LUUM TEMPLE

Tulum , Mexico 2019

CO-LAB Design Office

Institute for advanced architecture of Catalonia

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Luum Temple is part of the amenities of a new residential development called Luum Zama, in Tulum Mexico. Tulum's surging popularity has brought a lot of developers seeking to build maximum sellable areas, many of whom clear cut the existing jungle and build over the regulations. In contrast, The Luum Zama development sets aside 50% of its 8 hectare area for the conservation of existing vegetation while also implementing a reforestation program with endemic plants of the region.

the project consists of a five sided bamboo structure assembled from flat sections of bamboo bent on site, screwed and strapped together. The outer layer of the pavilion is composed of palm leaves, material suitable for tropical areas as it protects the structure from the elements.

Area: 250.0 m2

Year: 2019

LUUM TEMPLE

OVERAL GEOMETRY
The pavilion is composed of 5 sets of arching structures that radiate from a central point, creating a flower like shape. The structure sits on a concrete perimeter only accessible by foot.

What is the main criteria?
Each of the 5 petals is an exact copy of one another creating a perfect mirror.

What is the Pavillion composed of?
The canopy is composed by flat layers of bamboo that were bent in site and interwoven around 5 central support beams and 5 arches. The outer layers is composed of a dry palm leaf canopy.

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INTERNAL GEOMETRY
The interior layers of the structure are composed by interlocking layers of bamboo woven to form a triangular lattice.

PSEUDO CODE

Identify and trace the arch curve and the curve from the base of the arch to the central axis	**DEFINE GEOMETRY**
Loft the curves to create a surface and revolve arount he central axis at an agle of "8.8" to build the pentagonal geometry	**CREATE SURFACE AND REVOLVE AROUND THE CENTRAL AXIS**
Pipe the arch curves and one of the lateral curves and revolve arount he axis.	**CREATE SUPPORT BEAMS**
Create a perforated cylinder that protrudes over the pipes to form the central oculus.	**INSERT OCULUS**
Create a triangular grid on the surfaces and pipe the curves to create the thickness. offset by .5 and repeat to build the 4 woven layers.	**WEAVE 4 LAYERS**
Create an hexagonal panel surface on the surface formed on step 2. Change the parameters to flatten the cells to create long panles to mimic the outer layer of bamboo strips.	**INPUT FLAT SURFACE**
Scatter grass on a surface and controlling the blade size, shape and number parameters create 3 blocks.	**SCATTER GRASS AND CREATE BLOCKS**
Populate the surface and place the blocks on the points. Repeat 3 times with each type of block to create variety in texture and fill.	**CREATE PALM LEAF CEILING**

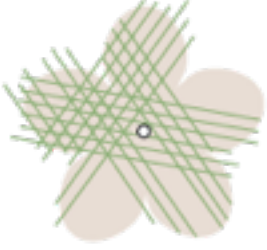
DEVELOPMENT

DEFINE GEOMETRY

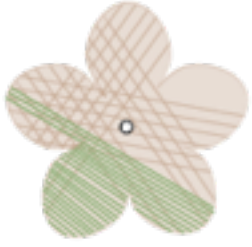
CREATE SURFACE AND REVOLVE AROUND THE CENTRAL AXIS

CREATE SUPPORT BEAMS AND INSERT OCULUS

WEAVE 4 LAYERS



INPUT FLAT SURFACE



CREATE PALM ROOF FROM GRASS BLOCKS

INTERNAL GEOMETRY

Bamboo strips interwoven in layers create the interior supporting structure.

