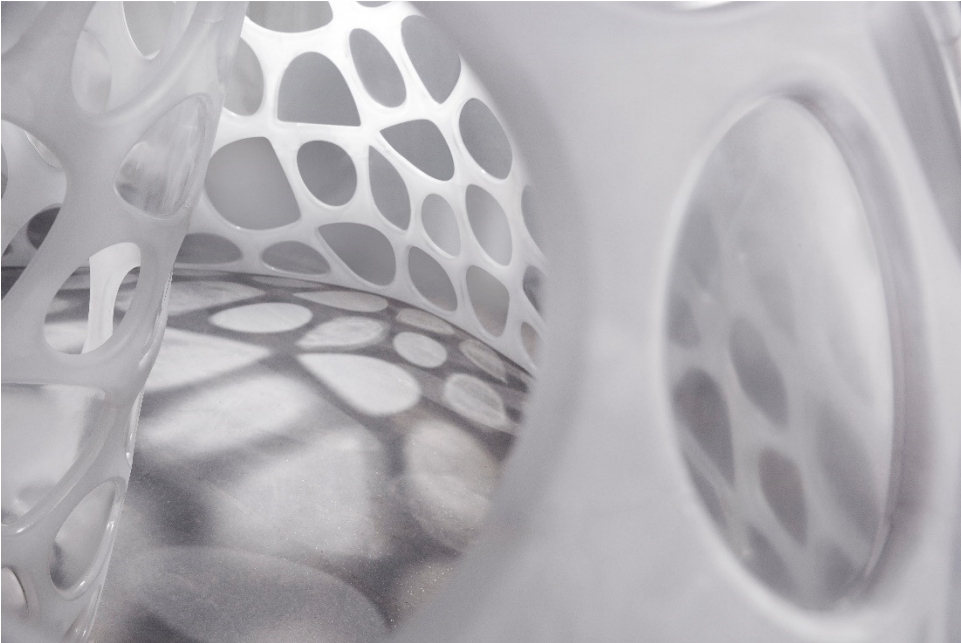
The architectural research results in a prototype of BRANE Architecture called Jelly House.



*Figure 7: Prototype developments of the Jelly House.*

This Jelly House is a manifestation of **the Five Points of BRANE Architecture:**

1. Skin and bones as one.
2. Ultra-lightweight.
3. Unified elements of construction.
4. Unified construction material.
5. Interactive and responsive envelope.



*Figure 8: Skin and bones as one.*



*Figure 9: Unified elements of construction. Unified construction material.*

How much does the Jelly House weigh? A scaled model of the Jelly House with weight 1.25kg can take the bodyweight of an adult of 80kg.



*Figure 10: Interactive and responsive envelope.*

Facing climate change, over population, pollution, we need new ways of using less to achieve more. BRANE Architecture, with membrane as the essential material, has the potential of adaptability to changes. Its fluidity in form and space, and the glow and float properties will generate new architectural expressions. Membrane will have unlimited possibilities in the future. With the advancement in nano technology and interactive materials, membranes with new properties will become information interactive skins for buildings, and an energy source using solar power.

BRANE Architecture is the future.

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