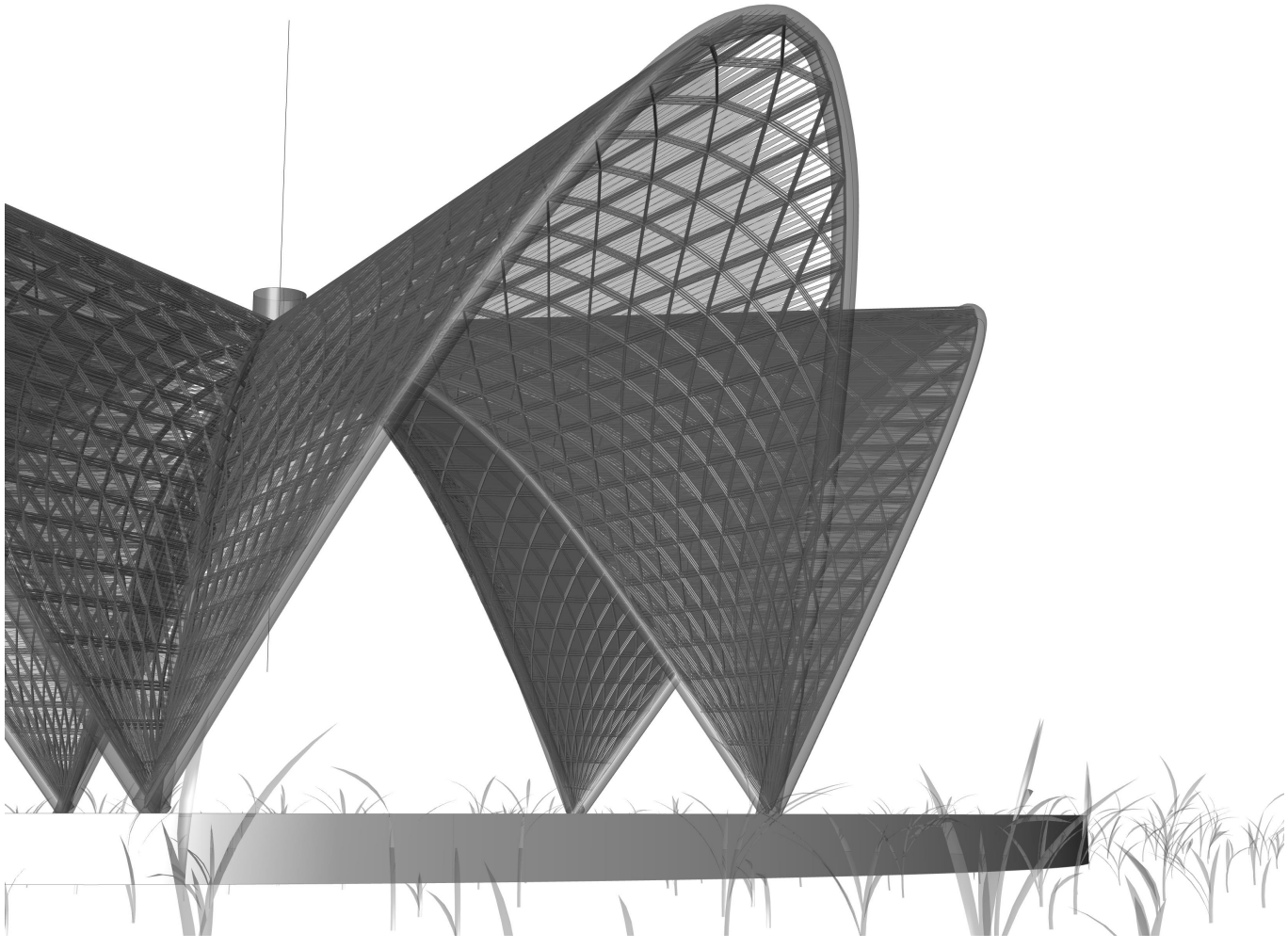
This structure takes the same of a triangular grid that wraps around the entire surface of the pavilion

Steps

1. Create triangular pattern on previously lofted surface.
2. Wireframe bleep to maintain only the curves
3. Pipe the geometry to create the thickness of the layer
4. Repeat 3 times by offsetting and moving each layer .5 distance up.

Flexible Parameters:

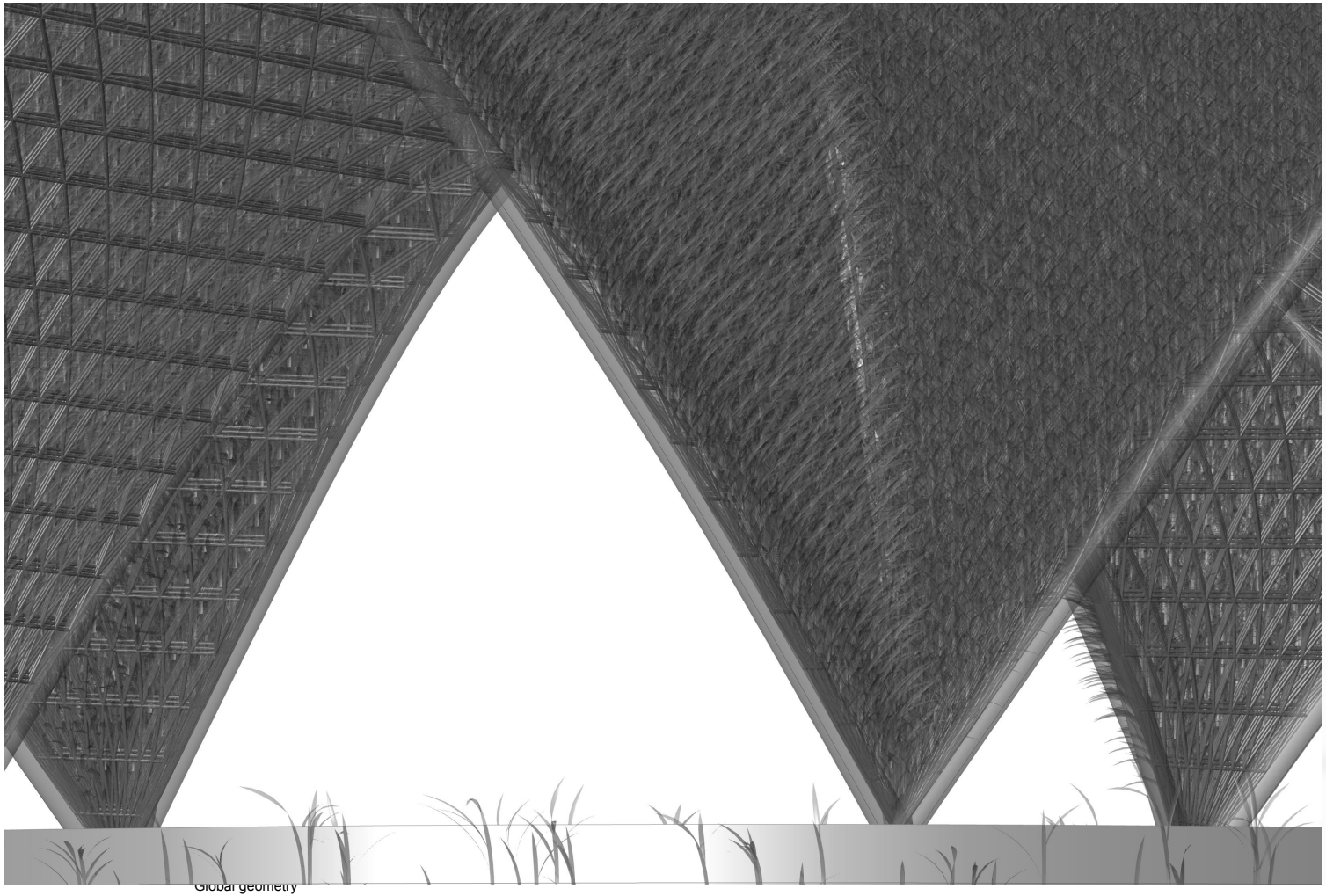
a. Number of panels
b. Layers and alignment
c. Type of pattern



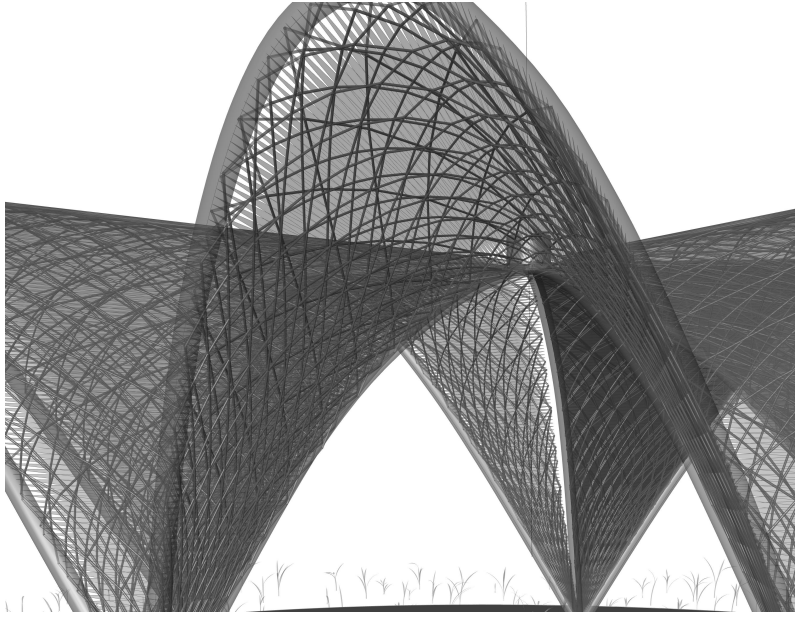
Facade array

The exterior surface is covered in woven palm leaves to create a sustainable and water permeable surface to protect the structures below.

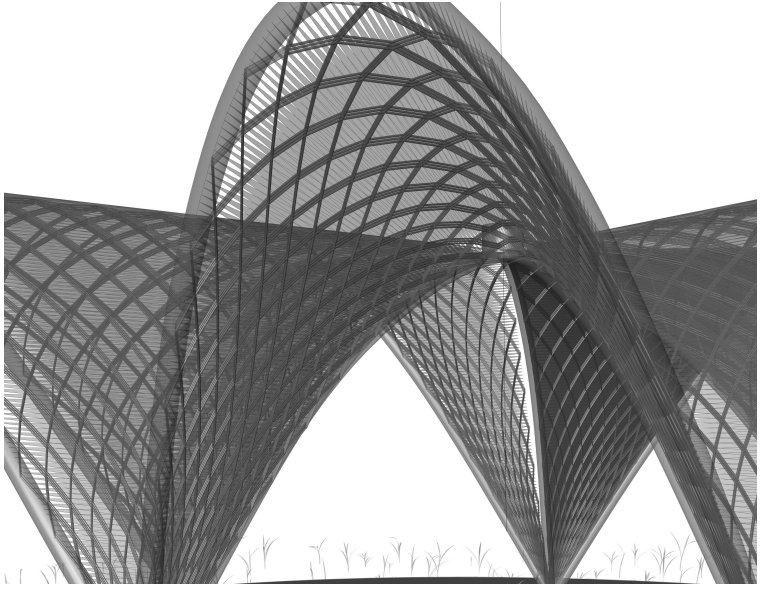
This was modeled using a grass scatter tool. The structure surfaces were populated with points and blocks were created based on the original grass model pictured on the bottom of the image. These blocks were inserted on the points to create the palm leaf surface texture.



Facade iterations

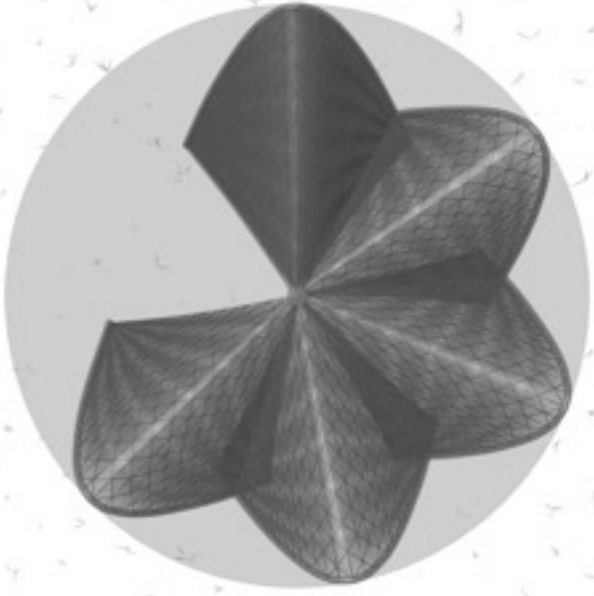


PATTERN OFFSET
in this iteration the internal structural layers were altered by changing the original pattern scale and proportion.

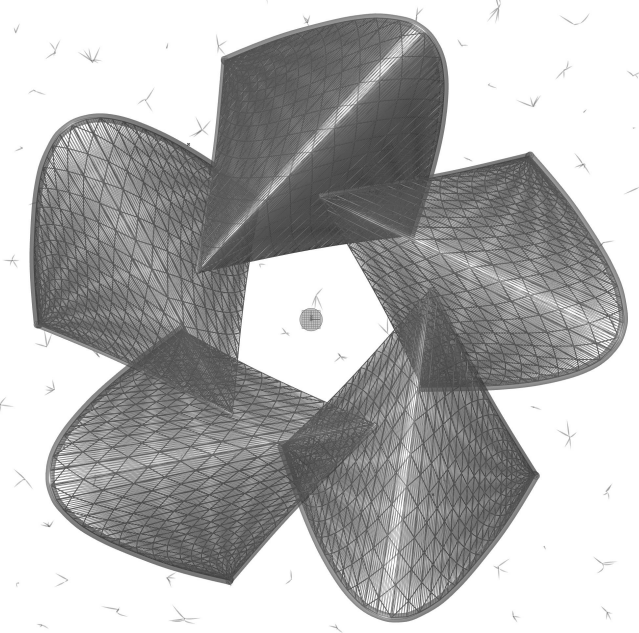


GRID DIFFERENTIATION
This version changes the original grid geometry resulting in larger openings.

Geometry Iterations



REVOLVE GEOMETRY
The original flower shape is distorted by revolting its components around a central axis



ROTATE GEOMETRY
Each of the elements is rotated on themselves

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